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*Dag Nikolaus Hasse,
Amos Bertolacci (Eds.)*

THE ARABIC, HEBREW, AND LATIN RECEPTION OF AVICENNA'S PHYSICS AND COSMOLOGY

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The Arabic, Hebrew and Latin Reception of Avicenna's Physics and Cosmology

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Dag Nikolaus Hasse and Amos Bertolacci

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Preface

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Introduction

Avicenna discusses physical and cosmological issues in many of his writings, and most pertinently in all of his great summae. The most comprehensive treatment can be found in the section on natural philosophy of the summa *al-Šifā'* (*The Cure*), which contains treatises on physics, on the heavens and the world, on coming to be and passing away, on actions and passions of elementary qualities, and on minerals and lofty impressions, i.e., on meteorology (besides psychology, botany, and zoology). Research on the influence of these sections and of the other summae is only at its beginning. The present study does not aim at providing a complete overview, but is meant to stimulate the field by presenting papers on current research on Avicenna's influence on key figures or topics of the Arabic, Hebrew and Latin philosophical traditions. It combines philological studies on the transmission of Avicenna's works with historical and philosophical interpretations of texts and authors influenced by Avicenna.

Some findings of the present book concern the Arabic transmission of Avicenna's works in the Islamic East. It is well known that Avicenna's late work *al-Išārāt wa-l-tanbīhāt* (*Pointers and Reminders*) had a broad manuscript transmission and a rich commentary tradition in Arabic; recent scholarship is progressively showing that the same applies to Avicenna's earlier *al-Šifā'*, which is likewise transmitted in hundreds of manuscripts, although the massive bulk of this work prevented its commentary tradition, until the Safavid epoch, to pass from the form of glosses to the form of independent commentaries. The reception history of the *Išārāt* is visible also in terminology. An example of this is Avicenna's phrase *ḥikma muta'āliya*, 'philosophy of the supernal world', or simply 'cosmology', which from the thirteenth century onwards received a transcendent interpretation meaning 'exalted philosophy' (see the article by Gutas). Given the well-documented influence of the *Išārāt*, but also the attested use of the *Šifā'* by commentators on the *Išārāt* as a reference work for the clarification of doubtful or controversial issues, it is not too surprising that Faḥr al-Dīn al-Rāzī in the sections on place and directions of his *Mabāḥiṭ al-mašriqiyya* relies much more heavily on the *Šifā'* than on the *Išārāt*. Rāzī's sections are a patchwork of silent quotations from Avicenna's *Šifā'*, *Nağāt*, *Dānešnāme* and *Hudūd*, while the influence of the *Išārāt* is limited to a single chapter. This wide recourse by Rāzī to works of Avicenna other than the *Išārāt* is remarkable, and shows the full-fledged acquaintance with the Avicennian corpus by a prime exponent of post-Avicennian philosophy and theology, especially since Rāzī, as a commentator on the *Išārāt*, knows this text very well (see the article by Janssens).

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In Andalusia and the Maghreb, Avicenna's philosophy was mainly known via the *Šifā'*, as is confirmed by the sources on which Averroes drew when attacking Avicenna. There are indications that Averroes was also acquainted with the *Nağāt*, for instance with the passage on the doctrine of a celestial cold emanating from the stars (see the article by Cerami). The Andalusian philosopher Ibn Daud may have been acquainted with the physics part of the *Nağāt* too, but his main sources in physics were clearly Avicenna's *al-Šifā'* and al-Ġazālī's Avicennian *Maqāšid al-falāsifa (Intentions of the Philosophers)* (see the article by Fontaine). The broad reception of the various parts of Avicenna's *al-Šifā'* in Andalusia is reflected also in the many Latin translations from *al-Šifā'* that were produced on the Iberian peninsula. While a good number of *al-Šifā'* translations carry the name of the translator, three of them are anonymous. Stylistic analysis shows that the *Physics* I–III and *Isagoge* sections of *al-Šifā'* were, in fact, translated by Dominicus Gundisalvi in the later twelfth century, while 'On Floods' (*De diluviis*), i.e., chapter II.6 of the meteorological part of *al-Šifā'*, was translated, in all likelihood, by Michael Scot in the early thirteenth century (see the article by Hasse and Büttner).

As to Avicenna's transmission in the Latin West, it is well known that the high point of Avicenna's influence in psychology was reached in the middle of the thirteenth century and that his authority in this field decreased afterwards. It is noteworthy that changing attitudes towards Avicenna can be observed also in physics, as a comparative analysis of Albertus Magnus' commentaries on the *Physics* and the *Metaphysics* shows, which date from ca. 1250 and ca. 1264 respectively. In the commentary on the *Physics*, Albertus defends Avicenna openly against the criticisms of Averroes, whom he accuses of aggressiveness towards Avicenna. In the later commentary on the *Metaphysics*, Albertus now silently follows Averroes on many issues debated between Avicenna and Averroes. Albertus' respect for Avicenna is still high, which is why he does not criticize him directly and tries to explain and excuse Avicenna's opinions when they diverge from Averroes', who seems to have replaced Avicenna as the main doctrinal authority after Aristotle (see the article by Bertolacci).

The Latin reception of Avicenna's meteorology, in turn, differed much from other areas of Avicennian philosophy. Only sections from Avicenna's meteorology of *al-Šifā'* were translated early enough to influence the scholastic discussion: 'On Minerals' and the above-mentioned 'On Floods'. The translator of 'On Minerals', Alfred of Shareshill, inserted the text at the end of Aristotle's *Meteorologica*, with the effect that Avicenna's standpoint was not known primarily through his own meteorology, which traveled under the name of Aristotle, but through other sources and mainly via Averroes' attacks on Avicennian doctrines. The full Latin translation of Avicenna's meteorology by the Burgos translators in 1274–80 apparently came too late and received hardly any diffusion (see the article by Mandosio).

As to the Hebrew tradition, hardly anything of Avicenna's works on physics and cosmology was translated into Hebrew. An exception is Ṭodros Ṭodrosi's translation of the physics and metaphysics parts of *al-Nağāt* (*The Salvation*), which, however, was made late, around 1334–40, and had a very meagre reception. Instead, readers got acquainted with Avicenna's physics and cosmology in other ways: by reading Avicenna in Arabic or by reading other authors such as al-Ġazālī in Hebrew, whose *Maqāṣid al-falāsifa* transport much Avicennian philosophy, also on physics. An example of a Hebrew writer reading Avicenna in Arabic is Samuel ibn Tibbon, who discusses Avicenna's theory of the emergence of dry land and of the generation of species by way of natural processes. This theory was attractive to naturalist interpreters of creation like Ibn Tibbon, especially since it was embedded in a global scientific doctrine of the earth and the cosmos. But while many parts of the doctrine were known and cited in Hebrew sources of the thirteenth to fifteenth centuries, its naturalist character proved an obstacle and an irritating challenge for many Jewish thinkers (see the article by Freudenthal).

The physical and cosmological doctrines covered in the present volume are in no way representative of the breadth of Avicenna's reception by later thinkers. Nevertheless, it is noteworthy that the studies shed light on a good number of doctrinal issues which were discussed vividly in the Arabic, Hebrew and Latin world. Motion and time are such issues. Avicenna inherits a distinction between four different kinds of motion to his successors, based on the criteria volitional / non-volitional and uniform / non-uniform. Only natural motion is defined as being non-volitional and uniform. This fourfold distinction is adopted, for instance, by the Jewish philosopher Ibn Daud (see the article by Fontaine). Avicenna's notion of nature as being non-volitional or 'serving' reappears also in the Latin West in William of Auvergne's discussion of causality (see the article by Fischer). Another peculiarity of Avicenna's theory of motion is the notion of 'positional movement', such as the movement of a spinning orb, which Avicenna adds to the traditional three movements of quality, quantity and place. This is an addition which Averroes polemicizes against in his commentaries (see the article by Cerami).

Avicenna, in the footsteps of Aristotle, defines motion as the emergence from potency to act and differentiates between motion which exists extra-mentally in reality and motion as a mental object. Both the definition and the distinction resonate with subsequent thinkers. One issue of discussion concerns the primacy of motion over time: if the emergence from potency to act is described as gradual, as in Avicenna's definition, does this not presuppose a notion of time, which we need for the definition of graduality (see the article by McGinnis)? This danger of circularity was addressed by many Arabic and Latin thinkers. The theory of gradual emergence found enough adherents nevertheless, among them Roger Bacon (see the article by Trifogli). As to the Islamic East,

it is noteworthy that Avicenna's influence on doctrines of motion is paramount in the twelfth and thirteenth centuries, but continues to be felt in Safavid and even nineteenth-century sources. The studies devoted to Faḥr al-Dīn al-Rāzī and al-Āmidī in this volume (by Janssens, Adamson and Lammer) demonstrate that the thinkers of the twelfth- and thirteenth-century Islamic East need to be interpreted with much methodological awareness: It is only by unpacking their sources and by outlining the structure of the entire many-page argumentation that one can isolate the position which Rāzī and Āmidī themselves adopted. At the same time, these thinkers are impressive for their sophistication and their enthusiasm for arguments.

With respect to the notion of time, it is noteworthy that the real or mental existence of time, and its priority or posteriority to motion, became major topics of Eastern Arabic philosophy. Aristotle and Avicenna had defined time as dependent on motion, namely, as the measure or magnitude of motion, with Avicenna's more refined definition being: time is the possibility associated with moving a certain distance at a certain speed. Abū l-Barakāt al-Baġdādī did not follow this line, but developed a metaphysical notion of time in which time is the magnitude of existence. Faḥr al-Dīn al-Rāzī, in turn, discusses the question of the existence of time in a way that is incompatible with definitions of time as the measure of motion. That fits well with his allegiance in other places to what he calls a Platonic (and, hence, non-Avicennian) theory of time, in which time is a self-subsistent substance. Al-Āmidī, in contrast, rejects the notion of time as a substance and develops his own position, albeit not openly expressed, in the form of an analysis of Avicenna's definition of time in terms of speed and distance (see the articles by Adamson and Lammer).

Many Avicennian doctrines about the earth and the heavens receive attention by Arabic, Hebrew and Latin readers. It is well known, and underlined by the present studies, that Avicenna's theory of the spontaneous generation of human beings was widely and controversially discussed by Averroes and many Latin authors. Another major source of controversy was Avicenna's doctrine of elementary mixture, according to which it is not the forms of the elements that are mixed in the compound, but the qualities of the elements. Averroes objected against this theory of the permanence of the substantial forms of the elements, and thus did many Latin readers, especially those who wanted to defend the possibility of alchemical transmutation, which Avicenna did not believe to be possible (see the article by Mandosio). It is apparent that Averroes, against his own purpose, helped to distribute knowledge about Avicenna's philosophical positions: his refutations of Avicenna's theories of the colours of the rainbow, of thunder, or of the inhabitability of the 'torrid' equatorial region were cited and discussed by many medieval and Renaissance Latin thinkers, who often enough did not follow Averroes, but Avicenna on these issues.

In general one can observe that the reception of Avicenna's physical and cosmological theories engendered discussions of impressive quality. In addition to many single doctrines, Avicenna also conveyed to many readers an acute sense for the epistemological status of natural science and for the discrimination between mental and extra-mental existence of its objects.

Changing Motion: The Place (and Mislplace) of Avicenna's Theory of Motion in the Post-Classical Islamic World

Jon McGinnis

Physics or natural philosophy traditionally was, as the name suggests, the study of nature (Gk. φύσις, Ar. *ṭabī'a*, Lt. *natura*). Ancient and medieval natural philosophers understood a nature to be an internal principle of motion and rest that belongs to a thing essentially and not accidentally.¹ Given this definition, and particularly its emphasis on nature as a cause of motion, the traditional core of physical inquiry concerned just that, motion. Indeed works on natural philosophy in both the ancient Greek and medieval Islamic world, certainly up through Avicenna's own monumental *Kitāb al-Šifā'*, started right there; they began with an account of nature followed by a discussion of motion and the conditions necessary for motion.

Avicenna's *Šifā'*, however, was not the primary vehicle for the transmission of Avicennan natural philosophy within the Islamic East. His *Išārāt* was.² Thus, it is something of a surprise that the *Išārāt* does not begin with a discussion of nature and motion, but of bodies and discrete and continuous magnitudes. In fact, the topic of motion does not really appear in the *Išārāt* until *namaṭ* 2, and even then it is in fact *mayl* (that is, 'inclination' or, to over-translate, 'motive force') that takes up the lion's share of the discussion. In fact, it would seem that in the *Išārāt* there is a shift from kinematics, that is, the study of motion, to dynamics, or the study of force. This situation immediately presents the historian of science with two questions. First, why does Avicenna give such short shrift to the concept of motion in the *Išārāt*? And, second, what, if any, impact does Avicenna's change in emphasis have on the understanding of motion in the post-Avicennan Islamic world?

In response to the first question, I pursue a suggestion of Dimitri Gutas, namely that Avicenna wrote the *Išārāt* with the *mutakallimūn* as his intended audience.³ This audience should be contrasted with the intended audience of the *Šifā'* and the *Nağāt*, which would have been primarily Peripatetics, or at

1 See Aristotle, *Physics*, 2.1, 192b21–3; Avicenna, *Šifā'*: *Physics*, I.5, §5.

2 See, for instance, Wisnovsky, *Avicennism and Exegetical Practice*.

3 Gutas, *Situating the Išārāt*.

least those versed in Aristotle and his commentators. If, then, we take seriously the suggestion that Avicenna wrote the *Iṣārāt* with an eye to the *mutakallimūn*, and I do, it provides a neat answer to the first question concerning the meagre discussion of nature and motion, a point to which I return shortly. As for the second question and what impact the *Iṣārāt*'s limited discussion on motion had on subsequent natural philosophy in the Islamic world, a response is not so tidy, since there were multiple transmission chains for Avicenna's physics. I consider merely one of those chains, namely, the tradition from Aṭīr al-Dīn al-Abharī's (d. 1262 or 1265) *Hidāyat al-ḥikma*, through the commentary of that work by Mullā Ṣadrā (1571–1636), followed by Faḍl-i Ḥaqq Ḥayrābādī's *al-Hadīya al-sa'īdiyya fī l-ḥikma al-ṭabī'iyya*, which, while not strictly speaking a commentary of the *Hidāya*, is clearly modelled on it.⁴ What I suggest is that in his *Hidāya*, al-Abharī promulgated what may be described as an 'anti-Avicennan' understanding of motion, drawn from the works of Abū l-Barakāt and Faḥr al-Dīn al-Rāzī. Mullā Ṣadrā in turn defended a conception of motion that is very close to Avicenna's own in the *Šifā'*, but is in a way sensitive to complaints of Abū l-Barakāt and al-Rāzī. Ḥayrābādī, in contrast, returned to the arguments of Avicenna's later critics, but, I suggest, he may well have done so because of deeper scientific methodological considerations associated with defining physical notions more generally, which at least intimates that he was breaking with the Aristotelian-Avicennan tradition of medieval natural philosophy.

Let me now turn to the first question in some detail. Again, the issue is to explain the poor showing of motion in the *Iṣārāt*. By way of comparison, the first two books of the *Physics* of the *Šifā'*, and so approximately half of that work, are dedicated to nature, motion and the conditions necessary for motion, that is, place and time. Only in book three of the *Physics* of the *Šifā'* does Avicenna finally take up bodies and magnitudes. In the *Iṣārāt*, in stark contrast, the entire first *namaṭ* deals with bodies and magnitude. It is not until *namaṭ* 2, which in fact is not dedicated to nature or motion but to directions (*ḡihāt*) and natural kinds of bodies (namely, celestial and elemental), that nature is introduced, and then in a completely perfunctory fashion. Indeed, so sparse are Avicenna's comments about nature (*ṭabī'a*) that both Faḥr al-Dīn al-Rāzī and Naṣīr al-Dīn al-Ṭūsī in their commentaries on the *Iṣārāt*, felt compelled to supplement the discussion by drawing upon material from *Physics*, I.5 of the *Šifā'* wherein Avicenna had provided his own distinct account and definition of nature.⁵ Al-Ṭūsī further adds something about motion, and even then he limits his comments

4 Al-Abharī, *Hidāya*, II.9; Mullā Ṣadrā, *Šarḥ al-Hidāya*, II.1.9; Ḥayrābādī, *Hadīya*, I.4.1.

5 Rāzī, *Šarḥ al-Iṣārāt*, II.5, p. 132; Ṭūsī, *Šarḥ al-Iṣārāt*, II.5, p. 270. For a discussion of Avicenna's own understanding of nature and the historical developments leading up to it see Lammer, *Defining Nature*, and Macierowski and Hassing, John Philoponus on Aristotle's Definition of Nature.

to merely mentioning Avicenna's four kinds of motion, namely, motion with respect to the categories of quality, quantity, place and position. Neither of these expositors discusses some of the more novel features of Avicenna's account of motion (to which I return in the sequel) in their *Iṣārāt* commentaries. Again, and simply focusing on the *Iṣārāt* itself, its section on physics is virtually an exercise in *not* talking about motion. So why?

Dimitri Gutas has observed that Avicenna's intended audience for the *Iṣārāt* may not necessarily have been the *falāsifa* but rather the *mutakallimūn*.⁶ Such a thesis certainly would shed light on some of the quirky aspects of the physics section of the *Iṣārāt*. Most notably, it would explain why Avicenna initiated this work with material from the middle of the *Physics* of the *Šifā'*, namely, with a discussion of body (*ġism*) and its accompany critique of atomism, rather than with a discussion of nature and motion. That is because it was a fairly common practice in early *kalām* manuals to begin with an account of the cosmos ('*alam*'), which would include a discussion of bodies, atoms and the aggregation of atoms. This was, for example, the approach in al-Bāqillānī's *Inṣāf* as well as his *Kitāb al-Tamhīd*, Māturīdī's *Kitāb al-Tawhīd* and al-Ġuwaynī's *Kitāb al-Irṣād* and the list can be extended.⁷ In short, if, as Gutas suggests, Avicenna wrote the *Iṣārāt* for the *mutakallimūn*, it would be natural enough for him to begin as they do with a discussion of bodies.

While the above provides some explanation as to why Avicenna might not have begun the *Iṣārāt* with a discussion of nature and motion, it does not explain why these core physical notions are left virtually unstudied in the *Iṣārāt*. Still, I think the thesis that Avicenna is writing for the *mutakallimūn* provides a hint. More specifically, while not all *kalām* thinkers denied secondary causation—that is, the notion that creatures are causally efficacious—some certainly did or, at the very least, were leery of assigning causality outright to anything other than the divinity.⁸ Additionally there were those *mutakallimūn* who were ardent critics of secondary causation such as al-Bāqillānī (950–1013), who was roughly a contemporary of Avicenna. In his *Kitāb al-Tamhīd*, al-Bāqillānī critiques secondary causation specifically in the form of an attack on natures (*tabā'i*), and it would definitely seem that he has the philosophers

6 Gutas, *Situating the Iṣārāt*.

7 Cf. al-Bāqillānī *Inṣāf*, §§5–6 and id., *Kitāb al-Tamhīd*, II; Māturīdī, *Kitāb al-Tawhīd*, I; and al-Ġuwaynī, *Kitāb al-Irṣād* (transl. Walker), pp. 11–16. It should be noted that these discussions are all in service of showing that the cosmos is temporally generated (*muḥdat*), a position that Avicenna would stridently reject.

8 For select discussions of causality within *kalām* see Frank, *The Metaphysics of Created Being*; Wolfson, *The Philosophy of the Kalam*, c. VII; Perler and Rudolph, *Occasionalism*; Druart, *Al-Ghazālī's Conception of the Agent*, and Griffel, *Al-Ghazālī's Philosophical Theology*, esp. cc. 6–8.

in his sights.⁹ In stark contrast, Avicenna throughout his *Šifā'* defends a theory of secondary causation, while at the same time making room for God's primary causation at every moment.¹⁰ Still, he may well have thought that asserting the reality of natures given their association with secondary causes would have been a strategic misstep, if, again, his target audience was the *mutakallimūn*.

In place of a discussion of nature and motion, Avicenna offers an account of *mayl*, and al-Ṭūsī in his commentary explicitly links that account with the *kalām* theory of *i'timād*, or 'tendency', a term that Avicenna himself was wont to couple with *mayl*.¹¹ Indeed, we know that certain *mutakallimūn*, like Ibrāhīm al-Nazzām, framed their discussion of motion (*ḥaraka*) in terms of *i'timād*.¹² Thus once again it would seem that shifts and new emphases in Avicenna's account of natural philosophy could be explained, if one assumes that he wrote the *Išārāt* with a *kalām* audience in mind.

What, then, were the effects on the subsequent tradition of natural philosophy, in light of Avicenna's reorientation of physics in the *Išārāt* with its decided silence concerning the nature of motion? This, our second question, is all that more pressing given that the *Išārāt* was arguably the most important work for the initial transmission of Avicenna's natural philosophy within the Islamic East. (Having said that, there was a resurgence of interest in the *Šifā'* in the Safavid period (ca. 1500s–1700s), albeit the interest focused primarily on metaphysics rather than natural philosophy, and then again in India (ca. 1600s–1700s), now with the focus on logic and physics.)¹³ While there are different lines of transmission with respect to Avicennan physics, the most obvious ones are those that take the form of direct commentaries on the *Išārāt*. Less obvious ones, but perhaps more important ones, are *madrasa* textbooks. Certainly one of the more important *madrasa* texts for teaching natural philosophy was al-Abharī's *Hidāyat al-ḥikma*.

I take as a working hypothesis that the account of general physics found in al-Abharī's *Hidāya* (and the subsequent commentaries on it as well as imi-

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- 9 Al-Bāqillānī, *Kitāb al-Tamhīd*, IV, pp. 34–47. For a presentation of al-Bāqillānī's critique of natures see McGinnis, *The Establishment of the Principles of Natural Philosophy*, pp. 120–21. The denial of natures is found even among the earliest Mu'tazilī *mutakallimūn* as witnessed in Abū l-Hudāyī's rejection of natures; see Frank, *The Metaphysics of Created Being*, pp. 22–3.
- 10 See Avicenna, *Šifā': Physics*, I.5, and id., *Šifā': Metaphysics*, VI.1–2; also Marmura, *The Metaphysics of Efficient Causality*, and Wisnovsky, *Final and Efficient Causality*.
- 11 See Avicenna, *Išārāt*, II.7, p. 280. For a translation and discussion of Ṭūsī's discussion of Avicennan *mayl* see Langermann, Naṣīr al-Dīn al-Ṭūsī's Exposition of *mayl*. For Avicenna's association of *mayl* and *i'timād* see Avicenna, *Kitāb al-Ḥudūd*, definition 45.
- 12 Al-Aṣ'arī, *Maqālāt al-islāmiyyīn*, pp. 346–7.
- 13 I am thankful to Amos Bertolacci for his observation on the resurgence of interest in the *Šifā'*. For a discussion of philosophy in the early Safavid period, see Pourjavady, *Philosophy in Early Safavid Iran*, and for the Indian interest in the *Šifā'*, see Ahmed, *The Šifā' in India I*.

tations of it) is primarily a reworking of *nimāṭ* 1 and 2 of Avicenna's *Iṣārāt*, and may well be simply a gloss of those sections, with additions from al-Rāzī and al-Ṭūsī.¹⁴ While a full account of my reasons for linking the *Hidāya* to the *Iṣārāt* would go beyond the scope of the present study, the following extremely broad outline is at least suggestive of this hypothesis: The *Hidāya* virtually follows *namaṭ* 1 of the *Iṣārāt* without change of structure or content. The first noticeable difference in organizational structure between the two works is that al-Abharī dedicates a *faṣl* to motion and rest (1.9). Still, with the exception of a one-sentence definition of motion and a one-sentence definition of rest, this *faṣl* basically reproduces al-Ṭūsī's commentary of *namaṭ* 2.5, namely, the section of the *Iṣārāt* where nature is first introduced. I return to al-Abharī's definition of motion shortly. The most significant differences between the physics of the *Iṣārāt* and the *Hidāya* are *Hidāya*, *funūn* 1.10 (on time) and 2.5–8 (issues associated with the nature of the movers of the celestial spheres). Avicenna treats these topics in the metaphysics of the *Iṣārāt*, whereas al-Abharī treats them under physics. In short, beyond a small handful of structural changes and some seemingly minor additions, the *Hidāya* draws heavily upon the *Iṣārāt* and its early commentary tradition; however, these seemingly minor changes may belie a more serious disagreement, as I hope to show.

Returning, now, to al-Abharī's account of motion, he defines it thus: 'Motion is the gradual emergence of potency into act (*ḥurūḡ min al-qūwa ilā l-fi'l 'alā sabīl al-tadrīḡ*).'¹⁵ It is certainly worth noting that in the *Physics* of the *Šifā'*, Avicenna provided an almost identical definition:

The technical sense among the ancients concerning the use of motion (*ḥaraka*) ... is that which does not emerge (*hurūḡ*) all at once [from potency to actuality] but [does so] only gradually (*mutadarraḡan*).¹⁶

The language of al-Abharī is virtually identical with that of Avicenna. Thus, it would appear that al-Abharī is supplementing the feeble account of motion in the *Iṣārāt* with material from the *Šifā'*.

This would be all there is to say about the reintroduction of motion into post-Avicennan physics, if al-Abharī's definition of motion were not in fact wrong, or at least wrong to a good Avicennan. While it is true that Avicenna mentions the definition proffered by al-Abharī, he also goes on almost immediately to say that it is inadequate.

14 For the circumstantial evidence for this thesis see McGinnis, *Pointers, Guides, Founts and Gifts*. I should also note that while the parallel between the *Iṣārāt* and the *Hidāya* are close in their accounts of general physics, the correspondence is less so for the discussion of the soul. I am grateful to Dag Hasse for this observation.

15 Al-Abharī, *Hidāya*, I.9, p. 223.

16 Avicenna, *Šifā'*: *Physics*, II.1, §2.

Now, were it not the case that we must take motion in the definition of time and that time often is taken in the definition of the continuous and gradual ... then it would be easy for us to say that motion is an emergence from potency to act either in time, or continuously or not all-at-once [but gradually]. As it stands, however, all of these descriptions include a hidden circular definition.¹⁷

Gradual is understood in terms of occurring *over a period of time*. Thus, an explanation of *gradual* requires an explanation of the notion of time (*zamān*). At *Physics* II.11 of the *Šifā'*, however, Avicenna, following Aristotle and the entire Aristotelian tradition, defines time as the number (or measure) of *motion* with respect to before and after.¹⁸ Consequently, an explanation of time assumes an account of what motion is. On the proposed definition, which al-Abharī adopts, however, motion is defined in terms of being gradual, which again presupposes an understanding of the nature of time. In short, the objection is that motion is being defined in terms of gradual, gradual in terms of time and time in terms of motion. Thus, one finds oneself in an explanatory loop.

In light of this objection, Avicenna rejected the definition of motion that al-Abharī will adopt later and instead undertakes a quite technical and subtle analysis of motion. First, following Aristotle, Avicenna understands motion in the proper scientific sense to be 'the first perfection belonging to what is in potency from the perspective of what is in potency.'¹⁹ He next distinguishes between two senses of motion: one as motion exists extra-mentally in the world and another as motion exists as an extended continuous thing in the mind.²⁰ I return to the sense of motion as a mental object in the sequel. As for extra-mental motion, that is, the motion in reality, I can only give a brief description of it here and a sketchy one at that.²¹

Again according to Avicenna there is the form of motion as it exists in the mind, namely, as something extending from starting point to ending point, and the form of motion as it exists in the world at any moment the external object is in motion. Avicenna glosses this latter extra-mental motion as some (material) thing's being at a point for only an instant. Of course, anything that is at a point for only an instant must be at some other point at any subsequent instant, and so has moved. It should be noted that Avicenna appeals to the notion of an instant, or now (*al-āna*), in his gloss, which presupposes a notion of time. Con-

17 Ibid., II.1, §3.

18 Ibid., II.11, §3 and id., *Nağāt*, IV.2.9, pp. 225–33. It should also be noted that al-Abharī himself accepts this definition of time; see al-Abharī, *Hidāya*, I.10, pp. 224–5.

19 Avicenna, *Šifā'*: *Physics*, II.1, §3; cf. Aristotle, *Physics*, 3.1, 201b4–6.

20 Avicenna, *Šifā'*: *Physics*, II.1, esp. §§5–6. For discussions see Hasnawi, La définition du mouvement, and McGinnis, A Medieval Arabic Analysis of Motion at an Instant.

21 For a more complete discussion see McGinnis, Avicenna's Natural Philosophy, pp. 71–5.

sequently, his gloss at least is subject to the earlier criticism of being circular. Nonetheless, Avicenna also attempts to restate this idea without the offending language, which he summarizes thus:

This is the form of motion existing in the moved thing, namely, an intermediacy between the posited starting and end points inasmuch as at any limiting point (*hadd*) at which it is posited, it did not exist there before or after,²² unlike [its state at] the points of the two extreme limits.²³

Thus, to our second question, ‘What was the effect of the *Iṣārāt*’s meagre discussion of motion on the subsequent tradition of natural philosophy?’, at least initially it was quite substantive. A sophisticated account of motion was replaced with a seemingly naïve one.

Or was it? In his *Kitāb al-Mu‘tabar*, Abū l-Barakāt al-Baġdādī (1080–1165) begins his discussion of motion by defining motion in the traditional Aristotelian way as ‘the first perfection of that which is in potency insofar as it is in potency.’²⁴ He then gives a variation of the purportedly circular definition recast now in terms of time, namely, motion is that which emerges from potency into act *in time*. Having done so, he asks the following rhetorical question:

So how is motion defined by time, since [the definition] has turned from this evident one [that is, Aristotle’s definition] to one that requires clarification, where the explanation of motion is better known than [time]?²⁵

Ironically, Abū l-Barakāt finds the answer to this question in the *Posterior Analytics* of Aristotle and Avicenna’s own *Kitāb al-Burhān*.²⁶ What Abū l-Barakāt reminds us is that ‘being better known than’ (*a‘raf minhu*) is said in two ways: something might be better known *by nature* or might be better known *to us*.²⁷ On the basis of these two ways that things might be better known, Abū l-Barakāt believes that one likewise can define (*ta‘rif*) something in two corresponding ways: either in a primitive, imperfect and general way by appealing to what is better known to us or in a complete, thorough and scientific way by appealing

22 One might complain that the notions of *before* (*qablu*) and *after* (*ba‘d*) hide an implicit reference to time; however, at *Šifā‘: Physics*, II.11, §6, Avicenna explains before and after in terms of possibility, which at least in his system is among the most basic explanatory notions.

23 Avicenna, *Šifā‘: Physics*, II.1, §6.

24 Abū l-Barakāt, *Kitāb al-Mu‘tabar*, vol. 1, p. 28.

25 Ibid., vol. 1, p. 29.

26 Aristotle, *Posterior Analytics*, 1.13, 78a22–b32, and Avicenna, *Kitāb al-Burhān*, III.3, pp. 202–3.

27 Cf. Aristotle, *Posterior Analytics*, 1.2, 71b33–72a5, and Avicenna, *Kitāb al-Burhān*, I.1, and id., *Šifā‘: Physics*, I.1.

to what is better known by nature. Abū l-Barakāt believes that from our recognition of past, future and the like, time is better known *to us* in this general way than is motion. It simply does not matter, he continues, that in the technical sense motion enters into the explication and definition of time. Thus, he concludes:

There is nothing amazing about knowing something in itself. I mean arriving at the complete knowledge of it from the imperfect knowledge of it. The imperfect knowledge is a way to the complete knowledge, as was sketched in the science of demonstrative speculation. Likewise, there is nothing amazing about knowing something through another with regard to general and imperfect knowledge, which belongs to that other in this way.²⁸

Abū l-Barakāt's point is that we can use a pre-theoretical notion of time, which is better known to us, to explain motion, and then use that understanding of motion, which is better known by nature, to provide a philosophically satisfying explanation of what time itself is.

While this all may smack of circular reasoning, Aristotle and Avicenna themselves both countenance such a conversion of terms in their respective works on demonstrative science, a point that Abū l-Barakāt exploits. Thus, for instance, in Avicenna's *Kitāb al-Burhān*, III.3, where he treats the difference between the fact (Gk. *hoti*, Ar. *inna*, Lt. *quia*) and the reason-why (Gk. *dioti*, Ar. *li-ma*, Lt. *propter quid*), he maintains the following:

So, clearly it is possible to prove the cause through the effect and the signified through the sign, namely, when it is proven through conversion and the issue depends only on being better known. Thus, if the relation of effect or sign to the minor term is better known, then it is fitting to make it a middle term and the cause a major term.²⁹

What then follows is the (in)famous demonstration that we can know that the planets are near from the fact that they do not twinkle, a fact that is better known to us.³⁰ This conclusion in turn can be used to demonstrate why the planets do not twinkle, namely, they are near, a fact now better known by nature.³¹ This method involves the logical theory of 'counter-predication' (Gk. *antikatēgoreō*, Ar. *muta 'ākis mutasāwī*), which involves the conditions under which the subject

28 Abū l-Barakāt, *Kitāb al-Mu'tabar*, vol. 1, p. 30.

29 Avicenna, *Kitāb al-Burhān*, III.3, p. 203.

30 For one discussion of Aristotle's deduction of the nearness of the planets from their not twinkling see Tuominen, *Apprehension and Argument*, pp. 68–86.

31 I should note that Avicenna explicitly denies that definitions (*hudūd*) can be demonstrated or even tracked down in other ways (Avicenna, *Kitāb al-Burhān*, III.2–3). Thus, given that the present discussion concerns the definition of motion, it is not clear whether Abū l-Barakāt's analysis works.

and predicate terms of a proposition can be switched or, more exactly, when a predicate can be made a subject. It is not my intention to assess the validity of applying the theory of counter-predication to (seemingly circular) demonstrations, although I note again that both Aristotle and Avicenna accepted it. Instead, I merely want to indicate that Abū l-Barakāt had some philosophical resources to justify understanding motion in temporal terms, as al-Abharī will do later, and doing so arguably does not lead to a viciously circular explanation. For one can define time either in terms better known to us, namely, by reference to things temporal, or in terms better known by nature, namely, by reference to act-potency relations.

Faḥr al-Dīn al-Rāzī in his *al-Mabāḥiṭ al-mašriqiyya*, moreover, gives his *imprimatur* to Abū l-Barakāt's suggestion:

Conceptualizing the true nature of 'all-at-once', 'not-all-at-once' and 'gradual' are all primitive conceptualizations owing to the aid of sensation. Sure, we understand that these things are known only by reason of the now and time, but that requires a demonstration. It is possible that the true nature of motion is known by these things, and thereafter motion fixes a knowledge of time and the now, which are reasons for those first things' being conceptualized, but in that case no circle is entailed. This is a fine answer.³²

Al-Rāzī's suggestion, like Abū l-Barakāt's, is that notions like *all-at-once* and *gradual* are known immediately through sensation. While it is true that the now and time, respectively, provide the basis in reality for our perceptions of things emerging gradually or all-at-once, such a relation must be demonstrated and is not immediately perceived. Since the notions of gradual and all-at-once are immediate, they can provide us with the true nature (*ḥaqīqa*) of what motion is. Having identified what motion is, one can use it then to define time and so explain gradual and the like.

Given Abū l-Barakāt and al-Rāzī's affirmation of this account of motion, one can now see why al-Abharī might have thought that defining motion in terms of gradual was not necessarily a circular explanation, as Avicenna had. Indeed it suggests that al-Abharī was *not* reading the *Šifā'*, but instead was supplementing the material from the *Išārāt* with the works of Abū l-Barakāt and/or (as I suspect) al-Rāzī.

By the time of Mullā Šadrā, however, the issue of the adequacy of al-Abharī's definition of motion was being taken up in a sophisticated way.³³ In his *Šarḥ*

32 Al-Rāzī, *al-Mabāḥiṭ al-mašriqiyya*, vol. 1, p. 670.

33 I have certainly missed a number of twists and turns up to Mullā Šadrā. Mullā Šadrā himself mentions the insights of al-Kātibī (d. 1277), al-Qūšġī (d. 1474), al-Dawwānī (d. 1502) and the commentary on the *Hidāya* of Ġiyāṭ al-Dīn al-Daštakī al-Šīrāzī (d. 1542). Additionally, one could mention Qaḍī Mīr Ḥusayn Maybudī (d. 1504) and the Šīrāzī-Ottoman scholar

al-Hidāya, Mullā Ṣadrā begins with al-Abharī's definition of motion as 'the emergence from potency to act gradually or little by little or not all-at-once'.³⁴ He presents this account, as Avicenna had before him, as one that is philosophically wanting, precisely because it involves an explanatory circle.³⁵ He then mentions the 'advocate of exchanges' (*ṣāhib al-muṭāriḥāt*, who I assume is Abū l-Barakāt) and explicitly al-Rāzī's defence of defining motion in terms of *gradual* or not *all-at-once* as well as their attempts to show that so defining motion was not viciously circular.

Mullā Ṣadrā rejects their defence. His criticism begins by implicitly assuming Avicenna's distinction between two different senses of motion, mentioned earlier, namely, between motion as it exists independently of any mind and motion as it exists in a mind.³⁶ Mullā Ṣadrā subsequently labels these two motions respectively, as 'motion qua intermedial' (*ḥaraka tawassuṭiyya*) and 'motion qua traversal' (*ḥaraka qaṭ'iyya*).

Motion qua traversal occurs when one observes an object in between two different, opposing states, for example, being *here* and then being *there*. Now in the world, a moving object is not partially *here* and simultaneously partially *there* during its motion. Consequently, in the world, motion is not some continuous thing that at any moment actually extends between *here* and *there* in the way that the distance traversed continuously extends between two points; rather, the relation between these two states, namely, being *here* and then being *there*, is impressed upon the mind, and it is this mental impression that gives rise to motion qua traversal, that is, the idea of motion as a continuous extended magnitude. Motion qua traversal, clearly, depends upon motion qua intermedial; for it is the moving object's being *here* and then *there* for only an instant that gives rise to the relation impressed upon the mind, which is motion qua traversal.

Mullā Ṣadrā thus notes:

In considering those things [that is, the gradual and the like] one inevitably comprehends some extended thing that itself is not fixed.³⁷ [That must be the case] lest one do away with the definition of the local transitions that require the mind (*al-intiqālāt*

Muṣliḥ al-Dīn al-Lārī (d. 1572). Concerning this latter scholar see Pourjavady, Muṣliḥ al-Dīn al-Lārī and His *Samples of the Sciences*, and his description of the section *A Discussion on Motion, Related to Natural Philosophy* (from *Samples*), which is occupied precisely with our issue. I am extremely thankful to Professor Pourjavady for sharing with me a manuscript copy of Lārī's *Unmūdağ al-'ulūm* (MS Damad İbrāhīm Paşa 791, fols 1b–75a).

34 Mullā Ṣadrā, *Ṣarḥ al-Hidāya*, II.1.9, pp. 103.

35 *Ibid.*, II.1.9, pp. 103–4.

36 Avicenna, *Ṣifā': Physics*, II.1, §§5–6, and Mullā Ṣadrā, *Ṣarḥ al-Hidāya*, II.1.9, pp. 104–5.

37 Reading *qārr* for the text's *qādir*. My reading is confirmed in an 1875 Indian Lithograph of the text. I am thankful to Sajjad Rizvi for providing me with a copy of the Indian lithograph.

al-fikriyya) that consist in a succession of instants (*ānāt*, literally, ‘nows’), of which between any two instants there is time. They are not motion, but the thing extended in this way is time.³⁸

The point is that when one conceptualizes the gradual, one must likewise grasp the notion of some extended changing thing, otherwise one cannot use the notion of gradual to define motion; however, notes Mullā Ṣadrā, the motion being defined is *not* motion qua intermedial, namely, motion that exists in the world, but only motion qua traversal, namely, motion that subsists in a mind. This motion qua traversal requires recognizing two nows or instants with a period of time extending between them.³⁹ Thus, in order to consider the notion of *gradual* one must comprehend time, and again time is defined in terms of motion.

Mullā Ṣadrā then considers Abū l-Barakāt’s response. Again Abū l-Barakāt’s position is that both time and motion are in a certain way grasped immediately, namely, one is better known and prior to us while the other is better known and prior by nature. Thus, according to Ṣadrā’s report of Abū l-Barakāt and Faḥr al-Dīn al-Rāzī’s opinion, the one defining motion in terms of gradual ‘takes that immediate way (*al-waḡh al-badīhī*) pertaining to each one of them in defining (*taḥdīd*) the essence of the other, and so there is no circle.’⁴⁰ Mullā Ṣadrā then just reproduces Abū l-Barakāt’s riposte to Avicenna’s original critique against defining motion in terms of (explicitly or implicitly) temporal notions: time, which is better known to us, can be used to define motion, which is better known by nature. Motion in turn is used to define time, but now time is explained in terms better known by nature rather than better known to us. The derivation is supposedly non-circular because the two notions of time are not the same: the first is a pre-theoretical, primitive notion, whereas the second involves the scientific understanding of what time is.

Mullā Ṣadrā blocks this rejoinder by explaining that it involves an equivocation precisely on the sense of motion being defined.⁴¹ Time, which is better known to us, concedes Mullā Ṣadrā, can be used to define motion qua traversal; however, it is not motion in the sense of traversal that is subsequently used to explain time. It is motion qua intermedial, that is, motion that exists in the world and is better known by nature, that explains time. The appeal to

38 Mullā Ṣadrā, *Ṣarḥ al-Hidāya*, II.1.9, p. 104.

39 For the general background to the temporal theory that Mullā Ṣadrā is referencing see Avicenna, *Ṣifā’*: *Physics*, II.11–12; studies pertinent to post-classical developments of Avicenna’s temporal theory include Shayegan, *Avicenna on Time*, and her notes to these two chapters; Mayer’s two articles, Faḥr ad-Dīn ar-Rāzī’s Critique, and Avicenna against Time Beginning; and Rahman, *The Philosophy of Mullā Ṣadrā*, ch. V.B (on time).

40 Mullā Ṣadrā, *Ṣarḥ al-Hidāya*, II.1.9, p. 104.

41 Ibid.

counter-predication to explain motion and time works only if *motion* refers to a single thing in the following two expressions:

- (1) time is better known to us than *motion*;
- (2) *motion* is better known by nature than time.

But *motion*, Mullā Ṣadrā points out, harkening one back to Avicenna's two-fold distinction of motion from the *Ṣifā'*, is said in two ways: motion qua intermedial and motion qua traversal. Thus (1) and (2) need to be properly distinguished, in which case one sees that *motion* does not refer to the same phenomenon in both accounts.⁴² The first expression should be understood to say:

- (1') time is better known to us than *motion qua traversal*;

Whereas, the second expression should be read as:

- (2') *motion qua intermedial* is better known by nature than time.

According to Mullā Ṣadrā, then, there is not a single sense of motion that differs only relative to whether it is better known to us or by nature, and so neither is there a genuine case of the Aristotelian-Avicennan theory of counter-predication; rather, there is an equivocation of the term motion. Yet it was an appeal to counter-predication that made Abū l-Barakāt and al-Rāzī's defence of defining motion in temporal terms defensible at all. Consequently, concludes Mullā Ṣadrā, the definition of motion found in Abū l-Barakāt, al-Rāzī and al-Abharī fails to meet the standards of an adequate definition, precisely because it is a circular definition.

Mullā Ṣadrā, obviously, is not the final word on this point within the context of pre-modern Islamic physics, and in fact as late as the mid-1800s our issue was still being debated. For example, the Indian scholar Faḍl-i Ḥaqq Ḥayrābādī (d. 1861) in his work of natural philosophy, *al-Hadīya al-sa'īdiyya fī l-ḥikma al-ṭabī'iyya* (probably written in the early 1840s) adopts the position of Abū l-Barakāt, al-Rāzī and others concerning motion, namely that it can be adequately defined in terms of a gradual emergence.⁴³ Since Ḥayrābādī's *al-Hadīya* is arguably the last independent work written within the tradition of *Ṭabī'iyyāt* and apparently is modelled on the commentaries of Abharī's *al-Hidāya* by Qaḍī Mīr Ḥusayn Maybudī (d. 1504) and Mullā Ṣadrā, it seems fitting to end this study with this work. For clearly Ḥayrābādī is aware of the intervening debate about the adequacy of that definition and indeed wants to incorporate and respond to the advancements of thinkers like Mullā Ṣadrā.

So, to this end, after presenting the Aristotelian definition of motion, Ḥayrābādī writes:

42 Ibid., II.1.9, pp. 104–5.

43 For a general account of Ḥayrābādī and his *Hadīya*, see Ahmed and McGinnis, Faḍl-i Ḥaqq Khayrabādī.

The truth is that the conceptualization of motion is not something that needs this definition [of Aristotle's]. It is enough to say that it is the emergence from potentiality into actuality gradually, where the meanings of 'gradual,' 'little by little' and 'not all at once' are primitive conceptual notions (*al-ma'ānī al-awwaliyya*), which is owing to the aid of sensation. Their conceptualization does not depend upon conceptualizing the true nature of time and the now/instant (*al-āna*), even if the now and time are causes for them in existence. As for the description that they mentioned, even if it is less known than the conceptualization of motion in the clear well-known way, they still define it [i.e., motion] only by means of it [i.e., this description] for a basic understanding and propaedeutic for the positions they confirm about motion.⁴⁴

Ḥayrābādī's point is that the ideas of gradual and the like are primitive notions or brute facts, just as potentiality and actuality are primitive notions in Aristotelian natural philosophy. As such no proof that they exist is necessary. Consequently, since they are primitive notions, they can be introduced into the definition of motion without fear of circularity.

Indeed, in his discussion of time (*zamān*),⁴⁵ Ḥayrābādī begins by boldly asserting that there is no doubt that within the soul one thing occurs after another; that notions like change, coming to be, motion, priority, posteriority, and simultaneity are all designated by time; that even an imbecile or child has a knowledge of this; and that everybody knows what age, year, month, day, hour, and the like are. Consequently, there is no reason to prove the existence of time. Ḥayrābādī thus takes Aristotle and Avicenna's discussion about the relation between motion and time merely to show that time must be continuous, not to define what the essence of time is.

Indeed what is arguably most noteworthy in Ḥayrābādī's entire account of time is that he never defines time. As such he completely omits the philosophers' definition of time as the measure of motion with respect to before and after, while taking over their arguments concerning the continuity of time. This unwillingness to define time needs not be an embarrassment either; for if one's considered opinion is precisely that time is a primitive notion, then there cannot be any more basic notions by which to define it. Moreover, because Ḥayrābādī does not think that time needs to be defined and takes notions like *gradual* as grasped immediately, he simply does away with Abū l-Barakāt's defence of defining time in terms of notions better known to us and better known by nature.

It is difficult to assess the philosophical adequacy of Ḥayrābādī's position. On the one hand, he cavalierly dismisses any attempt to provide a scientific definition of time in terms of motion, a project initiated by Aristotle two millen-

44 Ḥayrābādī, *Hadīya*, 1.4.1, p. 34.

45 *Ibid.*, 1.5.1, p. 50–52.

nia earlier and followed by virtually the entire tradition up to Ḥayrābādī. This continuity even included dissenters like Abū l-Barakāt and al-Rāzī, who, while accepting the purportedly immediately grasped nature of temporal notions like gradual, also felt compelled to show how one could still define time in terms of motion by appealing to various ways something can be better known. Thus seen in one light Ḥayrābādī appears to be a flatfooted thinker who did not appreciate the subtleties of his predecessor. On the other hand, the consistency that he shows in his treatments of motion and time suggests that he was aware of the larger philosophical issues, which piqued his predecessors. Thus one cannot dismiss the idea that something innovative may be going on here. Let me gesture at two possible such moments, one methodological, the other more specific to physics.

As for the possible methodological innovation, Ḥayrābādī may have consciously been departing from the theory of definition of his predecessors. According to the received view laid out in such works as Aristotle's *Posterior Analytics* and Avicenna's *Kitāb al-Burhān*, a science attempts ultimately to reduce its definitions and concepts to the notions of actual being and potential being (Aristotle) or a necessary existent and possible existent (Avicenna)—or at least to concepts that are derived from these primary notions, like thing (*ṣayʿ*) or one (*wāḥid*).⁴⁶ Ḥayrābādī has certainly left behind this technical nicety. Such a departure would be a major methodological shift in post-classical natural philosophy. Unfortunately, a full investigation of Ḥayrābādī's epistemology, which would be needed to evaluate this suggestion, is well beyond the scope of the present study.

Specific to natural philosophy, all of Ḥayrābādī's predecessors felt that motion must be prior and better known *by nature* (even if not to us) than time, hence the reason to define time in terms of motion. In other words, time is a derived notion in Aristotelian-Avicennan physics. Ḥayrābādī, however, takes time (and one might add distance) as basic and primary, and so motion becomes the derived concept. If motion no longer takes pride of place in Ḥayrābādī's physics, then he appears to be taking a conscious step out of the Aristotelian-Avicennan physics of his predecessors and moving into something more like a Newtonian mechanics, where motion is seen as a function of distance and time. Such a reemphasis would again represent a major change in direction in Ḥayrābādī's physics relative to either classical or post-classical Islamic natural philosophy. Unfortunately, since, as noted, Ḥayrābādī's *al-Ḥadīya* stands at the

46 For example, Aristotle (followed by Avicenna) defines the primary subject of physics, namely, motion, as the actuality of potential insofar as there is potential (*Physics*, 3.1, 201a10–11); and similarly, soul, the primary subject of psychology, is defined as the first actuality of a body having life potentially (*De anima*, 2.1, 412a27–8). For Avicenna one should also include such primitive notions as *thing* and *one*.

end of a tradition, it is difficult to say what (if any) influences Ḥayrābādī's suggestion may have had.

The story I have just told, while hopefully interesting, is certainly incomplete. Nothing was mentioned of the intervening stages between al-Abharī and Mullā Ṣadrā, or between Mullā Ṣadrā and Ḥayrābādī. Still the story does begin to provide the contours of one chapter in the Arabic reception of Avicenna's physics, as well as how one issue in natural philosophy stayed alive in post-classical Islamic textbooks and commentaries. Indeed in this vein, our story shows how post-classical thinkers deftly put to practical use seemingly abstract metaphysical and logical notions to ends in natural philosophy. Thus, for example, Avicenna's distinction between extra-mental existence (that is, the essence or form of a thing as it exists in concrete particulars) and mental existence (that is, the essence or form as it exists in conceptualization) is seen at work in his and subsequent discussions of motion; for motion qua traversal is only ever a mental existent, while motion qua intermedial describes how motion exists in the concrete particulars out in the world. Mullā Ṣadrā exploited just this fact to disarm Abū l-Barakāt's argument by pointing out that the later was confusing two different kinds of existents when he spoke of motion. Similarly, the logical concept of counter-predication stands at the very heart of the later debate about how to define motion and time. Finally, with Ḥayrābādī one may be seeing a new conceptualization of the scientific project, one that sets aside earlier theoretical machinery, such as the need for definitions in terms of metaphysical primitives, and instead appeals to the immediately empirical. The discussion of motion during this period, far from being static, was constantly changing. One can only assume (or certainly hope) that many other scientific and philosophical exchanges among medieval post-classical thinkers lie hidden merely waiting to be discovered.

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Avicenna's *al-ḥikma al-muta'āliya*. Meaning and Early Reception

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In Avicenna's known works, the phrase *al-ḥikma al-muta'āliya* occurs in the *Iṣārāt*, book two, *namaṭ* X, section 9. I say 'phrase' and not 'expression' in order not to prejudge the issue, insofar as it is far from clear that, in Avicenna's usage, it is an expression with a distinctive meaning. It also appears to be unique, a *hapax legomenon*. It is not used in any other place in the *Iṣārāt*, and not at all in either the *Ta'īlqāt* or the *Mubāḥaṭāt*, among Avicenna's later works, and it is not to be found in similar discussions and contexts in earlier works, as far as I can tell. As usual, it has been vastly misunderstood and misinterpreted because it was viewed in light of what later philosophers made of it, and even they have been to some extent misunderstood. But the ways in which it was used in later philosophy have to be ascertained independently in each particular instance and have no immediate relevance for Avicenna's use of it.

In modern scholarship, the phrase has been variously translated, and, in the translations I consulted (without claiming comprehensiveness), invariably with vague words that do not explain its meaning in context. In his original 1891 edition of the last three *nimāṭ* of book two, Mehren makes no mention of the phrase itself in his paraphrase of section 9, but seems to render with the following statement only the ambiguity implied in Avicenna's words: 'nous pourrions peut-être, avec une certaine vraisemblance, supposer que ces âmes célestes embrassent en même temps et le général et le particulier.'¹ In the first full translation of the *Iṣārāt* in a European language, A.-M. Goichon translates the phrase literally, 'la sagesse d'en-haut,' but without immediate indication of what this 'wisdom of/from on high' would consist of in the context of the sentence she mistranslates.² M. Cruz Hernández follows Goichon slavishly and practically translates her French rather than the Arabic, reading 'la sabiduría de lo alto' for 'la sagesse d'en-haut.'³ For their part, Inati and the Turkish translators also translate it literally, 'the exalted wisdom,' and 'aşkın hikmet,' respectively, but because they translate the immediately following parentheti-

1 Mehren, *Traité des mystiques*, II, p. 17. The words I emphasize probably express that ambiguity.

2 Goichon, *Livre des directives et remarques*, p. 508.

3 Cruz Hernández, *Tres escritos esotericos*, p. 85.

cal clauses correctly (‘namely, that the celestial bodies, etc.’), they at least make clear what the contents of this ‘exalted wisdom’ are.⁴ However, why the theory about the knowledge of the celestial souls should be called ‘exalted, higher, or excessive wisdom’ remains unclear and the aura of a different, esoteric, wisdom beyond what is discussed in the passage hovers in the air. As a matter of fact, in his introduction to the latest ‘edition’ of the *Iṣārāt*, Mojtabā Zāre‘ī goes well beyond just suggesting an aura and instead explicitly states the view that has been held for the past few centuries in the Islamic tradition and, until recently, in most modern Western literature, namely, that Avicenna followed two paths to philosophy, one Peripatetic and rational, and the other the mystical ‘Eastern’ one (*mašriqiyya*) of *al-ḥikma al-muta‘āliya* (thus also conflating the *mašriqiyya* with the *muta‘āliya*).⁵

For the rest, the phrase has been understood primarily as ‘transcendent theosophy/philosophy,’ in the context of the use made of it by Mullā Ṣadrā, to mean more than what Avicenna intended by it in the *Iṣārāt*. Following Henry Corbin’s ad hoc dubbing of ‘oriental’ *ḥikma* as ‘theosophy’ (‘divine wisdom,’ rather than philosophy) with transcendent status,⁶ Seyyed Hossein Nasr rendered it as ‘transcendent theosophy’ not only as it applies to Mullā Ṣadrā but also to Avicenna,⁷ while those espousing the exuberant interpretation of Corbin and Nasr, like Sajjad Rizvi and Ibrahim Kalin, have tempered it somewhat to ‘transcendent philosophy’⁸ and ‘transcendent wisdom.’⁹ Rüdiger Arnzen objected to the use of the word ‘transcendent’ in this rendering, making the pertinent observation that ‘none of the various distinct meanings attributed to the term *transcendent* during the history of philosophy seems to be applicable to Mullā Ṣadrā’s terminology,’ and soberly proposed to read Mullā Ṣadrā’s title literally as *Wisdom Progressing Upward*,¹⁰ but Arnzen’s remarks fell on deaf ears in those studies that were published after his (2007), like that by Kalin. Other scholars also, like Hossein Ziai, rightly reacted to the Corbin/Nasr exuberance and made a case against such vague and philosophically unspecific

4 Inati, *Ibn Sīnā and Mysticism*, p. 96. Durusoy, Macit and Demirli, *İşaretler ve Tenbihler*, §330; unless ‘aşkın’ is a technical term meaning ‘transcendent,’ it is ambiguous in this context: it could mean ‘higher’ but also ‘excessive.’

5 Zāre‘ī, *Iṣārāt*, pp. 10–12. For the traditional view, see the references in Gutas, *Avicenna*, pp. xxi–xxii, and id., *Avicenna’s Eastern (‘Oriental’) Philosophy*. For the reason I put ‘edition’ in quotation marks see Lameer, *Towards a New Edition*, pp. 220–24.

6 As in, e.g., Corbin, *Avicenna and the Visionary Recital*, p. 38, and frequently elsewhere, where he translates *ḥikma mašriqiyya*, Avicenna’s work, as ‘oriental theosophy.’

7 Nasr, *Ṣadr al-Dīn Shīrāzī*, p. 94, n. 1 (where the quotation from Quṭb-ad-dīn is clearly misinterpreted), and id., *Mullā Ṣadrā: His Teachings*, p. 645.

8 Rizvi, *Mysticism and Philosophy*, p. 231.

9 Kalin, *Mulla Sadra*, pp. 1, 3 and 98–162.

10 Arnzen, *The Structure of Mullā Ṣadrā’s al-ḥikma al-muta‘āliya*, pp. 199–200 and n. 1.

terminology, and opted for 'metaphysical philosophy.'¹¹ Given the state of confusion regarding the precise meaning of the phrase as just briefly described, it would be good to follow Arnzen's proposal (*ibid.*) that 'we should rather work on a systematic Arabic *Begriffsgeschichte* of the term in question.' To begin tracing the initial stages of the history (*Geschichte*) of this phrase on its way to becoming a concept (*Begriff*),¹² I shall analyze in some detail in the following pages Avicenna's use of it and its early reception.

It is necessary to look first closely at the text itself. The phrase is embedded in arguably the most deliberately abstruse sentence in all of Avicenna's works. I say deliberately, because that's no way to write Arabic, and Avicenna knew it. In their commentaries, both Rāzī and Tūsī are forced to act the part of professors of Arabic and parse the sentence by specifying what the subject and what the object is, where to find a circumstantial *ḥāl* accusative, etc. I am citing the text below from the editions of Forget (p. 210) and Zāre'ī (p. 375), the only editors who provide some semblance of an apparatus with variant manuscript readings.¹³

تنبيه. (a) قد علمت فيما سلف أنّ الجزئيات منقوشة في العالم العقليّ نقشاً على وجه كلّيّ ثمّ قد تبيّنت لأنّ الأجرام السماوية لها نفوسٌ ذوات إدراكاتٍ جزئية وإراداتٍ جزئية تصدّر عن رأيٍ جزئىّ ولا مانع لها عن تصوّر اللوازم الجزئية لحركاتها الجزئية من الكائنات عنها في العالم العنصرىّ

(b) ثمّ إنّ كان ما يُلوحه ضربٌ من النظر مستورٌ إلاّ على الراسخين في الحكمة المتعالية — أنّ لها بعد العقول المفارقة التي هي لها كالمبادئ نفوساً ناطقةً غير منطبعة في موادّها بل لها معها علاقةٌ ما كما لنفوسنا مع أبداننا وأنها تنال بتلك العلاقة كمالاً ما — حقاً، صار للأجسام السماوية زيادٌ معنى في ذلك لتظاهر رأيٍ جزئىّ وآخر كلّىّ

(c) فيجتمع لك ممّا تبيننا عليه أنّ للجزئيات في العالم العقليّ نقشاً على هيئة كلّية وفي العالم النفسانيّ نقشاً على هيئة جزئية شاعرة بالوقت أو النقشان معاً

A fairly literal translation would be,

X, 9 Reminder

(a) You have come to know in what has preceded that particulars are engraved on the world of [supernal] intellects (*al- 'ālam al- 'aqlī*) in a universal way. Next, you have been reminded that the heavenly bodies are in possession of souls having particular perceptions and particular wills which proceed from a particular thought (*ra'y*), with nothing preventing them from forming concepts, among the things that are generated from them in the [sublunar] world of elements, of the particular concomitants of their particular motions.

11 Ziai, Mullā Ṣadrā, pp. 638 and 641–2, nn. 8–11, and *id.*, *Recent Trends*, p. 407.

12 In *Dā'irat al-ma'ārif-i buzurg-i Islāmī*, there is a hefty article on the concept by Reḏā Moḥammadzāde, mostly as it occurs in Mullā Ṣadrā with some brief mention of Avicenna, Suhrawardī, and Ibn 'Arabī, and principally based on the work of Iranian scholars.

13 For the sad state of the 'editions' of the *Isārāt* (as with all works of Avicenna), see Lameer, *Towards a New Edition*.

(b) Next, if what a kind of theoretical investigation [that is] veiled [to all] except to those thoroughly versed¹⁴ in the philosophy of the supernal [world] reveals—[namely,] that they [the heavenly bodies], in addition to the separate intellects which they have as first principles, [also] have rational souls which are not impressed in their matters but rather have a certain relation to them just as our souls do with our bodies, and that they acquire, by means of this relation, a certain perfection—is true, then the heavenly bodies come into possession of an additional quality [*ma'nan*] in this regard because they manifest a thought (*ra'y*) that is particular and another [that is] universal.

(c) You can thus gather from what we have reminded [you] that, in the world of [supernal] intellects, the particulars are engraved in a universal form, and, in the world of [supernal] souls, they are engraved in a particular form that reflects [real] time; or the two engravings are simultaneous.

The passage has syntactical, lexical, and textual problems. The syntax, though convoluted, is clear, and was adequately explained by Rāzī and Ṭūsī. The entire paragraph (b) is a single conditional sentence, having the structure, ‘if what X reveals is true, then the heavenly bodies have an additional characteristic.’¹⁵ The difficulty arises, first, from the fact that the subject (X) in the protasis (the ‘if’ clause) is a lengthy clause—i.e., ‘what a kind of theoretical investigation [that is] veiled [to all] except to those thoroughly versed in the philosophy of the supernal [world] reveals,’—and second and more misleadingly, from the huge parenthetical sentence (Y) introduced between the verb and its predicate in the protasis: ‘if what X reveals—namely, Y, that such and such—is true, then ...’. The problem is magnified by the occurrence of *ḥaqqan*, which is the predicate of *kāna*, right after an accusative *tanwīn* in the parenthetical sentence (Y), *kamālan mā—ḥaqqan*, which led to the two accusatives being read by some as belonging together. All this created havoc in the editions and translations, despite Rāzī’s and Ṭūsī’s clear instructions on how to read the sentence, with

14 Avicenna uses a Qur’ānic term here, *al-rāsiḥūna*, ‘firmly rooted, thoroughly versed,’ *fī l-’ilm*, in knowledge, Q 3:7 and 4:162. In the former passage in the Qur’ān it is used in a phrase that was discussed for its parsing: *wa-mā ya’lamu ta’wīlahū* (i.e., *mā tašābaha min al-kitābi*) *illā llāhu wa-l-rāsiḥūna fī l-’ilmi yaqulūna āmannā bihī*, ‘and none knows its (i.e., the ambiguous part of the Book) interpretation save only God and those firmly rooted in knowledge say “We believe in it”’ (transl. Arberry). Averroes used this passage to support his view that philosophers are intended by the phrase, parsing it as, ‘and none knows its interpretation save only God and those firmly rooted in knowledge; [they] say “We believe in it”’ (Hourani, *Averroes on the Harmony*, pp. 53–4). But long before Averroes this parsing was generally used by Shi’ites, including certainly the Ismā’īlīs, to refer to the imams (cf. Walker, *Early Philosophical Shiism*, p. 27). In the second passage of the Qur’ān, 4:162, ‘those firmly rooted in knowledge’ among the People of the Book are promised ‘a mighty wage.’

15 As Ṭūsī explains (pp. 122–3, ed. Dunyā): *Mā yulawwihuhū* is the subject (*ism*) of *kāna* and *ḥaqqan* is the predicate (*ḥabar*), with the apodosis (*tālī*) of the conditional proposition (*qa-ḍiyya šarṭiyya*) beginning with *šāra li-l-aḡsāmi*.

only Zāre'ī correctly printing and punctuating the Arabic (except for the accusative *mastūran* as will be discussed below), and the Turkish translators accordingly parsing its syntax properly (and again, only mistranslating *mastūran*).¹⁶

There are two lexical problems in paragraph (b). In the clause constituting the subject of the protasis, Avicenna uses as verb the root *lwh* with the attached pronoun *-hū*, giving as possible readings either the first form of the verb, *yalūḥuhū*, or the second form (*fa'ala*), *yulawwiḥuhū*. The first form, *lāḥa*, not being transitive, does not take direct objects, so the reading is clearly *yulawwiḥuhū*.¹⁷ *Lawwaḥa* is both intransitive and transitive. As intransitive, it has the same meaning as the first form, 'to become clearly visible, to appear clearly' and it is so used by Avicenna a few sections further down in the *Iṣārāt* from the present passage (in X, 14 and 15). As such, it can take an object only with the preposition *bi-* to mean 'to hint, intimate, allude to' (along with other prepositions: see *WKAS* II, pp. 1699–1700); but since the text is clearly *yulawwiḥuhū* and not *yulawwiḥu bihī*, with no attested variants, these meanings are inappropriate here. Transitive *lawwaḥa* is defined in the dictionaries to mean mainly 'to scorch,' also inappropriate in this context,¹⁸ so Avicenna must be using it here as causative of the first form, 'to bring something to light, to reveal,' as he does elsewhere.¹⁹

16 The unspeakably incompetent editor Dunyā, pp. 122–3, butchers typographically the sentence and has *ḥaqqan* introduce a new paragraph, giving the impression that he intends it to be understood as an adverb beginning a new sentence, 'Truly, the heavenly bodies ...'. Goichon, *Livre des directives et remarques*, p. 508, misses the structure of the sentence completely and reads *kamālan mā ḥaqqan* ('une certaine perfection véritable'), followed again by Cruz Hernández, *Tres escritos esotericos*, p. 85 ('una cierta perfección auténtica'). Inati, *Ibn Sīnā and Mysticism*, p. 96, though correctly isolating the parenthetical sentence within brackets, also misses the predicate and reads *kamālan mā ḥaqqan* ('some real perfection'), mistranslating the protasis.

17 A transitive first form, *yalūḥuhū*, allegedly meaning 'he sees it,' is badly attested and does not appear to have been in use, according to Ullmann, *WKAS* II, p. 1698b32–43.

18 Dozy II, p. 563b gives a couple more meanings of transitive *lawwaḥa* which appear to be topical.

19 In the *Ilāhiyyāt* of the *Šifā'*, p. 366, line 14 (ed. Marmura) / p. 443, line 8 (ed. Mūsā et al.) = *Naḡāt*, p. 501, line 12 (ed. Kurdī), he says, *wa-ammā l-ḥaqqu fī dālika* [scil. *al-ma'ādī*], *fa-lā yulawwiḥu* [scil. *al-sānu*] *lahum minhu illā amran muḡmalan* (that is, the lawgiver should reveal to the masses only generalities about afterlife), where *yulawwiḥu* takes the direct object in the accusative, *amran*. Strangely, *WKAS* II, pp. 1698b–1703a does not cover this definition of the word, and neither do other dictionaries (which admittedly were only casually and not thoroughly consulted), though this meaning is clearly well understood and was known: Inati, *Ibn Sīnā and Mysticism*, p. 96, correctly translates it as 'reveal' in the *Iṣārāt* passage, and Marmura translates it in the *Ilāhiyyāt* passage as 'indicate' (perhaps in this case improperly equating *lawwaḥa* with *lawwaḥa bi-*, as I did in *Avicenna*, p. 339, 'intimate'); but most significantly, the word in the *Ilāhiyyāt* passage is translated as *detegat* in the medieval Latin translation (*Liber de philosophia prima*, p. 535, line 54, ed. Van Riet),

The second lexical difficulty concerns the word under scrutiny in this study, *muta ʿāliya*. The actual meaning of the word itself is not so much in question, as the active participle of the well known sixth form of the verb, *ta ʿālā*, can only mean ‘rising above, being on high, being exalted,’²⁰ but the problem is with the precise reference of this *ḥikma*, of this philosophy that is ‘on high,’ in this original phrase Avicenna has just coined, *al-ḥikma al-muta ʿāliya*. Happily he proceeds immediately to define it for us in that lengthy parenthetical sentence (Y) in the protasis of paragraph (b): it refers to the doctrine that the celestial bodies, in addition to their separate intellects, also possess rational souls not impressed in their matter which, through their association with their bodies, acquire an additional quality which completes their epistemological range; hence they also acquire a ‘perfection,’ manifestly referring to their ability to cause/perceive particulars in real time. Thus the phrase means, in context, ‘the doctrine or philosophy dealing with the celestial, “on high,” bodies,’ or ‘philosophy about the supernal/celestial bodies,’ or ‘philosophy of the supernal world,’ as I translate above.

The main issue here is, of course, the thorny philosophical problem of knowledge of particulars by the celestial intellects and souls. Regardless whether or not Avicenna is referring by his newly minted phrase to a doctrine that goes beyond Peripatetic standards, as Tūsī claims (see further below), the fact is that Avicenna is drawing attention to the problem and his solution of it in terms that rhetorically intend to win acceptance for it and deflect criticism. The Qurʾānic reference in *al-rāsiḥūna*, ‘thoroughly versed,’ evokes the sense that only God and the elite know about this doctrine (just as only God and the elite know about the ambiguous parts of the Qurʾān), and Avicenna clearly counts himself among the latter, thus forestalling disagreement on the part of the intellectually challenged. And *al-muta ʿālī*, of course, is also one of the ‘beautiful’ names of God,²¹ with the implication for the intellectually challenged that the phrase *al-ḥikma al-muta ʿāliya* refers to what they would take to be ‘the wisdom of the On-high’—or ‘God’s wisdom’ in creating the souls and intellects of the spheres with such capacities of knowing the particulars—and further bolsters in their eyes Avicenna’s claim that the doctrine referred to by that phrase is true. This rhetorical tour de force is part of Avicenna’s indicative style of writing in the *Iṣārāt*.²²

which means precisely ‘to uncover, reveal.’ This usage of the verb can thus hardly be idiosyncratic to Avicenna and requires further research into the texts.

20 Avicenna uses it elsewhere in his works in its regular meaning, as, for example, in his essay on love, *Iṣq* (Mehren, *Traité des mystiques*, III, p. 23, line 6 = ‘Āṣī, *Tafsīr*, p. 265, line 2), followed by the preposition ‘*an: fī dātīhi l-muta ʿāliyati ʿan qabūli ta ʿūrī l-ḡayri*, ‘its essence [which is] exalted above receiving the other’s influence,’ very much like the use Tūsī makes of it in his interpretation, as will be discussed below.

21 See, for example, the traditional ways of understanding the term in the Qurʾān discussed in Gimaret, *Les noms divins en Islam*, p. 206.

22 See Gutas, *Avicenna*, pp. 346–50 for this style of writing.

As for the text itself, it is relatively free of variants except for a very significant one that potentially changes the tenor of the passage. The word *mastūr* in the protasis is transmitted both in the nominative, *mastūrun*, and in the accusative, *mastūran*. In the absence of a critical edition of the *Iṣārāt*, it is impossible to gauge the relative worth of the manuscripts that bear the one or the other reading. An additional difficulty is constituted by the fact that some manuscripts contain just the text of the *Iṣārāt* itself—i.e., they are witnesses of the direct transmission of the text—while others have it as lemmata embedded in Ṭūsī's commentary and represent the indirect transmission of the text. No editor to date has kept the evidence from these two different sources separate and evaluated it differently, as he should have; all have used both indiscriminately. This is of great significance in this case, for Ṭūsī had a particular axe to grind, as we shall next discuss.

To the extent that the apparatuses of Forget and Zāre'ī are reliable, the incidence of the nominative and accusative forms is as follows. Of the nine manuscripts used by Forget for *namaṭ* X,²³ four have the nominative (BCFG), and the rest presumably have the accusative, assuming Forget's apparatus is negative and that the manuscripts whose reading is not recorded in the apparatus bear the reading adopted in the text (the accusative in Forget). Of the four having the nominative, one is identified by Forget as being Ṭūsī's commentary, which is remarkable given Ṭūsī's express preference for the accusative, while of the remaining three, one is the oldest manuscript used by Forget (Leiden Or. 1062, dated 614H). Thus the evidence provided by Forget, sketchy as it is, suggests the primacy of the nominative (if we disregard the bare numerical extent of witnesses). In the case of Zāre'ī's edition, the evidence is much flimsier. Zāre'ī apparently used only one manuscript containing independently the text of the *Iṣārāt*, or possibly two,²⁴ while the rest of his manuscripts are all of Ṭūsī's commentary; and according to his apparatus, that single manuscript read the word in the nominative.

There is additional, and ancient, evidence that the original reading in this passage was in the nominative. One of the earliest critics of Avicenna's thought, Ibn Ḡaylān al-Balḥī (d. ca. 1194),²⁵ quotes in his *Hudūt al-'ālam* the very passage from the *Iṣārāt* under discussion, *namaṭ* X, 9, and in his text the word appears as *mastūr*, not *mastūran*.²⁶ Given the period when he was active, Ibn Ḡaylān had access to a manuscript of the *Iṣārāt* that would date from around

23 According to Lameer, *Towards a New Edition*, p. 215.

24 See the analysis of Zāre'ī's use of manuscripts *ibid.*, pp. 220–24.

25 Shihadeh, *Post-Ghazālian Critic*, p. 140.

26 Mohaghegh, *Hudūt al-'ālam*, p. 120, line 20. The appearance in this edition of the verb *yulawwihuhū* as *yhwḡh* is apparently a misprint.

a century after Avicenna's death, clearly one of the earliest attestations of this text accessible to us.

Furthermore, *mastūrun* is justified paleographically as the original reading because it is what is called the 'more difficult reading' (*lectio difficilior*; it is also the 'shorter,' *brevior*, reading) than *mastūran* and because *mastūran* can be explained as a mistake due to dittography. To wit: if the original text was, in unvocalized Arabic,

ان كان ما يلوجه ضرب من النظر مستورا على الراسخين في الحكمة المتعالية

then the absence of an immediate object to *kāna*—or its appearance as *ḥaqqa* more than two lines down the text which, as recorded above, was missed by almost every modern reader of this paragraph, and so, very likely, by many earlier readers—made *mastūr* the obvious and easy choice as the object in the accusative, where the *alif* of the following *illā* was read as the final *alif* with a *tanwīn* for *mastūr*, reading *mastūran*. Once this reading gained currency because of its simplicity, then an additional *alif* was inserted after the first one, as a dittography (or as thought to have been missing due to haplography), to read *illā* and 'correct' the remaining, and manifestly wrong, *lā*. Thus was born the variant *mastūran* relatively early, for it was reported by both Rāzī and Ṭūsī, writing less than two centuries after Avicenna's death. Despite the seemingly obvious and easy, but faulty, reading *mastūran*, the fact that the correct reading *mastūrun* has been transmitted at all in most manuscripts of the *Iṣārāt* itself as well in Ibn Ḡaylān's citation of it is a tribute to the precision with which scribes of Arabic manuscripts approached their task.

There is, finally, the all-important question of what the two variants would mean and the extent to which meaning can dictate, or justify, preferring one over the other. Ṭūsī states the problem very well:

ولفظة "مستور" تورد في بعض النسخ بالرفع على أنه صفة لـ"ضرب" من النظر" وتورد في بعضها بالنصب على أنه حال من الهاء التي هي ضمير المفعول في قوله "ما يلوجه" وهو الصحيح لأن الموصوف بالاستتار هو الحكم بوجود تلك النفوس التي ذكر الشيخ في مواضع أنه سرٌّ لا النظر المؤدى إلى ذلك الحكم

The word *mastūr* is transmitted in some manuscripts in the nominative (*rafʿ*), as a complement (*ṣifa*) of *ḍarḥun min al-naẓar*; and in other manuscripts it is transmitted in the accusative (*naṣb*), as a circumstantial accusative (*ḥāl*) modifying the object pronoun *-hū* in *mā yulawwiḥuhū*: this [i.e., the accusative] is correct because what is being described as being veiled is the determination that these souls [of the spheres] exist—which Avicenna elsewhere said is a secret—not the theoretical investigation that leads to this determination.

In other words, Ṭūsī wants to read the protasis of paragraph (b) in the text as follows:

If *what* a kind of theoretical investigation reveals *as something veiled [to all]* except to those thoroughly versed in the philosophy of the supernal [world] ... is true, then ...

rather than, as the protasis would go with *mastūrun* in the nominative,

If what a kind of theoretical *investigation [that is] veiled [to all]* except to those thoroughly versed in the philosophy of the supernal [world] reveals ... is true, then ...

But this will not do because it is contradictory in Ṭūsī's terms. Ṭūsī is saying, in effect, that the same thing which theoretical (i.e., philosophical) investigation reveals as something veiled to the masses it reveals clearly to the elite, to those versed in the supernal philosophy. This would be fine if it was understood to mean that the masses do not fully understand philosophical argumentation but the elite do. However, Ṭūsī goes on in his commentary to make the outrageous claim that the knowledge that the elite have of this issue is through 'taste' (*dawq*) and 'unveiling' (*kaşf*), i.e., non-philosophical direct intuition (see below, paragraph 3c of his text). In that case what Ṭūsī is saying is that what philosophical investigation, *nazar*, reveals clearly to the elite is known by them through non-philosophical direct intuition, equating *nazar* with *dawq*. This is self-contradictory, and obviously Avicenna would (could) not have said anything of the sort. Thus from the point of view of the meaning of the variants also *mastūrun* in the nominative is the correct reading.

The early reception of this passage of the *Işārāt* and especially of the phrase *al-ḥikma al-muta'āliya* is relatively uneventful, suggesting that they were understood essentially in the literal, if prosaic, manner in which I translated them above. Already during Avicenna's lifetime, there is no mention of the phrase either in the *Ta'liqāt* or the *Mubāḥaṭāt*, works in which Avicenna's students asked him about difficulties in his theories in his published works. If it had had some of the notorious implications with which it was invested in later times, one might be surprised at this silence and try to account for it by suggesting that Avicenna's students did ask him about it but either orally, in which case there would be no record, or, if in writing, the record has not survived. Another explanation might be that since the *Işārāt* was a late work, and Avicenna's injunctions to Bahmanyār and Ibn Zayla that they should not show it to anybody were taken seriously,²⁷ not enough people knew about it, or the *Işārāt*, to ask him before his death. But this surprise is unwarranted if one starts *not* from the positions of later tradition but from Avicenna's own words and thus avoids having to resort to assuming hidden meanings or lost oral teachings. The plain fact seems to be that there was nothing to ask about: difficult though the

27 See the historical and ideational context of the composition of the *Işārāt* in Gutas, *Avicenna*, pp. 155–9.

sentence might be, the meaning of the phrase itself is quite clear, as presented above. Avicenna defined what he meant by *ḥikma muta 'āliya*, and those who heard or read it, however many or few, knew exactly what he was talking about and there was no need for further questions.

This conclusion seems to be supported by the absence of any discussion of the phrase in philosophical discussions and literature during the two centuries following Avicenna's death. Among Avicenna's students and successors, Bahmanyār did not mention it in his *Tahṣīl*, even in the section where he discussed the motion of the spheres and their motivations and sources (pp. 641–66, ed. Moṭahharī), and neither did al-Lawkarī in the second part of his metaphysical work *Bayān al-ḥaqq* (pp. 263ff., esp. pp. 333–8, ed. Dībāḡī). The same applies to a critic of Avicenna, Abū l-Barakāt al-Baḡdādī in his *al-Mu'tabar*.

This two-century period also saw the development of a vigorous commentatorial activity on the *Iṣārāt*, which established this work as the main source of knowledge of Avicenna's thought until the Safavids in the sixteenth century.²⁸ Among the earliest critical discussions of it are those by Šaraf-ad-dīn al-Mas'ūdī (fl. 1189–94)²⁹ and Ibn Ġaylān al-Balḥī (d. ca. 1194). The former wrote a series of 'objections' (*i'tirāḍāt*) or 'problems' (*masā'il*) on the *Iṣārāt*, in none of which he refers to our passage in *namaṭ* X, 9.³⁰ In particular, Ibn Ġaylān, who found great faults with the *Iṣārāt* and even quotes in his *Ḥudūt al-'ālam* (p. 120, lines 19–23, ed. Mohaghegh) the very passage containing the phrase *al-ḥikma al-muta 'āliya*, as described above, has nothing to say about it. But most importantly, Faḥr-ad-dīn ar-Rāzī (d. 1210) passes over the phrase in silence, that is, he makes no comment on its meaning, either in his *Lubāb* or in the *Šarḥ al-Iṣārāt*.

What Rāzī does do in the commentary is explain the *contents* of this *ḥikma muta 'āliya*, expanding on the parenthetical sentence provided by Avicenna himself in that passage (b) cited above, but without mentioning the phrase itself. After repeating what Avicenna says in paragraph (a), namely that the intellects of the spheres know all the particulars in a universal way and that the souls of the spheres know all the particulars that happen in this world in a particular way, al-Rāzī continues:

(b) Then there is something else here, which is that the celestial sphere, in addition to a separate intellect and a corporeal soul has a third item, which is a rational soul, that is, [a soul] that is neither a body nor corporeal in itself but has a relation to the sphere on

28 Cf. Wisnovsky, *Avicenna's Islamic Reception*, for the development of this tradition and p. 194 for a list of all the known commentaries. The earliest among them are discussed by Wisnovsky, *Avicennism and Exegetical Practice*, pp. 351–3.

29 Wisnovsky, *Avicenna's Islamic Reception*, p. 194.

30 See the list of these 'problems' in Wisnovsky, *Avicennism and Exegetical Practice*, p. 359, and Shihadeh, *Fakhr al-Dīn al-Rāzī's Response*, p. 10.

account of which it acquires renewed perfections (*kamālāt mutaḡaddida*), just like our rational soul, which is neither a body nor corporeal but has a relation to our bodies on account of which it is able to acquire perfections of the intellect (*kamālāt 'aqliyya*) ... Thus all the particulars which occur in this world are known to (reading *ma'lūm* rather than *ma'lūl*) the separate intellect [of the sphere], to the rational soul [of the sphere], and to the corporeal soul [of the sphere].³¹

This is a fair summary of what Avicenna says is the content of the *ḥikma muta'āliya*, without his introductory fanfare of Qur'ānic references to the unique knowledge possessed by those versed in 'supernal' philosophy, with all the implications of divinity of the word *muta'āliya*. One wonders whether Rāzī thought anything of this, and if he did, what. He certainly was aware of the rhetorical tactics of Avicenna, but he did not call him on this; perhaps this is because he himself uses similar tactics when he decides to misrepresent or criticize Avicenna's position to make it more conformable to his views—but this is a separate issue. For our purposes, what is significant is that Rāzī, like all his predecessors, did not consider the use of the phrase *al-ḥikma al-muta'āliya*, rhetorical tactics aside, as something obscure or unintelligible in need of elucidation: it was something obvious.

Strangely, because we have learned to think of him as the sober Avicennan commentator, it was the great Ṭūsī (1201–73) who put a spin on the phrase and opened the floodgates of fanciful interpretations that have continued to this very day.

Ṭūsī begins by summarizing the first paragraph (a) of this *Tanbīh* and concludes,

(3a) فَإِنَّ جَمِيعَ ذَلِكَ يَدُلُّ عَلَى جَوَازِ ارْتِسَامِ الْكَائِنَاتِ الْجَزْئِيَّةِ بِأَسْرِهِا الَّتِي هِيَ مَعْلُولَاتُ الْحَرَكَاتِ الْفَلَائِيَّةِ وَلِوِازِئِهَا فِي النَّفْسِ الْفَلَائِيَّةِ إِلَّا أَنَّ ذَلِكَ يَقْتَضِي كَوْنَ الْكَلِّيَّاتِ الْعَقْلِيَّةِ مَرْتَسِمَةً فِي شَيْءٍ وَالْجَزْئِيَّاتِ الْحَسِّيَّةِ مَرْتَسِمَةً فِي شَيْءٍ آخَرَ وَذَلِكَ مَا يَقْتَضِيهِ رَأْيُ الْمُشْتَائِينَ

(3a) All this shows that it is possible for the totality of the particular existents, which are the effects and concomitants of the motions of the spheres, to be imprinted on the souls of the spheres, except that this requires that the intelligible universals be imprinted on one thing and the sensible particulars on another; this is what the doctrine of the Peripatetics requires.

Then he continues,

(3b) ثُمَّ إِنَّهُ أَشَارَ بِقَوْلِهِ ثُمَّ إِنَّ كَانَ مَا يَلُوحُهُ ضَرْبٌ مِنَ النَّظَرِ إِلَى قَوْلِهِ لَتَظَاهِرَ رَأْيَ جَزْئِيٍّ وَأَخْرَجَ كُلِّيٍّ إِلَى الرَّأْيِ الْخَاصِّ بِهِ الْمُخَالَفَ لِرَأْيِ الْمُشْتَائِينَ وَهُوَ إِثْبَاتُ نَفْسٍ نَاطِقَةٍ مُدْرِكَةٍ لِلْكَلِّيَّاتِ وَالْجَزْئِيَّاتِ مَعًا لِلْأَفْلَاقِ فَإِنَّهُ قَوْلٌ بَارْتِسَامِهِمَا مَعًا فِي شَيْءٍ وَاحِدٍ

31 *Šarḥay al-Išārāt*, p. 129, lines 5–9, slightly corrected from this faulty imprint.

(3b) By his statement, ‘Next, if what a kind of theoretical investigation reveals ... they manifest a thought that is particular and another, universal,’ Avicenna then points to a doctrine that is peculiar to him and opposed to that of the Peripatetics, which is establishing that the [celestial] spheres have rational souls which perceive both universals and particulars simultaneously, for it is [a doctrine] that holds the simultaneous impression of both [universals and particulars] on a single entity.

Ṭūsī then proceeds to parse the grammar and syntax of that impossible sentence (as noted above, note 15), and concludes his analysis of the *Tanbīh* as follows:

(3c) وقوله أن لها بعد العقول المفارقة نفوساً ناطقةً بدل من قوله ما يلوحه وإنما جعل هذه المسئلة من الحكمة المتعالية لأنَّ حكمة المشائين حكمةٌ بحثيةٌ صرفةٌ وهذه وأمثالها إنما تتم مع البحث والنظر بالكشف والذوق فالحكمة المشتملة عليها متعالية بالقياس إلى الأولى

(3c) His statement ‘that they [the heavenly bodies], in addition to the separate intellects ... [also] have rational souls’ stands for his statement ‘what it reveals.’ He made this issue part of ‘the exalted philosophy’ only because Peripatetic philosophy is a philosophy [based] purely on research, while this one [i.e., the ‘exalted’] and its likes become complete, along with research and theoretical investigation, only through ‘unveiling’ and ‘tasting.’ The philosophy that includes [‘unveiling’ and ‘tasting’] is thus ‘exalted’ in comparison with the former.³²

This is completely gratuitous. Ṭūsī, first, correctly identifies that the long parenthetical clause beginning with ‘that they [the heavenly bodies], in addition to the separate intellects which they have as first principles, [also] have rational souls’ is a definition of ‘what it reveals,’ i.e., of *al-ḥikma al-muta‘āliya*, as discussed above; and second, he remarks, as did Rāzī before him, that this doctrine is new in that it adds a third entity in the constitution of the spheres in the supernal world: in addition to corporeal souls and separate intellects, which was the regular doctrine, they also have non-corporeal rational souls which are able to perceive universals and particulars simultaneously. The only difference between Rāzī and Ṭūsī is that Rāzī does not label these two doctrines whereas Ṭūsī calls the former the Peripatetic and the latter Avicenna’s own, which is fine. But why, having said that, Ṭūsī feels the need to say that this expansion of the doctrine by Avicenna is due to ‘unveiling’ and ‘tasting’, is problematic. Avicenna himself makes no mention of *dawq*, something he developed late in his

32 Ṭūsī, *Šarḥ al-Isārāt* IV, pp. 122–4 (ed. Dunyā). Because Ṭūsī interprets the word *muta‘āliya* to indicate rank (one wisdom is higher or better than another) rather than physical space (the supernal world above the earth), as intended by Avicenna, I translate the word here as ‘exalted’ and not as ‘supernal.’

life and even mentions once before in the *Iṣārāt* but, significantly, not here.³³ All Avicenna says is that he came up with the notion of a non-corporeal rational soul for the spheres by analogy to humans: we have both corporeal souls and non-corporeal rational souls, which is a theory that accounts much better for the variety of perceptions and knowledges that we acquire. Hence the application of the same theory to the spheres makes their functions better intelligible; there is no question of *dawq* here. The problem is with Ṭūsī and why he does this, for it is unprecedented.

Moḥammadzāde offers the suggestion (pp. 212b–213a) that Ṭūsī may have been following Suhrawardī here, who in the introduction to his *Ḥikmat al-iṣrāq* (p. 3 ed. Walbridge and Ziai / pp. 11–12, ed. Corbin) notoriously divides philosophers into a number of classes or ranks (*tabaqāt*) according to the degree to which they combine in their method 'research' (*baḥṭ*) and 'auto-apotheosis' (*ta'alluh*, 'self-deification'). But this is hardly relevant and even less likely. Suhrawardī talks about *baḥṭ* vs. *ta'alluh* and almost certainly deliberately does not call the latter *ḥikma muta'aliya* (as a matter of fact he never uses this phrase in his works), whereas Ṭūsī talks about *baḥṭ* and *naẓar* vs. *dawq* and *kaṣf* and expressly identifies the latter with *ḥikma muta'aliya*. And even if we assume that Ṭūsī knew Suhrawardī's *Ḥikmat al-iṣrāq*—and it is almost certain that he did—the fact that he avoids using the same terminology as Suhrawardī indicates that he did not wish to follow it. As for the notion in Ṭūsī of two paths to philosophy, *baḥṭ* and *dawq*, this also comes directly from Avicenna, who himself used these very terms as just stated. Suhrawardī also followed Avicenna, but changed the term for *dawq* to *ta'alluh*.³⁴ Thus Ṭūsī was the first to

33 For the concept of *dawq* in Avicenna see Gutas, *Avicenna*, pp. 343–5 and p. 75 n. 18 and the references cited there.

34 Interestingly, Suhrawardī uses the term *dawq* only thrice in the introduction, first to refer to himself and how he came to acquire philosophy (p. 1, line 10), second to tone it down and generalize its application by saying that all who strive (*muḡtahid*, in philosophy, understood) have some share of *dawq* (p. 1, line 12), and third to claim for his own *dawq* the authority of the *dawq* of Plato (p. 2, line 10), who is described *both* as 'the spiritual and secular leader in philosophy' (*imām al-ḥikma wa-ra'isuhā*) and as one of those who followed the path of God (*man salaka sabīl Allāh*). When it comes to ranking philosophers, though, he abandons the term *dawq* and uses *ta'alluh* instead which, together with the participle that introduces it, *mutawagḡil fī l-ta'alluh*, must mean something like 'he who penetrates deeply into becoming God' in seeking philosophy and knowledge. The religious politics of these terminological variations are relatively obvious, from Suhrawardī's claiming for himself primacy in both religion and philosophy, which are implicitly presented as identical, to his blatant (and blasphemous?) in his time) statement that such a perfect philosopher is 'God's successor on earth' (*halīfat Allāh fī l-arḍ*, p. 2, line 20 and p. 3, line 11), which echoes and explains the term *ta'alluh* he used, 'becoming divine, becoming Allāh.' Now it may be that *mutawagḡil* is intended by Suhrawardī to evoke *rāsiḥ* in the Qur'ānic *al-rāsiḥūna fī l-'ilm*, as discussed above, and that *ta'alluh* is meant to evoke *ḥikma muta'aliya*, taking the

make the unwarranted and, in the context of the passage in Avicenna's *Iṣārāt*, unjustifiable identification of *ḥikma muta 'āliya* with *ḍawq* and *kaṣf*. The reason why he did this is important, but it is a separate issue, to be discussed in connection with his intellectual biography and the many different doctrinal masks he wore throughout his turbulent career.³⁵

After Ṭūsī, it becomes open season for those who want to read into the phrase *al-ḥikma al-muta 'āliya* various meanings, and its history—its *Begriffsgeschichte*—will have to be traced among the numerous commentators on the *Iṣārāt* and in subsequent philosophical tradition, culminating, but not concluding, in the two books by Mullā Ṣadrā with this phrase in their title (*al-Ḥikma al-muta 'āliya fī l-asfār al-'aqliyya al-arba'a* and *al-Masā'il al-qudsiyya fī l-ḥikma al-muta 'āliya*). But the developments did not come immediately after Ṭūsī. For some time the response was either to follow Ṭūsī or to disregard the issue completely. Representative of the former attitude is Ibn Kammūna, who completed his commentary the year Ṭūsī died (1273).³⁶ His commentary, or actually running commentary, is more in the form of paraphrastic insertions from Ṭūsī into the text of Avicenna, including the distinction between research philosophy and that of 'tasting'. The paragraph (b) of Avicenna's text is paraphrased as follows:³⁷

(b) >ثم إذا كان ما يلوحه ضرب من < النظر مستوراً إلا على الراسخين في الحكمة المتعالية عن البحثية الصرفة وهي الحكمة التي تشتمل مع البحث والنظر على الكشف والذوق أن لها أي لتلك الاجرام بعد العقول المفارقة التي هي لها كالمبادئ نفوساً ناطقة غير منطبعة في موادها بل لها معها علاقة ما كما لنفوسنا مع أبداننا وأتمنا تنال بتلك العلاقة كمالاً ما حقاً صار للاجسام السماوية زيادة معنى في ذلك لتظاهر رأى جزئى وأخر كلى

adjective to mean 'divine,' but Ṭūsī, assuming that he would have seen through the politics of Suhrawardī's verbal acrobatics (or exactly because he saw through it), would have none of it and prefers to stay close to Avicenna's terminology. Similarly, even Ṣahrazūrī, Ṭūsī's contemporary Suhrawardī enthusiast, in the introduction to his very commentary on *Hikmat al-iṣrāq* markedly avoids the term *ta'alluh*, which he uses only twice in the more subdued form of *al-muta'allihīn* (p. 5, line 13 and p. 6, line 14, ed. Corbin, *Œuvres philosophiques*, 1952) to refer to the inspired philosophers, and sticks to *ḍawq* and *kaṣf*, but of course without any reference, just like Suhrawardī, to *ḥikma muta 'āliya*.

35 It is clear from what Ṭūsī says, if he is to be believed, that he revised and edited his commentary on the *Iṣārāt* twenty years after completing it (see Gutas, *Avicenna*, p. 493). It is also clear that he revised and edited some of his works for political/ideological reasons, as the frequently changing context of his work surroundings in his long and turbulent career required; see his statements in Dabashi, *The Philosopher/Vizier*, p. 234, and the reasonable assessment of his career offered by Dabashi and by Jorāti, *Science and Society in Medieval Islam*. With further study, it may be possible to discern the reasons for which he may have changed his commentary by adding or removing this interpretation of the phrase *al-ḥikma al-muta 'āliya* during revision, or, if he did not change it, why he chose so to interpret it in the first place.

36 Pourjavady and Schmidtke, *A Jewish Philosopher of Baghdad*, p. 59.

37 MS Istanbul, Lâleli 2516, fol. 277v. The beginning of the quotation here inserted in angular brackets is missing in the manuscript, clearly due to some inadvertent omission.

(b) 'Next, if what a kind of theoretical investigation reveals as something veiled [to all] except to those thoroughly versed in the philosophy that is exalted' above the philosophy [based] purely on research, which is the philosophy which includes along with research and investigation, [also] unveiling and tasting, '[namely,] that they,' i.e., these [heavenly] bodies, 'in addition to the separate intellects which they have as first principles, [also] have rational souls which are not impressed in their matters but rather have a certain relation to them just as our souls do with our bodies, and that they acquire, by means of this relation, a certain perfection—is true, then the heavenly bodies come into possession of an additional quality [*ma'nan*] in this regard because they manifest a thought (*ra'y*) that is particular and another [that is] universal.'

Quṭb-ad-dīn al-Rāzī (al-Taḥṭānī, d. 1364), as representative of the second attitude in his *Muḥākamāt*, does not even touch *nimāt* X, 9 and 10 of the *Iṣārāt*; he ends with the eighth, so we cannot tell what he thought of *al-ḥikma al-muta'aliya*. Here we have yet another datum in the long reception history of the *Iṣārāt*, namely the fact that some commentators simply stayed away from the final chapters or portions thereof, a datum that has to be incorporated into our analysis of the development of philosophy after Avicenna.

The study of the reception and interpretation of Avicenna's thought—interpretation which included not only commentaries, summaries, and paraphrases of his works but also the fabrication of pseudepigraphs with their particular slant, and which should not be confused with the thought of Avicenna himself³⁸—provides the best chart for the development of philosophy and theology in the Muslim East in the centuries following his death.

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38 For the distinction between Avicenna and the 'Avicenna transformed' of the later tradition see my comments in *Orientations*, pp. ix–xii.

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Avicennian Elements in Faḥr al-Dīn al-Rāzī's Discussion of Place, Void and Directions in the *al-Mabāḥiṭ al-mašriqiyya*

Jules Janssens

Although Faḥr al-Dīn al-Rāzī largely uses Avicenna's *Physics* (*al-Samā' al-ṭabī'ī*) of the *Šifā'* when discussing place, void and directions in his *al-Mabāḥiṭ al-mašriqiyya*, he does not merely repeat what his predecessor had said. The novelty of his account is apparent from its location within the overall structure of his work, i.e. as part of the discussion of the category of quantity. That discussion constitutes the first section (*fann*) of the first general part (*ḡumla*) of the second book of the *Mabāḥiṭ*, which is entitled: 'Matters of Substances and Accidents' (*Aḥkām al-ḡawāḥir wa-l-a'rāḍ*).¹ This entire first section is devoted to the category of quantity (*kamm*). Certainly, as far as the topic of directions is concerned, its inclusion within the category of quantity remains somewhat in line with Avicenna, who addresses it in the third treatise of his *Physics* where the explicit focus is on 'natural things owing to their quantity'.² But even then the broader framework is clearly not the same: for al-Rāzī it is 'accidents', *a'rāḍ*, and no longer (as for Avicenna) physics, that form the context of reference. In this, one clearly detects an understanding of the sciences that differs from Avicenna's Aristotelian perspective and its intimate link with the theory of *per se* predication as expressed in the *Posterior Analytics*.³ This same remark is, of course, also valid with respect to the topic of place. But here the rupture with Avicenna appears even more radical, insofar as for Avicenna its discussion belongs, together with that of time, to what 'follows motion', as explicitly indicated in the title of the second treatise of the *Physics*, i.e. *fī l-ḥaraka wa-mā*

- 1 For a basic outline of the general structure of book 2, see Janssens, *Ibn Sīnā's Impact*, pp. 265–70 and Eichner, *Dissolving the Unity*, pp. 157–8. The discussion on place and void is present in al-Rāzī, *Mabāḥiṭ*, vol. 1, pp. 217–51 (void: vol. 1, pp. 228–49); that on directions, *ibid.*, pp. 251–7.
- 2 Avicenna, *Šifā'*: *Samā'*, III, 1, p. 260 (edition McGinnis, henceforth MG); p. 175 (Cairo edition, henceforth C).
- 3 For a comprehensive discussion of al-Rāzī's epistemology that underlies his opposition to an Aristotelian 'essentialist' understanding of the sciences, see Ibrahim, *Faḥr al-Dīn al-Rāzī*, pp. 386–402 and 418–19.

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ḡarā maḡrāhā.⁴ Al-Rāzī, on the other hand, separates the discussion of place from that of motion and time. This is somewhat surprising, given that he, along with Avicenna, continues to accept an intimate link between motion and time, as evidenced by his dedicating to both of them together an entire section inside the framework of the first general parts on accidents.⁵ However, the integration of place in the section on quantity is not an invention by al-Rāzī. Bahmanyār ibn Marzūbān (d. ca. 458 H./1066) had already done it before him.⁶ Therefore it is beyond reasonable doubt that Bahmanyār influenced al-Rāzī. Nevertheless, no further use of Bahmanyār's treatment of place comes to the fore in al-Rāzī's treatment of place. Moreover, it has to be emphasized that Bahmanyār, in sharp contrast with al-Rāzī, deals with the topic of directions inside the explicit framework of the *Physics*.⁷

Let us now have a closer look at each of the nine chapters that together form al-Rāzī's core section on place, void and directions, and have been largely inspired by Avicenna's systematic treatment in *Šifā'*: *Samā'*, II, 5–9 and III, 13.⁸

Chapter 16: 'On Establishing Place' (*Mabāḥiṭ*, vol. I, p. 217, line 9–p. 221, line 13)

In this chapter, al-Rāzī first observes, in line with Avicenna's affirmation in *Samā'*, II, 5,⁹ that the proper existence and quiddity of place are not known, and that there exists only a very vague common idea of place as that from which or toward which something moves, or in which something rests (p. 217, lines 10–13).

4 Avicenna, *Šifā'*: *Samā'*, II, 1, MG p. 107; C p. 79.

5 Al-Rāzī, *Mabāḥiṭ*, vol. 1, pp. 546–680. Regarding the dependence of al-Rāzī's treatment of motion on Avicenna, *Šifā'*: *Samā'*, II, 1–4, see Janssens, *The Reception*, pp. 24–9.

6 Bahmanyār, *Kitāb al-Taḥṣīl*, p. 378. Here, as in other cases, Bahmanyār seems to blur the essential borders that exist for Avicenna between physics and metaphysics, see Janssens, Bahmanyār, p. 115.

7 See Bahmanyār, *Kitāb al-Taḥṣīl*, b. III, m. 2, f. 5, pp. 606–12.

8 To this basic treatment, one could add a few chapters on natural place, i.e. the chapters 14–17 of the first subsection (the substantification of bodies) of the first section (on bodies) of the second general part (on substances) of the second book (see al-Rāzī, *Mabāḥiṭ*, vol. 2, pp. 63–71). I will not deal with these chapters in the present paper because these chapters clearly deserve a separate treatment (with particular attention to the specific framework in which they are inscribed, i.e. the conception of body). Let me already observe that al-Rāzī opens his discussion of natural place with the evocation of a particular doctrine (ibid., vol. 2, pp. 63–5), which he qualifies as a doctrine elaborated in all likelihood by Ṭābit ibn Qurra—it would be worthwhile to examine whether one has here a fragment of Ṭābit's uncompleted (?) commentary on the *Physics*. A quick look has revealed that al-Rāzī continues to borrow elements from Avicenna's *Samā'* of the *Šifā'*, in *casu* from b. IV, c. 10–11 (as usual, with modifications both in the wording and in the order).

9 See Avicenna, *Šifā'*: *Samā'*, II, 5, MG p. 157, lines 3–5; C p. 111, lines 8–9.

Next he points out that a group of thinkers denies the very existence of place, and surveys four of their arguments in favour of this view (p. 217, line 14–p. 220, line 1). The first argues that place cannot be conceived as a substance, be it sensible or intelligible, nor as an accident, since in all these cases impossibilities arise (p. 217, line 16–p. 218, line 14). The wording is drawn from Avicenna,¹⁰ but al-Rāzī integrates into this first argument what in Avicenna appears as a second argument, namely one that is based on the idea of body (*ġism*). Whatever the case, this restructuring does not substantially affect the very wording of the argument. A clear Avicennian inspiration¹¹ is also detectable in the second argument against the existence of place that al-Rāzī presents (p. 218, line 15–p. 219, line 6). This argument denies that place can be any of the four causes, concluding that it therefore cannot be something indispensable for motion. The third argument points out that if body were in a place, the place of a growing body would have to grow with that body, which is something impossible (p. 216, lines 7–9). All this is in full agreement with Avicenna.¹² In the final, fourth argument, it is stated that if locomotion needs a place for a body, then it also needs a place for a point, but this is inconceivable (p. 216, lines 10–21). Again, the formulation is highly dependent on Avicenna.¹³ In summary, al-Rāzī not only derives these arguments from Avicenna, but largely takes over the latter's formulations as given in *Samā'*, II, 5.

As is well known, Avicenna does not agree with these arguments against the existence of place and offers later in his *Physics*, namely in chapter 9, an explicit refutation of each. This has not escaped al-Rāzī's attention, who makes these Avicennian criticisms his own, even if he slightly reformulates or restructures them (p. 220, line 2–p. 221, line 2). The following parallelisms come to the fore:

<i>Mabāḥiṭ</i> , p. 220, lines 2–11	= <i>Samā'</i> , II, 9, MG p. 203, line 6–p. 204, line 7; C p. 138, line 9–p. 139, line 3;
<i>Mabāḥiṭ</i> , p. 220, lines 12–15	= <i>Samā'</i> , II, 9, MG p. 205, lines 1–9; C p. 139, lines 11–17;
<i>Mabāḥiṭ</i> , p. 220, lines 16–17	= <i>Samā'</i> , II, 9, MG p. 206, lines 1–3; C p. 140, lines 6–7;
<i>Mabāḥiṭ</i> , p. 220, line 18– p. 221, line 2	= <i>Samā'</i> , II, 9, MG p. 204, lines 8–14; C p. 139, line 4–9.

Two remarks should be made here: (1) since al-Rāzī has combined Avicenna's first two arguments into one, it is quite natural that he does the same with respect to their refutations. However, it is striking that he omits Avicenna's

10 See *ibid.*, II, 5, MG p. 157, line 11–p. 158, line 14; C p. 111, line 14–p. 112, line 9.

11 See *ibid.*, II, 5, MG p. 160, lines 1–11; C p. 113, lines 3–11.

12 See *ibid.*, II, 5, MG p. 160, lines 12–14; C p. 113, lines 11–13.

13 See *ibid.*, II, 5, MG p. 159, lines 1–14; C p. 112, line 11–p. 113, line 3.

emphasis on the *figurative* character of the saying ‘place is coextensive with the placed thing’, which to some extent forms the core of the latter’s counter-argument; and (2) al-Rāzī limits himself to indicating that place is indispensable for motion insofar as it has a natural, hence not causal, priority. He does not, however, mention Avicenna’s additional remark¹⁴ that the existence of motion in the mobile does not prevent place from also being a material cause of motion.

Finally, al-Rāzī (p. 221, lines 3–12) presents three arguments that traditionally had been evoked in favour of the existence of place: these are based upon locomotion, replacement, and the necessary existence of up and down. All three proofs were also explicitly mentioned by Avicenna in his *Samā’*, II, 5.¹⁵ Although one finds a few additional elements in Avicenna’s treatment, al-Rāzī’s formulation shows no essential derivations from it. On the contrary, its very wording is highly dependent upon Avicenna’s.

All in all, al-Rāzī’s chapter offers nothing more than a slightly reworded version of Avicenna’s *Samā’*, II, 5, as well as of a part of the same work, II, 9, which is directly related to the refutation of arguments presented in II, 5. In other words, Avicenna’s influence on this chapter is tremendous. But given its introductory character, it would be unwise to conclude that al-Rāzī, in his *Mabāḥiṭ*, fully adopts Avicenna’s view(s) on place.

Chapter 17: ‘Checking the Opinions on the Quiddity of Place’ (*Mabāḥiṭ*, vol. 1, p. 221, line 15–p. 222, line 15)

Al-Rāzī first enumerates five views concerning the quiddity of place (p. 221, line 16–p. 222, line 4), namely that it is one of the following: matter, form, interval, an arbitrary surface (whether that surface surrounds or is surrounded), or the inner surface of a surrounding body that is in touch with the surface of the surrounded body. He insists that only this latter view is the correct view. Now, this view is without doubt also Avicenna’s view, which is derived ultimately from Aristotle. In fact, al-Rāzī copies verbatim the very first definition of place that Avicenna offers in his *Kitāb al-Ḥudūd*.¹⁶ As to the four other views, he derives their formulation from Avicenna as well, but from the work he used already in the previous chapter, i.e. the *Samā’* of the *Šifā’*, more particularly II, 6.¹⁷

Hereafter, al-Rāzī, once more inspired by Avicenna,¹⁸ briefly indicates why some believe that matter or form constitute the quiddity of place (p. 222, lines 5–8).

14 See *ibid.*, II, 9, MG p. 205, lines 9–16; C p. 139, line 17–p. 140, line 5.

15 See *ibid.*, II, 5, MG p. 161, line 1–p. 162, line 3; C p. 113, line 13–p. 114, line 8.

16 Avicenna, *Kitāb al-Ḥudūd*, p. 32, lines 9–10. Al-Rāzī reads *ḡism* instead of *ḡirm* (line 9), but this may well reflect Avicenna’s original wording.

17 See Avicenna, *Šifā’*: *Samā’*, II, 6, MG p. 163, line 10–p. 164, line 7; C p. 115, lines 4–11.

18 See *ibid.*, II, 6, MG p. 164, lines 8–9; C p. 115, lines 11–12.

Eventually, he mentions the reasons why this view is mistaken, namely that matter and form are neither a point of departure nor an end-point for motion, and that place does not enter into any form of composition (p. 222, lines 8–14). Avicenna is once again a source of inspiration,¹⁹ but al-Rāzī omits Avicenna's second argument, i.e. the idea that motion is *in* place, whereas it is *with* matter and form. Moreover, in the last argument he reformulates in terms of composition what Avicenna had expressed in terms of generation, but this does not constitute a radical rupture, because the fundamental distinction between what is (natural) material and what is (natural) place is maintained. It is worth mentioning that al-Rāzī's affirmation, given at the end of his discussion, that the proponents of this view mistakenly believed to have shown its correctness on the basis of a syllogism of the second figure, once more comes very close to Avicenna's own wording, albeit not in II, 7, but in II, 9.²⁰

As for the view of place as an interval, al-Rāzī indicates that he will discuss its validity in a separate section. He does this in the next chapter (p. 222, lines 14–15).

Chapter 18: 'A Discourse (*kalām*) against the Adherents of the Interval (*aṣḥāb al-bu'd*)' (*Mabāḥiṭ*, vol. 1, p. 222, line 16–p. 228, line 17)

In the first lines of his section, al-Rāzī distinguishes between two opposite tendencies within the circles of those who defend the idea of place as an interval (p. 222, lines 17–20). In fact, according to one of them this interval may be absolutely void of bodies (the refutation of which he will offer in the next chapter, as he explicitly says), whereas according to the other this cannot be the case. Here, one easily detects a direct inspiration from *Samā'*, II, 6.²¹

Al-Rāzī then proceeds to offer a survey of the arguments that have been developed in favour of the doctrine of place as an interval. Based on *Samā'*, II, 6,²² he presents as very first argument in this sense a kind of natural evidence, namely that everyone judges that water is actually received only in the space that is between the limits of the container (p. 222, line 21–p. 223, line 1); in other words, when I pour water into a vase, it will always fill the space that is between the sides of that vase. Hereafter, he offers seven proper proofs, two of which positively try to show that place is identical with the interval, while five others try to establish the correctness of this view in a negative way, namely by showing that place cannot be a surface.

19 See *ibid.*, II, 7, MG p. 170, lines 4–10; C p. 118, line 15–p. 119, line 3.

20 See *ibid.*, II, 9, MG p. 206, lines 4–7; C. p. 140, lines 8–10.

21 See *ibid.*, II, 6, MG p. 166, line 13–p. 167, line 2; C p. 116, line 16–p. 117, line 1.

22 See *ibid.*, II, 6, MG p. 164, line 10–p. 165, line 1; C p. 115, lines 12–15.

As for the two positive proofs, the first one consists in claiming that our imagination conceives the existence of an interval when it removes all the water from the container, just as it conceives a simple element when the imagination removes one element after another from a mixture (p. 223, lines 5–11), while the second claims that place must have three dimensions, just like a body, because the place must be equal to the placed thing, i.e., the body. One easily recognizes in both cases a slightly reworded version of *Samā'*, II, 6.²³

The five indirect arguments, construed in straight opposition to the idea of place as surface, are once more based on Avicenna and are given as follows: (1) if place is a surface, one cannot identify the place of rest of something that remains inside something in motion (p. 223, lines 14–21),²⁴ (2) place, contrary to surfaces, does not move or disappear (p. 223, line 21–p. 224, line 2),²⁵ (3) place, in sharp contrast with surface, is sometimes empty, sometimes full (p. 224, lines 2–3),²⁶ (4) according to the doctrine of place as surface, some bodies have no place (p. 224, lines 3–5),²⁷ and (5) the natural inclination of an element is not toward the limit, but toward the entirety of the body, hence toward the interval according to an ordered position (p. 224, lines 5–8).²⁸

In the next section, al-Rāzī refutes these proofs one by one (p. 224, line 9–p. 225, line 16). Against the first positive argument, he complains that it is based on the presupposition of something impossible, and that from the impossible nothing positive can be deduced (p. 224, line 9–11). Al-Rāzī here summarizes in a very basic and elementary way Avicenna's long refutation, which pays extensive attention to the limits, and even danger, of imagination.²⁹ Regarding the second of these positive arguments, al-Rāzī remarks that if the body's need for place is on account of its corporeality, which is understood as encompassing another body, then it is true; but if it is understood as implying that every corporeal interval requires an interval in which it exists, then it just begs the original question (p. 224, lines 12–16). This argument here involves a slight reformulation of *Samā'*, II, 9.³⁰ However, al-Rāzī omits the final part of Avicenna's refutation,³¹ where it is stressed that when the body requires place on account of its corporeality, it does not necessarily follow that it completely encoun-

23 See *ibid.*, II, 6, MG p. 165, lines 9–14 and p. 166, lines 1–3; C p. 116, lines 3–7 and 7–9.

24 See *ibid.*, II, 6, MG p. 165, lines 2–8; C p. 115, line 15–p. 116, line 3.

25 See *ibid.*, II, 6, MG p. 166, lines 4–5; C p. 116, lines 9–10.

26 See *ibid.*, II, 6, MG p. 166, lines 6–7; C p. 116, lines 10–12.

27 See *ibid.*, II, 6, MG p. 166, lines 8–9; C p. 116, lines 12–13. McGinnis judiciously notes that this is in all likelihood an allusion to the problem of the place of the cosmos itself in an Aristotelian perspective, see *ibid.*, MG p. 166, n. 8.

28 See *ibid.*, II, 6, MG p. 166, lines 10–12; C p. 116, lines 13–15.

29 See *ibid.*, II, 9, MG p. 208, line 1–p. 209, line 11; C p. 141, line 8–p. 142, line 7.

30 See *ibid.*, II, 9, MG p. 209, line 12–p. 210, line 7; C p. 142, lines 8–14.

31 Cf. *ibid.*, II, 9, MG p. 210, lines 7–13; C p. 142, line 14–p. 143, line 3.

ters the container in all of its corporeality. In itself this reformulation does not constitute a new argument; rather, it makes precise what had been said before. Hereafter, al-Rāzī, in direct dependence on Avicenna, rejects—again, one after another—the five indirect arguments that were based on the idea of place as a surface (p. 224, line 17–p. 225, line 16): (1) a body staying inside something in motion is itself neither in motion nor in rest (p. 224, line 18–p. 225, line 1);³² (2) it is true that place does not undergo essential motion, but this does not imply that it has no accidental motion (p. 225, lines 2–4);³³ (3) to state that place is sometimes empty, sometimes full, is not an intellectual argument and nothing disallows us from saying that the simple [surface] that is interior to the jar is empty or full (p. 225, lines 5–8);³⁴ (4) everything has a place, and therefore a position. The outermost sphere, too, has a position, but its motion is—in sharp contrast to what is usually the case—according to position.³⁵ Here (p. 225, lines 8–12), al-Rāzī does not use Avicenna's reply as expressed in *Samā'*, II, 9,³⁶ but he refers to what is a very innovative idea of the latter, i.e., the acceptance of motion in the category of position, as expressed e.g. in *Samā'*, II, 3;³⁷ and (5) it is possible to understand an element's seeking the extremity (*nihāya*) in such a way that it does not contradict the positing of the extremity as a place, namely in understanding this seeking as a seeking for a complete encounter of the surrounding with the surrounded (p. 225, lines 13–16).³⁸

32 See *ibid.*, II, 9, MG p. 206, line 13–p. 207, line 14; C p. 140, line 9–p. 141, line 7, summarizing, mainly based on the first part. Al-Rāzī says at the end that he will discuss the topic further in the section on motion—perhaps, he refers to chapter 20 of *fann 5 (Mabāḥiṭ, vol. 1, p. 597)*, titled: 'How the Body Is Devoid of Motion and Rest'.

33 See Avicenna, *Šifā'*: *Samā'*, II, 9, MG p. 211, lines 1–3; C p. 143, lines 5–7.

34 See *ibid.*, II, 9, MG p. 211, lines 4–6; C p. 143, lines 8–10. Al-Rāzī does not mention Avicenna's further development of this latter idea in II, 9, MG p. 211, line 7–p. 212, line 6; C p. 143, line 10–p. 144, line 2.

35 Let me note that for Avicenna the place of the outermost sphere is not a containing limit of that which surrounds, which is the usual definition of place, but is the upper surface of the sphere below it (see *ibid.*, II, 6, MG p. 169, lines 7–9; C p. 118, lines 7–9). As noted by McGinnis (*ibid.*, MG p. 169, n. 14) this conception probably has its ultimate source in Themistius' *In Physica*.

36 See *ibid.*, II, 9, MG p. 212, line 7–p. 213, line 14; C p. 144, lines 3–19.

37 See *ibid.*, II, 3, MG p. 145, line 1–p. 148, line 8; C p. 103, line 8–p. 106, line 3. Regarding the particular significance of this 'Avicennian' doctrine, see McGinnis, *Positioning Heaven*, pp. 151–61. It is worthwhile to note that al-Rāzī, in his treatment of motion, links the idea with the name of al-Fārābī, while referring to the '*Uyūn al-masā'il*', see Janssens, *The Reception*, pp. 28–9. It must be stressed also that al-Rāzī—somewhat surprisingly—poses an intimate link between this refutation and the former, as if both were answering a common argument.

38 See Avicenna, *Šifā'*: *Samā'*, II, 9, MG p. 214, lines 1–4; C p. 145, lines 1–3. Avicenna's further refutation (*ibid.*, II, 9, MG p. 214, lines 4–8; C p. 145, lines 3–5), which concerns the idea of an ordered interval, is not mentioned by al-Rāzī, perhaps because he judged the remark on the limit a sufficient counter-argument.

Al-Rāzī is not satisfied with just articulating a specific refutation for each of these arguments. He adds a more fundamental and encompassing objection against the conception of place as interval (p. 225, line 17–p. 228, line 21). Probably inspired by Avicenna,³⁹ he notes that those who defend this doctrine accept that one can distinguish between the interval of place and the interval of body (p. 225, line 17–p. 226, line 2). Next he formulates four major objections against this possible distinction:

(1) Two intervals, the quiddity of which partakes in one matter, cannot be distinguished in any way whatsoever (p. 226, lines 3–13). Here, one finds a (significantly) reworded version of Avicenna's refutation in *Samā'*, II, 7;⁴⁰

(2) If two intervals could have one quiddity in common, every singular person to whom one can point would be open to an infinite multiplicity (p. 226, lines 14–19).⁴¹ In this case al-Rāzī's objection seems to have been inspired by *Samā'*, II, 7.⁴² However, unlike Avicenna, he does not limit the argumentation solely to the idea of a single interval. In fact, he also deals with the general problem of identifying the individual as individual, as becomes evident in a specially added paragraph (p. 227, lines 5–11), where he shows that if one admits the present thesis of a common one quiddity for two intervals, one should doubt the individuality of everything;

(3) The impossibility of the interpenetration of bodies is not based on matter or form, but on magnitude, i.e., the being of a thing in what is essentially its own place and direction (p. 227, line 12–p. 228, line 3). Again, al-Rāzī has been inspired by Avicenna, namely, *Samā'*, II, 7,⁴³ but he presents a highly summarized version, which, moreover, includes a major shift in emphasis from the notion of the 'nature of the interval' to the idea of 'magnitude' (*miqdār*);⁴⁴

(4) The composite that would result from the conjunction of two intervals between the limits cannot have any greater amount than each one of them has,

39 See *ibid.*, II, 7, MG p. 171, lines 5–9; C p. 119, lines 9–12.

40 See *ibid.*, II, 7, MG p. 176, lines 1–11; C p. 122, lines 9–18.

41 To a possible objection from the adherents of the doctrine of the interval that the case of the singularity of a human person has nothing in common with the distinction between two intervals, which in their view can be proven by water leaving a jar (while impeding the entering of another body) and then entering it anew, al-Rāzī answers that nothing prevents the entering of a body after water has left a jar, as it has been shown before (see *Mabāḥiṭ*, vol. 1, p. 226, line 20–p. 227, line 4).

42 See Avicenna, *Šifā'*: *Samā'*, II, 7, MG p. 172, lines 1–6; C p. 119, line 15–p. 120, line 3.

43 See *ibid.*, II, 7, MG p. 174, line 1–p. 175, line 16; C. p. 121, line 1–p. 122, line 9.

44 As is usual in such cases, al-Rāzī relies more heavily on the beginning of Avicenna's wording than on the latter's further development (of which he seems to have derived directly the sole notion of *tahalḥul*, rarefaction).

and this is contrary to what is natural (p. 228, lines 4–8). This time al-Rāzī's wording is only slightly different from Avicenna's in *Samā'*, II, 7.⁴⁵

Chapter 19: 'Refutation of Those who Advocate the Void' (*Mabāḥiṭ*, vol. 1, p. 228, line 18–p. 246, line 17)

After he has rejected the conceptions of the quiddity of place as matter, form or interval, al-Rāzī presents the refutation of a fourth opinion, namely the one that advocates the existence of the void. As in Avicenna, this refutation occupies a very large part of the section on place, frequently rewording Avicenna, but also adding additional elements as well. Most importantly, however, it does not present the refutation(s) as having the last word. In other words (and this in sharp contrast with Avicenna), al-Rāzī's account leaves open the possibility of accepting the void. Anyhow, as we shall see, he does not, at least in the *Mabāḥiṭ*, express himself very clearly on this issue.

The chapter opens with a basic distinction between two conceptions of the void (p. 228, line 19–p. 229, line 6): (1) the void as an existing 'nothing', which is present in the interval between two non-touching bodies, and (2) the void as something existing in a non-bodily something characterized by three dimensions. *Samā'*, II, 8 provides a possible source of inspiration.⁴⁶ However, the formulation of the existing void in terms of something having three dimensions (p. 229, lines 5–6) has much in common with Avicenna's definition of the void as given in his *Kitāb al-Ḥudūd*.⁴⁷

Next al-Rāzī proceeds to refute the view of those who interpret the void as an existing nothing in an interval between two bodies (p. 229, lines 9–16). Certainly, the distance between two separated bodies can differ from that between two other separated bodies, but this cannot be explained by referring to imaginary intervals—undoubtedly (but al-Rāzī does not mention this in an explicit way) filled with an existing void—since they have no reality whatsoever. Al-Rāzī's wording largely corresponds to *Samā'*, II, 8,⁴⁸ but it replaces Avicenna's essentially logical approach by one in which physical reality prevails.⁴⁹

45 Cf. *ibid.*, II, 7, MG p. 173, lines 1–8; C p. 120, lines 8–14. Al-Rāzī adds a possible objection, which states that two intervals are greater than one only in case of their non-interpenetrating each other, but he indicates that this argument is based on circular reasoning (see *Mabāḥiṭ*, vol. 1, p. 228, line 9–17).

46 See Avicenna, *Šifā'*: *Samā'*, II, 8, MG p. 177, lines 3–7; C p. 123, lines 7–10.

47 See *id.*, *Kitāb al-Ḥudūd*, p. 33, lines 1–2.

48 See *id.*, *Šifā'*: *Samā'*, II, 8, MG p. 177, lines 7–11; C p. 123, lines 10–13.

49 For the characterisation of Avicenna's approach as 'logical', see McGinnis, *Logic and Science*, pp. 181–6.

Thereafter, al-Rāzī offers a double refutation of the view that envisions the void as something existing. In the first, he underscores that a void, which is receptive of dimensions, cannot be conceived otherwise than as a quantity, and therefore as a body—which is clearly absurd (p. 229, line 17–p. 230, line 12). In the elaboration of this argument al-Rāzī has combined elements taken from *Samāʿ*, II, 8 with others derived from Avicenna's *Nağāt*.⁵⁰ As for the second argument (p. 230, line 13–p. 231, line 2), it states that, given the impossibility of an actual infinity, the separate dimensions have to be finite. However, what is finite necessarily has a form, and since this form cannot have any other cause than matter, it would again follow that the void is a body. Once again, al-Rāzī has used elements derived from both *Samāʿ* and *Nağāt*.⁵¹

In what follows, al-Rāzī offers three arguments, which he labels 'rational' ('*aqliyya*'), that immediately reject both views of the void (p. 231, line 3–p. 233, line 9):

(1) Given the homogeneous character of the void, no motion or rest of any kind is possible in it (p. 231, line 5–p. 232, line 3). The idea that there is neither motion nor rest in the void is largely developed by Avicenna in his *Samāʿ*, II, 8.⁵² Al-Rāzī is clearly not interested in such a detailed refutation. He limits himself to expressing the basic idea. He, above all, stresses the homogeneity of the void, and consequently its having no natural place. Such an idea is not absent in Avicenna's *Samāʿ*, but is articulated more explicitly in the latter's *Dānešnāme*.⁵³

(2) If one compares the time of a motion in the void with that of a like motion in a plenum, many absurdities follow (p. 232, line 4–p. 233, line 3). In spite of some minor rewording, one easily recognizes here *Samāʿ*, II, 8.⁵⁴

(3) A stone thrown upwards would attain the sphere, if the void exists (since there is no resistance in this latter), but such is never the case (p. 233, lines 4–9). As far as I can see, the actual formulation of the argument is al-Rāzī's. Nevertheless, it is not devoid of an Avicennian inspiration, specifically the latter's idea of the necessity of the continuity of a forced motion in the void.⁵⁵

It must be added that although al-Rāzī finds these three arguments worth mentioning, and hence deserving of attention, he does not consider them as absolutely certain. In fact, he evokes three doubts (concerning the possibility of rest in a homogenous void, the relation between time in the void with time in

50 See Avicenna, *Šifāʿ*: *Samāʿ*, II, 8, MG p. 177, lines 8–9 and 12–p. 178, line 5; C p. 123, lines 10–11 and 13–p. 124, line 4, and id., *Nağāt*, p. 234, line 1–p. 236, line 6.

51 See id., *Šifāʿ*: *Samāʿ*, II, 8, MG p. 182, line 5–p. 183, line 7; C p. 126, lines 8–20, and id., *Nağāt*, p. 242, line 9–p. 243, line 11.

52 See id., *Šifāʿ*: *Samāʿ*, II, 8, MG p. 183, line 9–p. 197, line 4; C p. 127, line 1–p. 134, line 6.

53 See id., *Dānešnāme: Tabīʿiyyāt*, p. 19, line 14–p. 20, line 8.

54 See id., *Šifāʿ*: *Samāʿ*, II, 8, MG p. 190, line 7–p. 191, line 11; C p. 130, line 10–p. 131, line 11.

55 See *ibid.*, II, 8, MG p. 195, line 13–p. 196, line 19; C p. 133, line 6–p. 134, line 2.

the plenum, and the possibility of void spaces permeating the air in the space between Earth and Heaven), which he explicitly ascribes to the *Ṣāhib al-Mu'tabar*, i.e., to Abū l-Barakāt al-Baġdādī (p. 233, line 10–p. 234, line 21).⁵⁶ He values them as serious, but pays no further attention to them. Consequently, he creates—at least, in the present context—serious doubt regarding his own conviction about the existence or non-existence of the void.

Next al-Rāzī presents four 'physical' (*ṭabī'iyya*), i.e. empirical, arguments that further reinforce these rational proofs (p. 235, line 1–p. 237, line 20):

(1) When the mouth of a narrow necked flask is closed by a thumb, no water will flow out of it even if it has narrow pores at its bottom (p. 235, line 2–p. 236, line 16). This argument is present in Avicenna's *Dānešnāme: Ṭabī'iyyāt*.⁵⁷ However, al-Rāzī's formulation is much more detailed. It contains, moreover, a possible objection (p. 236, lines 2–7) consisting of three parts, two of which are also mentioned by al-Nīsābūrī (fl. first half of the eleventh century) and are related to the ideas of the widening of the pores and the heaviness of quicksilver.⁵⁸ However, immediately afterwards he explicitly rejects the objection (p. 236, lines 8–16).⁵⁹

(2) The rise of water in a siphon that is partly submerged in water or the attraction of flesh by an adjacent cupping glass (p. 236, line 17–p. 237, line 9).⁶⁰ Again, one finds a direct source of inspiration in Avicenna's *Dānešnāme: Ṭabī'iyyāt*.⁶¹ Against a possible objection that in such a case air would have a raising force,⁶² al-Rāzī notes that no air enters at all between two smooth

56 At first sight, these three doubts (see *Mabāḥiṭ*, vol. 1, p. 233, line 10–16; p. 233, line 17–p. 234, line 15, and p. 234, lines 16–20) have a source of inspiration in Abū l-Barakāt, *Kitāb al-Mu'tabar*, p. 59, line 22–p. 60, line 5; p. 62, line 16–p. 63, line 15, and p. 58, lines 9–13. However, since al-Rāzī's wordings are far from identical with these passages in Abū l-Barakāt al-Baġdādī's work, a more in-depth analysis is needed to determine in a final way whether they indeed constitute the immediate source of the former's formulations, but such examination clearly exceeds the limits of the present paper.

57 See Avicenna, *Dānešnāme: Ṭabī'iyyāt*, p. 23, lines 2–4.

58 See al-Nīsābūrī, *Masā'il fī l-ḥilāf*, p. 54, lines 15–25. Dhanani, *The Physical Theory*, p. 79, offers an English paraphrase of these two critical remarks made by the Basrian Mu'tazilites against their Baghdadian colleagues.

59 Whether he himself has elaborated the aforementioned rejections in question, or has taken them over from an earlier (then, in all likelihood, *kalām*) source, deserves further investigation.

60 The argument of the cupping-glass was well known in the Greek tradition, both in philosophy (e.g., Plato, Simplicius) and in pneumatics (e.g., Heron of Alexandria), see Pines, *Studies in Islamic Atomism*, p. 152, and Dhanani, *The Physical Theory*, p. 76. A version of this argument was also defended by the Baghdadian Mu'tazilites, see al-Nīsābūrī, *Masā'il fī l-ḥilāf*, p. 52, lines 16–18.

61 See Avicenna, *Dānešnāme: Ṭabī'iyyāt*, p. 23, line 5–p. 24, line 5.

62 This objection might have been inspired by the objection that the Basrian Mu'tazilites formulated against the argument of their Baghdadian opponents (see previous note).

objects, and, in direct line with Avicenna, mentions in this respect the example of the cupping glass placed on an anvil;

(3) A pipe entering a flask inevitably leads to the breaking (either inwards or outwards) of the latter;

(4) If one admits the existence of the void at a given moment, then, if one inverts a phial in a place where the void is multiplied, air would be attracted to ascend to these empty places, but how could there be no perception of any bubbling, unless the ascending does not separate the connectedness of the water?⁶³

Thereafter, al-Rāzī distinguishes with Avicenna⁶⁴ between two conceptions of air that circulate among the adherents of the void, namely, air as an absolute void (a totally absurd idea), and air as something full but mixed with void (p. 237, line 21–p. 238, line 5). As to this latter conception, he offers ten indications (five rational and five physical ones), followed by objections to each (p. 238, line 5–p. 246, line 17):

(1) The motion of bodies would be impossible in a world where there is only fullness, hence no void (p. 238, line 7–p. 239, line 1). A very basic statement of this argument can be found in Avicenna, *Samāʿ*, II, 6.⁶⁵ Although al-Rāzī's presentation is much more detailed, it has clearly been inspired by Avicenna's formulation. However, al-Rāzī adds a few elements that almost certainly have their immediate source in *kalām* texts.⁶⁶ This is also the case in the reply (p. 242, line 15–p. 244, line 2), where one finds, especially with regard to the last part (p. 243, line 18–p. 244, line 2), a clear inspiration from Avicenna, *Samāʿ*, II, 9,⁶⁷ but also a direct reply to the earlier *kalām*-inspired argument.⁶⁸

(2) The phenomenon of rarefaction and condensation—both its use as an argument in favour of the existence of a void (p. 239, lines 1–3) and its refutation (p. 244, lines 3–8)—are directly based on Avicenna, *Samāʿ*, II, 6 and II, 9.⁶⁹

63 I did not find any direct source for these two latter arguments, but note that Avicenna affirms in the *Dānešnāme: Ṭabīʿiyyāt*, p. 24, lines 5–6, that the engineers have developed many other experiences that prove the non-existence of the void. It therefore seems possible, and even probable, that Avicenna and al-Rāzī had a common source.

64 See Avicenna, *Šifāʾ*: *Samāʿ*, II, 6, MG p. 167, lines 1–10; C p. 116, line 18–p. 117, line 7.

65 See *ibid.*, II, 6, MG p. 168, lines 11–14; C p. 117, line 18–p. 118, line 2.

66 The evocation of two small jugs filled with water, whereby one would directly take over the water of the other (an absurd idea) (al-Rāzī, *Mabāḥiṭ*, vol. 1, p. 238, lines 18–21), directly reminds one of al-Nīsābūrī, *Masāʾil fī l-ḥilāf*, p. 48, lines 18–19.

67 See Avicenna, *Šifāʾ*: *Samāʿ*, II, 9, MG p. 218, lines 6–11; C p. 147, line 19–p. 148, line 1.

68 I looked in vain for a direct source. The actual formulation is therefore perhaps proper to al-Rāzī, but this needs further investigation. It is worth noting that al-Rāzī mentions the example of a fish swimming in water as a (mistaken) argument for the existence of a void (*Mabāḥiṭ*, vol. 1, p. 243, lines 13–15). In this case, his ultimate source of inspiration is clearly Lucretius, *De rerum natura*, I, lines 378–80.

69 See Avicenna, *Šifāʾ*: *Samāʿ*, II, 6, MG p. 167, lines 12–15; C p. 117, line 8–10, and II, 9, MG p. 214, lines 8–13; C p. 145, line 6–10.

(3) The phenomenon of growing—here too, as in the previous case, both *pro* (p. 239, lines 4–5) and *contra* (p. 244, lines 9–12) are also directly based on Avicenna, *Samā'*, II, 6 and II, 9.⁷⁰

(4) If each surface of a body must touch another surface, there would be an actual infinity of bodies, which is impossible; hence, it is possible that a body does not touch another body, and therefore the void exists (p. 239, lines 5–8). In the reply, it is stressed that such an infinity of bodies follows only on the condition that another body—actually, not possibly—exists externally to the first (p. 244, lines 13–15). As far as I can see, this argument is completely absent in Avicenna.⁷¹

(5) The elevation of one surface, which is fully imposed upon another surface, inevitably leads to the acceptance of the void (p. 239, line 8–p. 241, line 16). Al-Rāzī immediately judges it to be a strong argument, since he qualifies it as a 'powerful proof (*huḡḡa qawīya*) in view of an establishment of the void (*li-muḡbitī l-ḥalā'*)'. Hence, without surprise, he presents it in a detailed way—referring *inter alia* to the notion of fragmentation, *tafakkuk*, and the related example of the rotation of the millstone.⁷² The reply only states that its refutation is difficult, but will soon become clear (p. 244, lines 15–16). One has the impression that al-Rāzī is effectively attracted by the argument, but is still hesitant to accept it. We discover here again an ambiguous attitude with regard to the issue of the existence or non-existence of the void.

(6) When a phial, which is sucked on, is inverted into water, water enters it. One discovers both in the argument *pro* (p. 241, lines 17–21) and the reply (p. 244, line 17–p. 245, line 20) a direct inspiration of Avicenna, *Samā'*, II, 6 and II, 9.⁷³ However, when used in defence of the existence of a void, al-Rāzī seems to have combined Avicenna with al-Nīsābūrī's *Masā'il fī l-ḥilāf*⁷⁴ (or a similar source). As to the refutation, its first part (p. 244, line 17–p. 245, line 9) only slightly modifies Avicenna's wording,⁷⁵ whereas its final part implies a

70 See *ibid.*, II, 6, MG p. 168, lines 6–7; C p. 117, lines 14–15, and II, 9, MG p. 215, lines 5–7; C p. 145, lines 14–16.

71 I could not find any precise source, although the argument *pro* has some Philoponian undertones.

72 Both played an important role in the *kalām* discussions about atomism, see Dhanani, *The Physical Theory*, pp. 178–80. Avicenna also briefly refers to them in his *Samā'*, III, 3–4. The ultimate source of the argument might be Lucretius, *De rerum natura*, I, lines 384–97. A detailed analysis of the argument clearly exceeds the limits of the present paper, all the more so since the argument is not based on Avicenna.

73 See Avicenna, *Šifā'*: *Samā'*, II, 6, MG p. 168, lines 9–10; C p. 117, lines 16–18, and II, 9, MG p. 215, line 8–p. 218, line 5; C p. 142, line 15–p. 147, line 13.

74 Cf. al-Nīsābūrī, *Masā'il fī l-ḥilāf*, p. 49, lines 15–18.

75 Cf. Avicenna, *Šifā'*: *Samā'*, II, 9, MG p. 215, line 8–p. 216, line 10; C p. 145, line 16–p. 146, line 12.

strong reformulation, including some omissions, of the remaining part of Avicenna's text, as indicated just before.

(7) The creation of a void in separating the two sides of an inflated bladder (p. 242, lines 1–4).⁷⁶ In the counter-argument (p. 245, line 21–p. 264, line 6), it is insisted that air enters the small pores of a skin even if this is not required by its nature.⁷⁷

(8) If only the plenum exists, no needle can enter an inflated bladder (p. 242, lines 5–8), against which it is argued that in such a case either air leaves the bladder in an imperceptible way, or the sides of the bladder are increased with the volume of the needle (p. 246, lines 7–10).⁷⁸

(9) It is possible to pour water into a flask completely filled with ashes (p. 242, lines 9–10). The objection states that the whole container would be void, not the ashes in it (p. 246, lines 11–12). Both formulations are taken over from Avicenna, *Samā'*, II, 6 and II, 9.⁷⁹

(10) A cask can contain both wine and wineskin (p. 242, lines 11–13), but it is objected that the capacity of the wineskin in relation to the cask might not be obvious to the senses, or, alternatively, the wine might be squeezed or become smaller by a natural or forced condensation (p. 246, lines 13–16). Once more Avicenna's *Samā'* constitutes al-Rāzī's direct source.⁸⁰

All in all, the present chapter on the void shows great dependence on Avicenna, mainly on the *Samā'* of the *Šifā'*, but also on the physical sections of two other of his encyclopaedic works, namely *Dānešnāme* and *Nağāt*. Moreover, regarding the definition of the void we saw a possible influence of the *Kitāb al-Ḥudūd*. On some occasions, we saw the additional use of *kalām*-inspired ideas, as expressed in such a work as the *Masā'il fi l-ḥilāf* of al-Nīsābūrī, but they seem always to have their ultimate source in ancient thought. However, compared to Avicenna's vast influence, the impact of *kalām* on al-Rāzī's discussion of the void reveals to be very limited. The overall picture is one of refuting the existence of the void, in full line with Avicenna, even if al-Rāzī omits to

76 Al-Rāzī's formulation of the argument is very similar to, albeit not identical with, that of al-Nīsābūrī, *Masā'il fi l-ḥilāf*, p. 48, lines 22–5. Dhanani, *The Physical Theory*, p. 84, remarks that this argument seems to derive from Greek atomism, since it is an adaptation of Lucretius' fifth argument for the existence of void.

77 Whether al-Rāzī has himself invented this counter-argument (which includes the mentioning of a folded leaf), or derived it from an existing source, needs further investigation (compare above, n. 66).

78 The argument *pro* is again (see above, n. 76) close to that of al-Nīsābūrī, *Masā'il fi l-ḥilāf*, but now p. 49, lines 4–8. Regarding the reply, the same remarks as expressed in the previous note apply.

79 See Avicenna, *Šifā'*: *Samā'*, II, 6, MG p. 168, lines 1–2; C p. 117, line 11, and II, 9, MG p. 215, lines 1–2; C p. 145, lines 11–12.

80 See *ibid.*, II, 6, MG p. 168, lines 2–5; C p. 117, lines 12–14, and II, 9, MG p. 215, lines 2–4; C p. 145, lines 12–14.

mention Avicenna's detailed arguments for the impossibility of a (natural or forced, circular or rectilinear) motion in the void, developed in *Samā'*, II, 8.⁸¹ However, it is striking that al-Rāzī labels one of the arguments in favour of the existence of an interstitial void as 'strong', while offering no explicit reply to it. Even more astonishing is his high assessment of Abū l-Barakāt al-Baghdādī's doubts against the rejection of the existence of the void. In both cases, al-Rāzī's own position is ambiguous, at least suggesting that he no longer fully subscribes to a complete rejection of the void, as expressed by Avicenna. Whatever the case, he undeniably derived much of his material from the latter's works, as will also be the case in the following chapter, in which he rejects the idea of an attractive force in the void.

Chapter 20: 'If the Void Were Persistent, It Could not Have an Attractive nor a Repelling Force with Regard to the Bodies' (*Mabāḥiṭ*, vol. 1, p. 246, line 18–p. 249, line 6)

Al-Rāzī first notes that among the adherents of the doctrine of the void, Abū Bakr al-Rāzī defended the idea of the presence of an attractive force in the void, while others defended the presence of a repelling force (p. 246, line 20–p. 247, line 3). This note offers a slightly modified version of Avicenna, *Samā'*, II, 8.⁸² However, it has to be stressed that Avicenna does not mention the name of Abū Bakr al-Rāzī at all.⁸³

Thereafter, al-Rāzī refutes the acceptance of an attractive force in the void (p. 247, lines 4–14). He stresses the homogeneous character of the void and insists that the void (if one would admit its existence) should retain the water in the clepsydra. One easily recognizes a direct inspiration from Avicenna, *Samā'*, II, 8.⁸⁴

Finally, al-Rāzī rejects the possibility of a repelling force in the void (p. 247, line 15–p. 249, line 6), and this in two ways: (1) the motion of a body cannot be explained by a dispersed void, whether it is inside or outside the body (p. 247, line 15–p. 248, line 17) and (2) the idea of an interstitial void cannot

81 This omission perhaps also has to do with the particular difficulty of interpreting the argument against circular motion; see McGinnis, *Avoiding the Void*, p. 74–89, and Ceylerette, *Le vide chez Avicenne*, pp. 101–17.

82 See Avicenna, *Šifā'*: *Samā'*, II, 8, MG p. 197, lines 5–9; C p. 134, lines 6–9.

83 The explicit attribution of the doctrine of the attractive power of the void to Abū Bakr al-Rāzī is present in later authors, like al-Īḡī (d. 1355) and M.Š. Šīrāzī (d. 1640) (see Pines, *Studies in Islamic Atomism*, pp. 151–3), but they take this information almost certainly from al-Rāzī's *Mabāḥiṭ*, as is evidenced by Šīrāzī's dealing with this issue in the sixteenth chapter of the first *fann* of the second *saḡar* of his *Al-Asfār al-arba'a* (the beginning of the chapter corresponds almost verbatim with al-Rāzī's very wording in the *Mabāḥiṭ*).

84 See Avicenna, *Šifā'*: *Samā'*, II, 8, MG p. 197, lines 10–16; C p. 134, lines 10–15.

explain any upward motion, because in the void one cannot discern any natural place (p. 248, line 18–p. 249, line 6). Again, *Samā'*, II, 8, functions as a direct source.⁸⁵ Besides a few other minor modifications, one also finds a switch in the order of exposition, but this switch is of no real doctrinal significance.

Chapter 21: 'Verification of the Quiddity of Place' (*Mabāḥiṭ*, vol. 1, p. 249, line 7–p. 250, line 19)

With Avicenna, *Samā'*, II, 6,⁸⁶ al-Rāzī enumerates four basic characteristics of place (p. 249, lines 8–11): that in which a body is, that which encompasses a body and nothing else, that which can be left by motion and that which is open to replacement. Al-Rāzī next (p. 249, lines 11–15) reformulates what Avicenna, *Samā'*, II, 6 (MG p. 163, lines 3–9; C p. 114, line 13–p. 115, line 4), presents as the opinions of the common man. However, he omits the lines in which Avicenna explicitly presents the second common opinion of place in terms of a thing that contains another.

As for the opinion that argues that place is the surface, however it might be, al-Rāzī insists (p. 249, lines 16–21), almost verbatim with Avicenna, *Samā'*, II, 6,⁸⁷ that the place of the outermost sphere according to this view is the outer surface of the sphere below it. However, al-Rāzī qualifies this view as weak since it ignores the very fact that the motion of the spheres is according to 'position' (p. 150, lines 1–2)—an Avicennian idea *par excellence*.⁸⁸ In this case, al-Rāzī was probably directly inspired by Avicenna's insistence on the 'positional' motion of the celestial sphere in *Samā'*, II, 7.⁸⁹ But al-Rāzī, above all, considers the present doctrine as a mistaken doctrine because it implies the possibility of having two places for any given body, which is absurd (p. 150, lines 3–5). This latter remark is clearly inspired by Avicenna, *Samā'*, II, 7.⁹⁰ Then, al-Rāzī rejects as purely verbal a possible defence for the view under consideration (p. 250, lines 6–16), a defence which claims that the place of the surrounded surface has to be distinguished from that of the surrounding surface. Al-Rāzī concludes that the argument is not rational, all the more so since the *Šayḥ*, i.e. Avicenna, absolutely rejects this kind of affirmation,⁹¹ and this on the basis of the common knowledge that each body has only one place.

85 See *ibid.*, II, 8, MG p. 198, line 11–p. 199, line 17; C p. 135, line 6–p. 136, line 1, and MG p. 198, lines 1–10; C p. 134, line 15–p. 135, line 6.

86 See *ibid.*, II, 6, MG p. 163, line 11; C p. 115, line 5.

87 See *ibid.*, II, 6, MG p. 169, lines 5–9; C p. 118, lines 6–9.

88 See McGinnis, *Positioning Heaven*, pp. 151–60.

89 See Avicenna, *Šifā'*: *Samā'*, II, 7, MG p. 171, lines 1–4; C p. 119, lines 6–8.

90 See *ibid.*, II, 7, MG p. 170, lines 10–11; C p. 119, lines 3–4.

91 See *ibid.*, II, 7, MG p. 170, line 13–p. 171, line 2; C p. 119, lines 5–6.

In sum, al-Rāzī takes over all the essential elements of Avicenna's presentation, as well as refutation, of the view that identifies place with surface, albeit he modifies the order of exposition.

Al-Rāzī concludes that the true view of place identifies it with the containing surface, since it is the only one that does justice to the four basic characteristics (p. 250, lines 17–19). Again, he is directly inspired by Avicenna, more precisely the beginning of *Samā'*, II, 9.⁹²

Chapter 22: 'Sorts of Place'

(*Mabāḥiṭ*, vol. 1, p. 250, line 20–p. 251, line 9)

In this short chapter, al-Rāzī notes that a place can sometimes coincide with a single surface, while at other times it coincides with a number of surfaces of which a single place is formed, and he then presents different kinds of relationships between surfaces. In all this, he slightly rewords Avicenna, *Samā'*, II, 9.⁹³ At the end of the chapter, al-Rāzī explicitly affirms that the proper exposition of place ends here, but that he will continue with the discussion of direction, *ḡiha*, given that it is intimately linked with the topic of place. At first sight this seems to constitute a very reasonable way of proceeding. However, al-Rāzī here again deviates in a substantial way from Avicenna, who deals with the topic of directions only in the last two chapters of book three of the *Samā'*, which deals with the 'physical things from the point of view of their having quantity', and therefore no longer with 'motion and what follows it', as was the case for place.

Chapter 23: 'Investigation of the Claim that the Directions of Bodies Are Six' (*Mabāḥiṭ*, vol. 1, p. 251, line 10–p. 254, line 13)

This chapter largely reproduces Avicenna, *Samā'*, III, 13, where Avicenna formulates questions about the (common) opinion that a line has two, a surface four, and a body six directions, and indicates as well the reasons for this belief. Moreover, special attention is paid to the difference between determining the directions of animals and plants, on the one hand, and the Earth and celestial spheres, on the other. Al-Rāzī fully subscribes to these Avicennian ideas, as is shown by his almost complete verbatim quotation of Avicenna's chapter.⁹⁴

92 See *ibid.*, II, 9, MG p. 201, lines 3–8; C p. 137, lines 5–9.

93 See *ibid.*, II, 9, MG p. 202, lines 1–4; C p. 137, lines 11–13.

94 Besides the very beginning and end of the chapter (which are of a formal nature to establish a link with what precedes and follows), only a few lines (i.e. *ibid.*, III, 13, MG p. 386, lines 6–9; C p. 249, line 17–p. 250, line 2) seem to have been completely omitted, whereas another small passage (i.e. *ibid.*, III, 13, MG p. 385, lines 4–10; C p. 249, line 6–10, the idea of

Chapter 24: ‘How to Delimit Directions’ (*Mabāḥiṭ*, vol. 1, p. 254, line 14–p. 257, line 8)

The chapter opens with a particular emphasis on two characteristics of a direction: it is something existent (p. 254, lines 15–21) and it is something not divided in extension (p. 254, line 21–p. 255, line 4). Unsurprisingly, al-Rāzī has derived these ideas from Avicenna, but this time not from the *Samāʿ* of the *Šifāʾ*,⁹⁵ but from the *Išārāt*, namely, several passages near the end of *namaṭ* 1.⁹⁵

Having noted (p. 255, line 5–6) with Avicenna, *Išārāt*, p. 107, lines 1–2 that each rectilinear extension has two limits, al-Rāzī indicates that what delimits must be a body, either one or more than one. (1) If it is one, it must be a circular body, and then what surrounds delimits the direction of extreme proximity and the centre delimits the direction of extreme remoteness (p. 255, line 8–p. 256, line 3). As usual, al-Rāzī offers a detailed logical argument before presenting this final conclusion. For both the argumentation and the conclusion he is highly indebted to Avicenna. The former part of his exposition (p. 255, lines 6–17) is largely inspired by Avicenna, *Samāʿ*, III, 14.⁹⁶ As for its latter part (p. 255, line 17–p. 256, line 3), it uses elements of another Avicennian work, namely *Nağāt*.⁹⁷ Although in both cases there is a significant reformulation, the basic ideas remain identical. (2) If what delimits is more than one body, one has to distinguish between the case where one has more than two bodies and the case where one has exactly two bodies. In the former case the number of directions is according to the number of bodies, while in the latter case what surrounds suffices to delimit both limits (p. 256, line 4–p. 257, line 7). Here, al-Rāzī slightly rewords *Nağāt*.⁹⁸

Conclusion

At the beginning of the paper I stressed that al-Rāzī’s discussion of place and directions in the framework of the treatment of the category of quantity constitutes a major departure from the structure of Avicenna’s *Physics*. But, when we look at the content of his exposition, we see that it is in a most substantial way dependent on what the latter has written about these topics. The section on place can be qualified, on account of the data given above, as a restructured, slightly modified version of

‘up’ of Earth as related to Heaven) has been synthesized into the simple mentioning of the ‘up of Earth’.

95 See Avicenna, *Išārāt*, p. 104, lines 15–19; p. 105, line 16–p. 106, line 7; and p. 105, lines 4–13. All three passages are paraphrased by al-Rāzī.

96 See id., *Šifāʾ*: *Samāʿ*, III, 14, MG p. 389, lines 3–13; C p. 251, lines 5–12.

97 See id., *Nağāt*, p. 258, line 15–p. 259, line 4, and p. 259, line 14–p. 260, line 5.

98 See *ibid.*, p. 260, line 9–p. 264, line 5.

Šifā': *Samā'*, II, 5–9, where Avicenna deals with place (and the intimately related topic of void) in a very systematic manner.⁹⁹ On occasion, al-Rāzī adds a few elements derived from other sources, but even then most of them remain Avicennian, i.e. *Nağāt*, *Dānešnāme* and *Kitāb al-Ḥudūd*. Still, one finds a few non-Avicennian elements, although exclusively in the chapter on the void. Especially significant are the two cases, where al-Rāzī suggests that the (radical) rejection of the void as found in Avicenna, is open to questioning. As we saw, one of them explicitly refers to Abū l-Barakāt al-Bağdādī, while the other offers an argument for which we did not find a direct source, but which al-Rāzī qualifies as strong. Unfortunately, he does not develop these 'critical' elements, and thus creates an ambiguity regarding his own attitude towards the existence or non-existence of the void.¹⁰⁰ It is worthwhile to note here that only a correct identification of all the sources, which are used in the *Mabāḥiṭ* (as I have tried to do in what precedes), as well as in addition an in-depth study of them, permits one to evaluate in a correct and precise way al-Rāzī's doctrine(s), more particularly what is original in it (them). As for the treatment of directions, it is again completely Avicennian in inspiration. Once more, its main source is *Šifā'*: *Samā'*, but now chapters III, 13 and 14, beginning, supplemented by a large part of Avicenna's discussion of this topic in the *Nağāt*, and a few elements derived from Avicenna's *Isārāt*. All in all, we have here a good illustration of the tremendous influence Avicenna's writings had on later Islamic thought. Undoubtedly also important is the fact that al-Rāzī's major source for the discussion of these physical issues is not Avicenna's *Isārāt*, but *Samā'* of the *Šifā'*. This is all the more striking since al-Rāzī is above all famous as one of the major commentators of the former work. Moreover, given the high numbers of commentaries of the *Isārāt* in the later Islamic tradition, McGinnis has claimed that the main post-classical works on natural philosophy in the later Islamic tradition are based mainly on precisely this work—although he makes this claim not without due prudence, since he explicitly presents it as being formulated by way of hypothesis, a working idea.¹⁰¹ The present study invites to nuance somewhat this claim. It clearly shows that it does not apply to the physical section of the *Mabāḥiṭ*, one of al-Rāzī's major works, at least as far as the sections on place, void and directions are concerned. However, in an earlier study, I show a similar massive use of the *Samā'* of the *Šifā'* in the *Mabāḥiṭ*'s exposition of motion.¹⁰² There, I indicate that Mullā

99 Avicenna's treatment reminds one of the corollaries on specific physical topics as present in Philoponus and Simplicius, see Janssens, *Ibn Sīnā: An Important Historian*, pp. 83–4.

100 I want to stress that this remark concerns only the *Mabāḥiṭ*, not necessarily al-Rāzī's other works. Only a detailed examination of each of those works will enable one to determine whether al-Rāzī expresses himself in a more explicit way elsewhere.

101 See McGinnis, *Pointers, Guides, Founts and Gifts*, pp. 433–4. Regarding the great attention paid to the *Isārāt* in the later Islamic tradition, see Wisnovsky, *Avicenna's Islamic Reception*, pp. 193–9.

102 Janssens, *The Reception*, pp. 24–9.

Şadrā, at least in his *Aşfār*, was highly influenced by both Avicenna's *Samā'* and al-Rāzī's *Mabāḥiṭ*. Of course, McGinnis offers solid evidence that the same Mullā Şadrā, more precisely in his commentary on al-Abharī's *Hidāya*, largely follows the argumentation of the *Işārāt*.¹⁰³ Here, a fundamental question arises: did thinkers, like e.g., al-Rāzī and Mullā Şadrā, evaluate in their thinking and therefore prefer the more Aristotelian-inspired *Samā'* in one (or some) of their works and the more properly Avicennian-inspired *Işārāt* in another (or others)? Or did they not see any serious doctrinal difference between both works of Avicenna? No simple answer is directly available to this question. Therefore, I have to leave it open for the moment. Whatever be the case, it is clear that one cannot limit the reception of Avicenna's physical ideas in the later Islamic tradition to their presentation in the *Işārāt*.

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¹⁰³ McGinnis, *Pointers, Guides, Founts and Gifts*, pp. 442–3.

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The Existence of Time in Faḥr al-Dīn al-Rāzī's *al-Maṭālib al-‘āliya*

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It is a pity that philosophers are largely unaware of the work of Faḥr al-Dīn al-Rāzī. His writings present a goldmine of clever and fascinating arguments on a wide range of philosophical topics. He may have been a theologian, but he was the sort of theologian an analytic philosopher would enjoy. Of course, there are good reasons for his absence from the canon of the history of philosophy, and major obstacles to integrating him into that canon. His highly dialectical style of writing can be off-putting, especially if one is keen to know what Faḥr al-Dīn himself thinks on a given issue. The arguments he presents need to be understood against a complex background, since he is often looking back as far as Aristotle while also engaging with Avicenna and with fellow representatives of philosophical *kalām*. Most basically, there is a lack of translations, and for several of his works, even of editions. Still, there is an increasing amount of secondary literature that makes clear his argumentative sophistication and philosophical interest.¹ My aim in this paper is to contribute, if modestly, to that trend by examining a particularly intriguing stretch of one of his latest works, the *Maṭālib al-‘āliya* (*Exalted Topics of Inquiry*).²

I will be focusing on only the first three *fuṣūl* of the *Maṭālib*'s fairly lengthy treatment of time.³ In these sections, Faḥr al-Dīn discusses the question of whether time exists, and if so, how we know that it exists. This is a question he covers in several other texts, and I will refer occasionally to these other treatments in what follows and in the notes. But I will mostly be restricting myself to the *Maṭālib*, which I have chosen in part because it is so detailed, and in part for its explicit engagement with two previous theories of time—those of Abū Bakr Muḥammad ibn Zakariyyā' al-Rāzī and of Avicenna. I should also note that apart from some brief remarks in my conclusion, I will have nothing to say about the rest of the discussion of time in the *Maṭālib* itself, and in particular the question of what time is, or its 'quiddity'. In dividing his discussion into

1 For instance Mayer, Faḥr ad-Dīn ar-Rāzī's Critique; Shihadeh, *The Teleological Ethics*, and several studies in Hasse and Bertolacci, *The Arabic, Hebrew and Latin Reception*.

2 For the chronology of Faḥr al-Dīn's works, see al-Zarkān, *Fakhr al-Dīn al-Rāzī*; Shihadeh, *The Teleological Ethics*, pp. 7–11, and Griffel, On Fakhr al-Dīn al-Rāzī's Life.

3 Faḥr al-Dīn al-Rāzī, *Maṭālib*, vol. 5, pp. 9–49.

treatments of time's existence and of its quiddity, Faḥr al-Dīn follows the lead of Aristotle at *Phys.* IV.10, 217b31–2 ('whether it is among the things that are and that are not, and what is its nature').⁴ In the *Šifā'* Avicenna divides his discussion in the same way, as we will see shortly. In this paper, I will be concerned only with the first issue of time's existence, which will give us plenty of material to deal with.

Faḥr al-Dīn considers three broad positions concerning our question.⁵ The first option is that time does not in fact exist (section 1 below). While this may seem so implausible as to be hardly worth discussing, there are two reasons for Faḥr al-Dīn to include it. For one thing, as usual he is pursuing an exhaustive method in which all possible positions on a given topic are canvassed and evaluated. If he simply assumed the existence of time and asked how its existence becomes known, his discussion would not be complete. For another thing, the denial of time's existence is not quite as radical as it sounds. The skeptic considered by Faḥr al-Dīn admits that some things are successive or persist. He simply denies that there is some *further* objectively existing thing, namely time, that would be needed to account for their succession and persistence. Still, this skeptical option is discussed in less detail than the positive views that do assert the existence of time. Here there are two kinds of theory. One theory is that of Abū Bakr al-Rāzī, who is mentioned explicitly (*Maṭālib*, vol. 5, p. 21). He held that we need not demonstrate the existence of time, since it is just obvious (section 2 below). In fact, on his view that would be putting the claim too weakly. Not only is there no *need* to demonstrate the existence of time, but it would be a *mistake* to try to prove its existence on the basis of anything else, such as heavenly motion. For time is conceptually or ontologically prior to anything that could be used to demonstrate its existence, so that such demonstrations are inevitably circular.

The other sort of positive theory does try to prove time's existence. One might think of this as a compromise or middle view: this view rejects skepticism concerning time's objective existence, but accepts the need to prove it exists. Within this branch, Faḥr al-Dīn considers four attempted proofs. The first is, unsurprisingly, the theory found in Avicenna's *Naḡāt* and *Šifā'* (also cited explicitly, *Maṭālib*, vol. 5, p. 33). This tries to establish time in relation to the possibility of something's moving a certain distance at a certain speed (section 3.1 below). Next, Faḥr al-Dīn treats a proof that points to the 'before-

4 For Aristotle's treatment of time in the *Physics* see Coope, *Time for Aristotle*.

5 Cf. Abū l-Barakāt, *Mu'tabar*, vol. 3, p. 36, who mentions the following possible views about time: it is a 'word with no meaning'; an object of sensation, namely motion; an object of the intellect, namely the measure of motion; a substance; an accident; neither substance nor accident; existent; non-existent; integrally existent (on this see further below); non-integrally existent. For the list of questions cf. vol. 2, p. 70.

ness and afterness' of things. The proof attempts to show that beforeness and afterness must be something above and beyond the things that are before and after, for instance a father and son (section 3.2 below). Both this argument and Avicenna's are subject to a battery of objections which remain unanswered, suggesting that Faḥr al-Dīn does not deem these proofs to be successful. A third proof receives no similar refutation, but on the other hand Faḥr al-Dīn does not explicitly affirm its efficacy. The argument asserts that when we make temporal divisions, for instance by distinguishing years or months from one another, there must be some extended thing that we are dividing (section 3.3 below). This divided thing is a kind of 'vessel' or 'receptacle' (*zarf*) for time-segments like years and months. Finally, Faḥr al-Dīn mentions a traditional *kalām* theory of time, which seems to win his approval. According to this proof, time is needed as a third existing thing to which we refer when we draw a link between two events (section 3.4 below). For instance, if I say I will meet you when the sun rises, this makes sense only if time exists, since it provides a means by which to link the meeting to the sunrise.

In what follows, I will examine each of these negative and positive positions in turn. I will not have space to discuss every single argument and counter-argument (for instance, the second *faṣl* on the self-evidence of time has no fewer than twenty-one arguments). However an outline of this entire section of the *Maṭālib* is provided as an appendix to the paper. In the outline I have numbered the arguments and counter-arguments, and will refer to these numbers throughout in addition to giving page references. For instance, §3.2.1.4 refers to the third *faṣl*'s second proof, first (positive) section of arguments for this proof, fourth argument.

1 The Denial of Time's Existence

As already explained, the first view canvassed by Faḥr al-Dīn is that time does not exist—a contention supported by twelve arguments.⁶ It seems that with this thesis, the skeptic means that time does not exist, as Avicenna would say, 'in external reality'. (Faḥr al-Dīn follows Avicenna in using the expression *fī l-a'yān* for this notion, which I will translate 'among objectively real things' or, for economy of expression, 'objectively'.) At least, in the penultimate proof (§1.11, *Maṭālib*, vol. 5, p. 18), the skeptic argues that if there were any such thing as time, it would be the measure of motion; but motion has no objective existence, so neither does time. This leaves open the possibility that time has at

6 In *Mabāḥiṭ*, pp. 755–61, he contents himself with five negative arguments; at *al-Risāla al-kamāliyya*, p. 67, only two skeptical proofs are given, namely a regress argument and the argument that past and future time do not exist now, and the present can be neither divisible nor indivisible so it cannot exist either.

least mental (*dīhnī*) existence, and it seems the skeptic has no stake in denying this. Correspondingly, the anti-skeptical theories to come in *fuṣūl* 2 and 3 aim to prove that time has objectively real existence and *not* only existence in the mind or imagination (this point is made, for instance, in §2.1.7, *Maṭālib*, vol. 5, p. 25). In light of this, we can be more precise about the issue being discussed in this whole stretch of the *Maṭālib*: Faḥr al-Dīn is asking whether time has existence in objective reality, as opposed to merely mental existence; and furthermore asking, if it does exist, whether that is something known immediately (the contention of §2) or established by proof (as argued in various ways in §3).

The proponent in §1 is, then, a skeptic who thinks that time has, at most, mental existence. This is rather surprising, given that Faḥr al-Dīn's discussion is based on that in the *Šifā'* of Avicenna. There, when Avicenna lays out the views people have taken on time, he says:

Avicenna, *Healing: Physics* II.10.1: Some people have denied that time has any existence, while others believed that it has an existence, but not at all as [existence] occurs among external, objectively real things (*fī l-a'yān al-hāriġa*), but as a product of the estimative faculty. Still others believed that, although it does exist, it is not a single thing in itself; rather, it is in some way a relation that certain things (whatever they might be) have to other things (whatever they might be) ... Others have given time a certain existence and subsistent reality, while others yet even made it a substance subsisting in its own right.⁷

These are the possibilities Avicenna goes on to discuss in the rest of section II.10 of his *Physics*.⁸ Why then does Faḥr al-Dīn not likewise divide his treatment of skeptical views on time into two parts, one in which the skeptic denies all existence to time, and another in which mental existence is conceded to it? One explanation might be that Avicenna goes on to present the mental existence option as a natural corollary of the first battery of skeptical arguments. He writes:

Avicenna, *Healing: Physics* II.10.5: Due to these skeptical puzzles and the fact that time must have some existence, many people felt compelled to give time some other manner of existence—namely, the existence that is the activity in the estimative faculty (*fī l-tawahhum*).

7 Section numbers and translation from Avicenna, *The Physics of The Healing*. I quote using McGinnis' translation, with very occasional modifications.

8 No existence at all: II.10.2–4; existence only in *tawahhum*: II.10.5; relational account: II.10.6, refuted at II.10.10; objective existence and subsistence: II.10.8; self-subsisting: II.10.7.

Here it may be relevant to note that in Avicenna, the faculty of *wahm* or *tawahhum* is mentioned as a source of spurious, if irresistible, belief.⁹ Thus, Faḥr al-Dīn would be on relatively firm ground in assimilating the ‘no existence’ view to the ‘only mental existence’ view.

The skeptic of *faṣl* 1 begins his case by asserting a distinction between two kinds of entities, one that exists successively, the other continuously:

Maṭālib, vol. 5, p. 9: Those whose endurance is on account of their isolated constituents (*afrād*) and the succession of their units, without these being continuously successive (*mutaʿaqiba mutatāliya*), so that each of them exists after non-existence and then does not exist after existing ... and those that endure in the sense that their being is constantly persisting as objective realities (*bi-aʿyānihā*).

But in neither case do we need to posit time as some additional entity to explain how things manage to exist successively or continuously. The first skeptical argument then calls on this distinction, to argue that time itself could (if it existed) be neither successive nor continuous. Since these are the only two options, time therefore does not exist at all. Against the possibility that one and the same time exists continuously, the skeptic argues that in that case everything would happen simultaneously—for instance today would be the same as the day of the great flood. And against the idea of time as successive—that is, made up of lapsing time-parts which come in and out of existence—the skeptic points out that a further, second-order time would be needed to explain the sequence of these time parts. This would yield an infinite regress.

This is a first taste of a dilemma that will arise repeatedly in Faḥr al-Dīn's discussion of time's existence. On one horn of the dilemma, time is itself a temporal entity, in the sense that its parts happen at a time. In that case another time is needed to account for the occurrence of these time-parts. The other horn says that time is not constituted by such lapsing parts. But in that case, it exists without lapsing, so that there is only ever one time and everything happens at that time, i.e. simultaneously. A similar dilemma is presented in the fourth argument of this *faṣl* (§1.4). The skeptic assumes that the proponent of time's existence is imagining that there must be some ‘container’ (*ẓarf*) for occurrent events. Suppose, for instance, that yesterday you went for a walk, and today you are reading a book. The walking can only be ‘prior’ to the reading in light of some framework—the *ẓarf*—which provides a basis for priority and posteriority. This would be time. But if so, then shouldn't the same rationale go for time itself? Time also existed yesterday and exists today. If it can pull off that trick without a further, second-order time as a framework, then the walking and reading could already exist yesterday and today without first-order time.

9 See on this Black, Estimation in Avicenna.

If on the other hand first-order time cannot exist without second-order time, then we have a regress. A suggested escape would be to ‘posit infinite times, containing one another’, as Faḥr al-Dīn puts it—so that we have mutually overlapping first-order parts of time, instead of a regress. But then an infinite number of times would be happening right now, which is absurd. Furthermore, the aggregate of first-order, overlapping times that existed yesterday would be temporally prior to the aggregate of times that exist today. So we still need a second-order time to make sense of the priority of one aggregate to the other.

This strategy of ‘aggregation’ might put us in mind of the famous proof for God’s existence given by Avicenna, and perhaps it brought the same thing to mind for Faḥr al-Dīn. The next three arguments (§1.5–7) all invoke Avicenna’s conception of God as the Necessary Existent. Of course a fundamental part of Avicenna’s philosophical theology is that there is only one such existent—not only is God necessary, but nothing other than God can be necessary in itself.¹⁰ Faḥr al-Dīn would of course accept this claim, even if he might raise doubts about Avicenna’s attempt to establish God as the Necessary Existent.¹¹ So he would himself take seriously the next several arguments, which show that the existence of time would compromise God’s status as the unique Necessary Existent. The skeptic asserts that God Himself is temporally prior to ‘daily events’ (*al-ḥawādīṭ al-yawmiyya*) (§1.5, *Maṭālib*, vol. 5, p. 13). If time must exist in order for God to be prior in this way, then God is in a sense dependent on time—and therefore not necessary. But if time does not need to exist in order for God to be prior to things, then neither does it need to exist in other cases of priority (e.g. my having existed prior to my children). The next argument (§1.6, *Maṭālib*, vol. 5, p. 14) applies the same reasoning to God’s being eternal: either He needs time in order to be eternal, or He doesn’t, yielding the same two consequences that His necessity is compromised or that time’s existence is superfluous to explain the temporal properties of things.

A further argument (§1.7, *Maṭālib*, vol. 5, pp. 15–16) poses a different kind of challenge, by suggesting that if time existed, it would have to exist necessarily. First, we are given reason to think that time should be contingent: as a whole, it stands in need of its parts in order to exist, and its parts are in turn transient and thus obviously contingent. Thus, all time segments and the aggregate of all time are contingent. Yet if this is the case, we could suppose that time itself exists after not existing. But how can time exist *after* not-existing? That would mean that there was a time at which time did not yet exist—obviously a contradiction. So time is after all necessary in itself. Here there are, in fact, two threats being posed. First, within this argument itself we’ve seen reason to think that time, if it existed, would need to be both contingent and necessary.

10 For his argument to this effect see Adamson, *From the Necessary Existent to God*.

11 See on this Mayer, *Faḥr ad-Dīn ar-Rāzī’s Critique*.

To avoid this contradiction we should say that it doesn't exist at all. Second, if time is necessary then God would not after all be unique in having necessary existence. That this would itself be a sufficient objection to the existence of time is clear from the next argument (§1.8, *Maṭālib*, vol. 5, pp. 15–16) which simply argues in another way that time, were it to exist, would be necessary.

God's relationship to time comes to the fore again in the tenth argument of this first *faṣl* (§1.10). Here, Faḥr al-Dīn comes for the first time to consider a broadly Aristotelian understanding of time, according to which it is one of the 'concomitants (*lawāḥiq*) of motion' (*Maṭālib*, vol. 5, p. 17). Speaking again for the skeptic, he proceeds by way of a classic dilemmatic argument: if it exists, either time is such a concomitant or not, but both possibilities are excluded, therefore it doesn't exist. One reason it cannot be such a concomitant is that God, as we have seen, has temporal features, such as existing before something He creates. Likewise, there is the non-existence that precedes the existence of created things. Neither God nor non-existence move, though. In fact, he puts the point rather more strongly: God is 'beyond' (*munazzah 'an*) motion, which I think means that the application of motion to Him is a category mistake. We could take this to be a version of an ancient objection against the link between time and motion, which cites the fact that unmoving and indeed immovable things (like the center of the universe) still fall under time.¹² Nonetheless, there is a case to be made that time *is* a concomitant of motion, namely that we can conceive of before and after only thanks to motion. At the end of the next argument (§1.11), which deals similarly with the question of whether time is specifically the *measure* of motion, Faḥr al-Dīn rather surprisingly makes the authority of Aristotle the sole reason to accept this definition (*Maṭālib*, vol. 5, pp. 18–19).

At the end of this first *faṣl*, Faḥr al-Dīn remarks that the arguments he has offered are good and powerful ones (*Maṭālib*, vol. 5, p. 19). Given that he himself will be endorsing a version of the third view, that time does exist but stands in need of proof, this remark too seems rather surprising. Probably, though, he means simply that they pose a genuine challenge for those who uphold the existence of time. If we step back from the individual arguments and think about the nature of this challenge, we will see that the skeptic is invoking a principle of parsimony. At both the beginning of the *faṣl* and now here again at the end, the skeptical view is described as the denial that time could be 'anything other than the fact that some existents are eternally existent in their objective reality, while others are originated, successive and consecutive items' (*Maṭālib*, vol. 5, p. 19). As we already saw, the skeptic is happy to describe things in 'temporal' terms, by calling them 'eternal' or 'successive'. Indeed some of the skeptical arguments presuppose this. For instance §1.5 and

12 See Adamson, Galen and Abū Bakr al-Rāzī on Time.

§1.6 assume that God has the temporal properties of being ‘before’ things and of being ‘eternal’. The skeptic’s guiding thought, then, is that there is no need to posit any further existing thing that would be called time, above and beyond the temporal properties that belong to eternal and successive existents. We can see this particularly clearly in the arguments that pose the threat of a ‘second order time’, that is, a time at which time itself would occur. In this context Faḥr al-Dīn has the skeptic say things like ‘if there is no need [for second order time] then the same holds for all other occurrences’ (§1.4, *Maṭālib*, vol. 5, p. 12)—in other words, if time doesn’t need a further time, then nothing needs time in the first place. And, by our principle of parsimony, if there is no need for time, we should assume there is no such thing.

These skeptical arguments, therefore, have in part the function of placing a burden of proof on those who assert the existence of time—the skeptic insists that in the absence of proof, the default view would be to reject time’s existence (and as we have seen this would mean objective existence, not just mental existence). The positive proofs offered in the third *faṣl* would constitute an adequate response to this skeptical challenge. On the other hand, the skeptical *faṣl* also includes arguments that would establish something stronger: that the notion of objectively existing time is incoherent. A number of the arguments have the form of a *reductio*: for instance in §1.10 we are told that absurdities arise if time is concomitant to motion, but also if it is *not* concomitant to motion.¹³ This yields not a skeptical conclusion that there is no need to posit time’s existence, but rather what in discussions of ancient skepticism is called a ‘negative dogmatic’ claim: as Faḥr al-Dīn himself puts it, ‘both options are false, so the claim that [time] exists is false (*bāṭil*)’ (*Maṭālib*, vol. 5, p. 17). A similar result is obtained without *reductio* in the final argument (§1.12), which is rather ingenious. The suggestion here is that originated things are preceded by their non-existence; to put this another way, non-existence is ‘before’ what is originated. But then the ‘beforeness’ is a property of what doesn’t exist, and a property of the non-existent likewise does not exist (*Maṭālib*, vol. 5, p. 19). It must be said that this doesn’t look like an airtight proof. After all, beforeness would also belong to things that *do* exist, such as God, as we have already learned in previous arguments. Still, it is interesting that Faḥr al-Dīn doesn’t feel the need to demonstrate the failure of these negative dogmatic proofs.

13 Other proofs in this *faṣl* show that the assumption of existing time would yield unwanted implications, in particular (as we have seen) that God is not necessary (§1.6), or that He is not unique in being necessary (§1.7). I would classify these also as *reductio* arguments in that the implied conclusions are taken to be absurd, even if they are not straightforward contradictions.

2 Time as Epistemically Immediate

The same thing happens in the next *faṣl*, which is devoted to the epistemic immediacy of time: a large number of arguments for this notion are offered, and left to stand unrefuted. At the end, Faḥr al-Dīn says that the *faṣl* was a 'report' or 'confirmation' (*taqrīr*) of the position, and he apparently feels no pressure to assess the arguments just surveyed. Rather, it would seem that he is undertaking the more neutral task of mapping the terrain of arguments for and against the existence of time as completely as possible. Obviously the section of the *Maṭālib* being considered in this paper is too small to warrant any general conclusions, but it is worth noting that this raises a question about Faḥr al-Dīn's intentions in this text. As I mentioned above, his usual method seems to be that of an exhaustive survey—one would expect to get refutations of all but one possible view, which is thus revealed as the truth. Here, he seems closer to having the exhaustive survey as an end in itself, though as we will see he does ultimately express a preference for an argument given in the third *faṣl*.

The second *faṣl* raises a further issue of methodology: how and how often is Faḥr al-Dīn drawing on previous sources? He routinely says that he is reporting on arguments he has come across, for instance at the end of the first *faṣl* (*al-dalā'il ... allatī stanbatnāhā*, *Maṭālib*, vol. 5, p. 19). In that *faṣl* no names are attached to the skeptical view of time, though the inspiration of the section of course derives ultimately from the skeptical arguments offered by Aristotle in *Physics* IV.10, and more proximately from Avicenna, as mentioned above (*Healing: Physics* II.10.2–5). By contrast, the second *faṣl* names its protagonist, namely the earlier philosopher of Rayy, Abū Bakr al-Rāzī (d. 925). The beginning of the *faṣl* reads as follows:

Maṭālib, vol. 5, p. 21: You should know that there are two groups of people who accept duration (*mudda*): those who hold that the knowledge of its existence is immediate (*badīhī*) and necessary, with no need for proof or demonstration; and those who do think it is established by proof and demonstration. The first group includes Muḥammad b. Zakariyyā' al-Rāzī, among others. Even though you will find them doing nothing but asserting immediacy and necessity, nonetheless we will set out their remarks as well and completely as possible. I say that they do present arguments that their claim is right, in the following ways.

There follow twenty-one arguments, first to the effect that time is self-evident, then against the notion that time is known through motion (for instance, through the motion of the sphere). Notice that Faḥr al-Dīn is scrupulous here in saying that none of these arguments are meant to *prove* the existence of time. That would, of course, conflict with the central claim of this *faṣl* which is that there is no need to give any such proof and that indeed doing so would be a

mistake, since it would inevitably involve trying to prove something immediate from something less immediate (or at best, from something equally immediate). Rather, these are arguments whose function would be to call our attention to the epistemic immediacy of time.

To what extent is Faḥr al-Dīn actually drawing on the earlier al-Rāzī in this section, as opposed to inventing arguments to put into Abū Bakr al-Rāzī's mouth? This is of some importance, because Abū Bakr's infamous theory of time as one of five eternal principles is known only through later testimonies. So we would like to know whether Faḥr al-Dīn's discussion can be taken as evidence for the way Abū Bakr developed and defended his theory. A reason for pessimism is that Abū Bakr apparently features as a protagonist here simply because Avicenna has alluded to his theories in the context of the *Physics* of the *Šifā'*. As we saw, Avicenna's list of views on time includes the claim that time is 'a substance subsisting in its own right' (*ḡawhar qā'im bi-dātihī*) (*Healing: Physics* II.10.1). This is well attested as the view of Abū Bakr al-Rāzī,¹⁴ as is the further point Avicenna mentions later in connection with this view, that 'the necessity of [time's] existence is such that it does not need to be established by proof (*dalīl*)' (*Healing: Physics* II.10.7).¹⁵

As I have argued elsewhere, Abū Bakr al-Rāzī's view probably evolved out of an engagement with the lost *On Demonstration* of Galen.¹⁶ In his *Doubts about Galen*, he informs us that Galen called time a 'substance' (*ḡawhar*)¹⁷. We know that in the same work, Galen had argued against Aristotle's definition of time as 'the number of motion in respect of before and after' on the basis that this definition is circular. After all, what could 'before and after' (πρωτέρον τε καὶ ὑστέρων) mean here, if not temporal priority and posteriority? Thus, Galen had suggested that time is 'defined through itself' (ἀφορίζεσθαι δι' αὐτοῦ)¹⁸. It is not clear whether, in addition to this epistemic claim, Galen really made the further metaphysical claim that time is self-subsisting, an idea associated with his name in various Arabic but no Greek sources. Certainly Abū Bakr al-Rāzī made both claims, though: for him time, 'eternity' (*dahr*) or 'duration' (several sources confirm Abū Bakr's use of the word *mudda*) is both a fundamental ontological principle, subsisting through itself rather than being caused by anything else, *and* epistemically fundamental, in the sense that we can grasp it immediately, with no need for proof. Abū Bakr supported this contention with a thought experiment: suppose that the heavens were suddenly to vanish.

14 See for instance Abū Bakr al-Rāzī, *Rasā'il falsafīyya*, pp. 193, 266 and 269.

15 Ibid., p. 198.

16 See again Adamson, Galen and Abū Bakr al-Rāzī on Time.

17 Abū Bakr al-Rāzī, *Kitāb al-Šukūk 'alā Ḡālīmūs*, p. 8.

18 Themistius, *In Phys.*, p. 149.

Wouldn't time continue to pass? He went so far as to present this question to ordinary folk, and they answered that time would indeed continue.¹⁹

Now back to Faḥr al-Dīn and the question of whether we can use him as evidence for Abū Bakr al-Rāzī. I have said that his mention of Abū Bakr in this context is presumably occasioned by Avicenna's allusion. But Faḥr al-Dīn is well informed about Abū Bakr; indeed elsewhere in the *Maṭālib* he preserves evidence about him that is otherwise unknown.²⁰ In fact, even in our present context it is he who identifies as Abū Bakr's the view that time is immediately known (Avicenna does not name his source). Furthermore, Faḥr al-Dīn explicitly says that the arguments in *faṣl* 2 are drawn from Abū Bakr and like-minded people. Of course, it is highly unlikely that all twenty-one arguments in this *faṣl* were offered separately and in this form by Abū Bakr. Probably Faḥr al-Dīn has done quite a bit of work in building up a case for the view. We should also make allowance for his caveat that other people besides Abū Bakr have been proponents of time's immediacy.

Still, I think that at least the first argument has a good chance of deriving from Abū Bakr himself:

§2.1.1, *Maṭālib*, vol. 5, pp. 21–2: Let us postulate an individual who was unaware of the existence of the celestial spheres and stars, and their rising and setting, being unsighted and sitting in a dark house, and suppose he resolves not to move at all, even by blinking or breathing. So this man would perceive duration as something flowing²¹ that occurs, and passes constantly without ceasing or finishing. The knowledge of this is necessary, such that if he considered this situation from early morning until mid-morning, and then from mid-morning until noon, then even though he was unaware of the motion of the sun, the moon and the other stars and spheres, he would immediately know that what elapsed from early morning until mid-morning is half of what elapsed from early morning until noon. He will know immediately that his knowledge of what he is considering does not depend on his knowledge that a sphere or star is moving. These considerations prove that the knowledge of the existence of duration and time is immediate and primary, with no need for proof or demonstration.

19 Abū Bakr al-Rāzī, *Rasāʾil falsafīyya*, p. 264, cf. p. 199. There seems to be a reminiscence of this in the *Maṭālib*: §2.2.8 argues that the general run of people would acknowledge that were God to destroy the heavens in the last judgment and then wait before restoring them, then time would pass in between these two events and could be shorter or longer.

20 See Rashed, Abū Bakr al-Rāzī et le *kalām*, and Rashed, Abū Bakr al-Rāzī et la prophétie. The evidence in question appears at *Maṭālib*, vol. 4, pp. 401–19.

21 This image of the 'flow' of time is a consistent feature of the position presented in this second *faṣl*. A vivid description comes at the end of §2.2.9 (*Maṭālib*, vol. 5, p. 30): 'in a situation where we are unaware of the heavenly sphere, the sun, the moon and the other stars, we would in our intellects perceive something passing and elapsing, with something coming after something, like water running and flowing, or like a thread placed against the tip of a sword and then pulled along. The thread would pass across the edge of the sword part by part; it is like that here [with time]'. This image of the sword is taken from Abū l-Barakāt, *Mu'tabar*, vol. 2, pp. 78–9, where he also speaks of time as 'flowing'.

It is not only the characteristic inventiveness of the thought experiment that might encourage us to see it as authentic, but also its similarity to a different thought experiment ascribed to Abū Bakr al-Rāzī by another source, the Ismāʿīlī thinker Nāṣir-e Ḥusraw, who is highly critical of the earlier Rāzī's theory of five eternal principles. According to the latter, when discussing pleasure Abū Bakr asked us to consider someone sitting in a house that is neither particularly hot nor particularly cold. Such a person, he argued, would have no awareness of the temperature at all.²² (The point of this was to show that we do not get pleasure from our natural state, but only from perceptible return to that state.²³) Furthermore, our thought experiment reappears in the second half of this *faṣl*, and this time is combined with the otherwise attested scenario mentioned above, in which Abū Bakr encourages us to imagine that the heavens are eliminated and to realize that time would nonetheless continue (§2.2.1, *Maṭālib*, vol. 5, pp. 26–7). The linking of these two thought experiments, the second of which is securely tied to Abū Bakr by other sources, is strong evidence that the house scenario is his brain child. The same probably therefore applies to a third scenario, which is added in §2.2.1 for good measure: imagine a person born deaf and blind, who has never become aware of the sun or stars. If he concentrated on stilling his breath and blinking, like the unsighted man in the house, he would continue to perceive time's passing.

What are these thought experiments intended to show us? At first the answer seems obvious from the context: that the (objective, not merely mental) existence of time is something we grasp immediately, with no need for proof. In particular, we do not get to know about time via motion. Hence the envisioned scenarios present people who experience no motion, but nonetheless are aware of time passing.²⁴ Notice that in the first version of the house thought experiment, the man is even able to compare *amounts* of time, considering that one span of time is half of another even without motions that these time spans could measure. All of this makes good sense, since as we have seen, Abū Bakr is known to have taught that there is no need to prove the existence of time. Also, it fits well with what we know about his five eternal theory, in the sense that time as such is (epistemically) prior to any motion. As several sources tell us, he

22 Abū Bakr al-Rāzī, *Rasāʾil falsafīyya*, pp. 151–2.

23 On this see Adamson, *Platonic Pleasures*.

24 It is perhaps worth noting how reminiscent this is of the more famous 'flying man' thought experiment devised by Avicenna, in which sensory deprivation does not prevent self-awareness, as opposed to the awareness of time. The main difference in set-up is that Abū Bakr's man in the house still has the opportunity to touch things, such as the floor he is sitting on, whereas Avicenna's flying man is in midair with his limbs stretched out. Abū Bakr's less radical thought experiment is sufficient for his purpose, since his sense of touch is not giving him access to motion (and in particular to heavenly motion; see immediately below).

believed that we know before and after through time, not vice-versa.²⁵ We can then measure off 'relative' motions, like days, with the help of motions such as the sun's supposed orbit around the earth. This relative sort of time would in fact depend on motion for its existence.²⁶ The same point is made in one of the arguments listed by Faḥr al-Dīn (§2.1.6, *Maṭālib*, vol. 5, p. 24).

On the other hand, it is striking that in all three scenarios described by Abū Bakr, or at least in Faḥr al-Dīn's presentation of those scenarios, there is a specific reference to *heavenly* motion. In the second scenario the heavens are imagined to vanish (or in one version, to come to rest²⁷), and in the other two scenarios sensory deprivation is said to prevent awareness of the motion of the sun, moon and stars, but not the passage of time. This suggests that Abū Bakr was actually offering not so much (or not only) a positive case for time's immediacy, as a critique of a rival theory of time. According to this rival theory, time would be linked to heavenly motion rather than to motion in general. Abū Bakr might have had in mind the *Timaeus*, of course, but another relevant text would be Alexander of Aphrodisias' *On Time*. It proposes that 'time is the number of the movement of the [outermost] heavenly sphere'²⁸. Alexander hoped to head off a potential objection, namely that various motions would have various uncoordinated times.²⁹ Since the outermost sphere's motion is the fastest, it could be used as a baseline against which to compare all other motions.

So it would seem that Abū Bakr's thought experiments had a fairly narrow target, namely the claim that time is the number not just of any motion, but of celestial motion. Nonetheless, Faḥr al-Dīn introduces the house thought experiment at the beginning of a series of more general arguments for the epistemic immediacy of time. Given its mention of the heavens, its rightful place is in the second series of arguments in this *faṣl*, which (taking up the issue of Abū Bakr's original polemic) refute the association of time with celestial motion. Faḥr al-Dīn marks the transition between the two series of arguments as follows: 'having established that the knowledge of the existence of duration and time is immediate and primary, we say: this duration cannot be asserted on the basis of the motion of the sphere or of any attribute having to do with the motion of

25 Abū Bakr al-Rāzī, *Rasā'il falsafīyya*, pp. 195 and 200.

26 Ibid., p. 198.

27 Ibid., p. 199.

28 Sharples, Alexander of Aphrodisias, *On Time*, p. 62 (Sharples' translation). Cf. Aristotle, *Phys.* IV.14, 223b18–23 on this possibility.

29 Apparently Abū Bakr made this objection himself. Nāṣir-e Ḥusraw reports: 'the sect of philosophers who said that matter and place are eternal also affirmed that time is a substance. And they said that time is an extended and eternal substance. They rejected the statement of those philosophers who said that time is the number of the motions of the body, and said that if this were so, then it would be impossible for moving things to move at the same time with different numbers' (Abū Bakr al-Rāzī, *Rasā'il falsafīyya*, pp. 166–7).

the sphere' (*Maṭālib*, vol. 5, p. 26). In keeping with this structure, most of the arguments in the first series (§2.1) do indeed argue positively and on general grounds for the immediacy of time to the intellect.

Particularly noteworthy for our purposes are the last two arguments of the first, general series (§2.1.9–10, *Maṭālib*, vol. 5, pp. 25–6), which argue that we need time in order to compare motions one to another.³⁰ In §2.1.9 we consider pairs of motions that begin simultaneously, or in which one motion begins before the other. We have immediate or 'necessary' knowledge of this simultaneity, beforeness or afterness, and these immediate notions involve time (since to know that motion A is simultaneous to motion B is just to know it happens at the same *time*). Similarly, in §2.1.10 it is argued that we have necessary knowledge of one motion being slower than another, and that this too 'presupposes the existence of time'. The language of 'necessary (*ḍarūrī*) knowledge' used here and indeed throughout *faṣl* 2 is *kalām* terminology.³¹ It indicates that notions like simultaneity are, so to speak, inevitably forced upon us rather than being reached through some indirect process of reasoning. Since an explanation of these notions inevitably contains reference to time, it turns out that time too is known 'necessarily'.

It is worth dwelling on these two arguments, because they look ahead to the Avicennan theory of time that will be presented in *faṣl* 3. Avicenna thought he could prove the existence of time by referring to motions that begin at different times, or have different speeds. This leaves us with something of a puzzle: why should reflection on the same scenarios yield in *faṣl* 2 the result that time's existence is immediate with no need for proof, and in *faṣl* 3 a proof of time's existence? Since Faḥr al-Dīn does not provide critical remarks in this second *faṣl*, we cannot be sure how he would answer this question. But he may well be anticipating an Avicennan objection, namely that this supposed 'necessary knowledge' is in fact nothing more than the operation of *wahm*, which as mentioned above is a faculty subject to powerfully attractive, but sometimes misleading, beliefs. It is not enough that we naturally or even inevitably think about time when we compare motions.³² Rather, what is called for is proof that these

30 Cf. Abū l-Barakāt, *Mu'tabar*, vol. 2, p. 73: 'those who say that someone unaware of motion is unaware of time have it backwards. We say to them that on the contrary, someone who is unaware of time is unaware of motion! For someone who is aware of motion is aware of the before and after in respect of the interval, and he does not put together the before and after in [the interval], but rather in the mind. This before and after applied to a before and after [in the interval] is time'.

31 See e.g. Ibrahim, Immediate Knowledge.

32 This may explain why Faḥr al-Dīn refers to 'innate intuitions' and the like in other arguments in this *faṣl* (for instance *al-fiṭra al-aṣaliyya* in §§2.2.2, 9 and 10: *Maṭālib*, vol. 5, pp. 27 and 30): he is trying to call attention to the fact that Abū Bakr's view depends exclusively on such ungrounded beliefs.

concepts have a basis in reality. Ironically, though, Faḥr al-Dīn will turn that possible rejoinder against Avicenna's own theory.

3 Faḥr al-Dīn on Avicenna's Proof of Time's Existence

That brings us to the main event in this section of the *Maṭālib*: Faḥr al-Dīn's presentation and refutation of the proof of time's existence found in the *Šifā'* and *Naḡāt* (he refers explicitly to both texts, and to the popularity of the theory, at *Maṭālib*, vol. 5, p. 33). Faḥr al-Dīn quotes almost verbatim from the version in the *Naḡāt* (cf. *Healing: Physics* II.11.1–2).³³

§3.1.1, *Maṭālib*, vol. 5, pp. 33–4: (a) If a motion allocated to a given interval (*masāfa*) with a given speed, has along with it another motion at the same speed, with the same starting and stopping points, they traverse the interval simultaneously (*ma'an*). But if (b) one of them begins without the other yet having begun, but they finish together, then one of them traverses less [of the interval] than the other does. (c) If they do begin together, but one moves more slowly (though they have the same starting and stopping points), then the slow one is found to traverse less [of the interval] while the fast one has traversed more. This being the case, between the starting point and stopping point of the first, fast one is a possibility to traverse a certain interval at a certain speed, or less than that interval at a certain slower speed. And between the starting and stopping points of the second fast one is a lesser possibility than this with respect to that determined speed, insofar as this possibility is [only] a part of the first possibility.³⁴ This being the case, this possibility is susceptible to increase and decrease. So necessarily, it must be something that exists.

Avicenna's approach accepts the Aristotelian view that time is a number or magnitude of the prior and posterior in motion (as he says explicitly at *Healing: Physics* II.11.3). What he has added is a specification of this magnitude: it is the possibility (*imkān*) associated with moving a certain distance at a certain speed.

The point of the comparison between the three scenarios envisioned here, on Faḥr al-Dīn's interpretation, is as follows:

§3.1, *Maṭālib*, vol. 5, p. 34: The first scenario (a) establishes the existence of this thing we call time. The second scenario (b) establishes that this possibility is different from³⁵ the motion itself, from the slowness and speed of [the motion] themselves, and from the magnitude of the motion³⁶. The third scenario (c) establishes that this possibility is something distinct from the magnitude of what moves and from the extent of the interval.

33 Avicenna, *al-Naḡāt*, vol. 1, p. 143.

34 This sentence is describing case (b), which is why the second motion is described as 'fast'.

35 Reading *muḡāyir* as in two manuscripts instead of *musāwī* ('equal') preferred by the editor.

36 Reading *al-ḥaraka*.

This summary, which receives a lengthy and somewhat pedantic further explanation in the *Maṭālib*, strikes me as basically correct (for a caveat, see below). Avicenna does want to show that time is something real, that is, objectively existent; that is a magnitude, since it can be compared in terms of larger and smaller (for instance it takes a longer time to travel the same distance at a slower speed); and that it cannot simply be identified with any of the other magnitudes in question here. This last point is made explicit by Avicenna himself, in fact (*Healing: Physics* II.11.2).

Avicenna also emphasizes that time cannot, as Abū Bakr al-Rāzī alleged, be self-subsisting. Rather it must be dependent on motion, since the possibility in question ends along with the end of the motion (*Healing: Physics* II.11.2). Faḥr al-Dīn does not mention this aspect of Avicenna's proof in his exposition, perhaps because for the question of time's objective existence, it is not important to decide whether time is self-subsistent or depends on motion—it will objectively exist either way. This is worth emphasizing: Faḥr al-Dīn is scrupulous in sticking to the question of whether time exists, as opposed to anticipating the next topic of what time is. Here we have a contrast between him and Avicenna. Although Avicenna does, as we have seen, distinguish between the questions of time's existence and its essence, he says that these are two birds one can kill with one stone: 'having pointed out the false teachings regarding time's essence, it is fitting that we point out the essence of time, from there, its existence will become clear to us' (*Healing: Physics* II.10.13). In this respect, Faḥr al-Dīn's summary of Avicenna's purpose is accurate, but incomplete—for Avicenna thought the three scenarios also reveal time's essence.

It is solely on the terrain of time's existence, then, that Faḥr al-Dīn will criticize Avicenna by posing three objections (politely labeled as 'questions', §3.1.1–3). The first is that Avicenna's account is circular. To speak, for instance, of 'fast' and 'slow' motions is already to smuggle in talk of time, 'because the fast is that which traverses what the slow traverses in less time, or traverses more than the slow does in an equal time' (§3.1.1, *Maṭālib*, vol. 5, p. 36). If we must presuppose time in order to describe something as faster or slower, as in principle (c), or as leaving at the same or different 'instants', as in scenario (b),³⁷ then we cannot even describe the scenarios in question without presupposing that time exists. Here, I think that Avicenna would probably respond that the speed and simultaneity of motions are obviously real phenomena, so if they cannot be described without invoking time then we can take time's objective existence too as secure.

37 In fact Avicenna avoids using the word 'moment' or 'instant' (*ān*) here, instead talking about motions beginning or ending 'together' or not. But Faḥr al-Dīn could, I think, rightly insist that this term 'together' can only be understood as temporal simultaneity, that is, occurrence at one and the same moment.

But this is too quick, if you'll pardon the expression. For Faḥr al-Dīn is not arguing that time may after all not exist, or only exist mentally. Rather, he is objecting that Avicenna has not ruled out the option explored in *faṣl 2*, namely that time is known immediately. As he says:

§3.1.1, *Maṭālib*, vol. 5, pp. 36–7: The existence of time is either in no need of proof (*istidlāl*), or does need to be proven. In the first case, going through this proof is needless. In the second case, we say, you are only able to conclude to the existence of time through these premises. But we have shown that one can establish these premises only once one knows that time exists. So the argument is circular, and hence obviously invalid.

Here, we should think back to the arguments of *faṣl 2*, which invoked these very same scenarios (§2.1.9–10: one motion beginning after another; one motion slower than another) to persuade us that there is no need to prove time's existence. It seems that there, Faḥr al-Dīn was already preparing the way for an objection to Avicenna: even if we must concede time's objective existence to make sense of the scenarios described in the *Naḡāt* and *Šifā'*, we would not thereby have proved anything. Rather, we might be just exploiting our immediate awareness of time as existent.

Even the concession that time must exist objectively, in order to make sense of the three scenarios, is short-lived. For Faḥr al-Dīn's next move is to argue that the scenarios can establish only mental existence after all.

§3.1.2, *Maṭālib*, vol. 5, p. 37: According to your teaching, whatever is judged to increase and decrease must certainly be something existent ... But it is known of elapsing things that their³⁸ parts are not stable, and their portions have no endurance. This being so, it is not right to make a judgment here about the thing itself on the basis of increase and decrease. Rather, the most that can be inferred (*al-gāya mā fī l-bāb*) is that the extended thing depicted in the estimation (*wahm*) can be judged as increasing and decreasing. But time as something extended has no existence whatsoever in objective reality (*fī l-a'yān*).

As I promised above, we here see Faḥr al-Dīn using against Avicenna the characteristically Avicennan tactic of reducing an opponent's confidently asserted conclusion to a mere figment of the *wahm*. In this case, the objection is a spin on a traditional skeptical argument about time, one already familiar from Aristotle:

Physics IV.10, 217b33–218a3: One part of it (τὸ μὲν αὐτοῦ) was, and is no more, while another part of it (τὸ δέ) will be, but is not yet. But time, whether indefinite or as an amount taken in each case, is made up of these. But what is made up of what does not exist cannot, it would seem, have any part in existence.

38 Reading *annahā* for *allatī*.

When Faḥr al-Dīn says that the parts of time that make it extended have no stability or endurance (*tabāt, istiqrār*), I believe he likewise means that what has elapsed is already non-existent, whereas what has yet to elapse is not yet existent. If, then, we are comparing time spans in terms of relative magnitude, we are comparing things with no objective existence. This shows that the comparison is an act of *wahm*, in the sense of spurious supposition. The most that reflection on Avicenna's scenarios can yield is a recognition of time's mental existence. But this is no achievement at all—even the skeptic of *faṣl* 1 was apparently ready to concede that, and the whole discussion concerns objective existence.

A final set of remarks on Avicenna's proof is labeled as a single 'question' but in fact consists of three independent arguments. The first (§3.1.3.1, *Maṭālib*, vol. 5, pp. 37–8) is a regress argument of the sort already familiar from the first, skeptical *faṣl* (cf. §1.4). Within any given span of time, understood as the possibility to move a certain distance at a certain speed there is another, smaller possibility of the same kind. 'This being so, it follows that time has another time, to infinity'. Yet it is not obvious why this should follow. It seems to me that the smaller time spans would not demand the postulation of the higher-order times needed to trigger a regress. Rather, they are smaller possibilities that are (first-order) parts of the larger (first-order) possibility that is time. For instance, if someone moves at a certain speed across Europe, beginning in London at t_1 , arriving in Paris at t_2 , in Würzburg at t_3 , and finally in Munich at t_4 , then the possibility of going from Paris to Würzburg at that speed is just part of the possibility of going from London to Munich at that speed. Perhaps Faḥr al-Dīn would insist that since the time span from t_2 to t_3 is happening within the time span from t_1 to t_4 , a part of the larger time span is measured by the smaller time span. This would yield the desired regress, but I do not see why Avicenna should admit that parts of time spans need to be measured the way that motions do, since time spans (or their parts) do not move over certain distances at certain speeds.

In the next refutation (§3.1.3.2, *Maṭālib*, vol. 5, p. 38), the worry is that the time extending from now until tomorrow is already elapsing. If this time already exists now, 'this yields the result that the time which will elapse tomorrow is occurring now, and is present in this moment.' We might make better sense of the argument by phrasing it in terms of parts and wholes:

- (1) There is a time, call it t , which extends from now until tomorrow.
- (2) t objectively exists now.
- (3) If t objectively exists now, then the whole of t objectively exists now.
- (4) Part of t occurs tomorrow.
- (5) If the whole of something exists now, then each of its parts exists now.
- (6) Therefore the part of t that occurs tomorrow exists now.

If this is right, the objection complements the argument for merely mental existence, just discussed above (§3.1.2). There, we were told that if past and future do not exist now, then time cannot exist as an extended thing. Here, we instead assume that time does exist (now) as an extended thing—this is why one might be tempted to endorse the suspicious-looking premise (3). After all, if the *whole* time span *t* from now until tomorrow doesn't exist now, or at any other given moment, then how can we say it exists as an extended thing? But once this has been conceded, then given the plausible mereological premises (4) and (5), the paradoxical result (6) does seem to follow.³⁹

Finally, Faḥr al-Dīn proposes a spatial analogue to what Avicenna has said about time:

§3.1.3.3, *Maṭālib*, vol. 5, p. 38: Between the top and bottom of a drinking-cup, there is a possibility to accommodate a certain magnitude of bodies, which would not be filled by a lesser magnitude, and would not accommodate a larger one. So it is necessary that this possibility, which accommodates that measure of body, is something existent. This forces you to acknowledge the existence of self-subsisting extensions (*ab'ād*) which are places for those bodies.

To which one might reply: so what? Well, in his discussion of place, Aristotle raised and then rejected the view that place is to be identified with extension (διάστημα, *Physics* IV.4, 211b14–29).⁴⁰ In this he is followed by Avicenna who criticizes the idea of place as extension (*bu'd*) in *Healing: Physics* II.7.3–9. Faḥr al-Dīn's argument, if successful, would therefore have some dialectical bite, by forcing on Avicenna the unwelcome conclusion of admitting the existence of such extensions.⁴¹ Speaking of dialectic, he characteristically proposes a response on Avicenna's behalf, which is that the possible presence of bodies in the cup is not to be reified as a distinctly existing *zarf* for those bodies—a more abstract 'vessel' within the concrete vessel that is the cup. Rather, Avicenna could say, there is nothing more here than the possible existence of bodies. But this of course would play right into the objector's hands, since we could say the same about motion and time. In other words, we could say that there are possible motions with certain speeds and distances, without identifying the possibility as an objectively existing *zarf* for those motions.

From all this we learn that, if Avicenna wants to deny the presence of objectively existing extension in the cup, but to assert the objective existence of

39 The argument is akin to one presented by Aristotle at *Phys.* IV.10, 218a21–30.

40 On this see Morison, *On Location*, pp. 121–32.

41 In fact Faḥr al-Dīn is, in a subsequent section of the *Maṭālib*, going to offer an elaborate defense of the claim that place is self-subsisting extension. On this see Adamson, *Fakhr al-Dīn al-Rāzī on Place*.

time as a possibility related to motion, he needs to find another disanalogy between possible locatedness and the possibility he identifies with time. This is, I think, something he could readily do. In the case of time, he has said that any given motion moves over a given distance with a given speed—inevitably then, time will exist objectively as a function of that distance and speed. There is nothing else that can play this role. In the case of location, though, we already have something to do the job the extension might do. This is the sort of place acknowledged by both Avicenna and Aristotle: ‘the surface that is the limit of the containing body’ (*Healing: Physics* II.9.1). Since this surface would have magnitude, it would suffice to invoke it in order to explain why the bodies in the cup (for instance beans poured into it) will take up a certain amount of the cup and no more. The analogy to Avicennan time is a close one: just as there are many places (containing surfaces) for many amounts of body that could be placed into the cup, so are there many possibilities of moving various distances at various speeds. According to Avicenna, place and time are both ontologically dependent on body and motion. But they are nonetheless objectively existent.

3.1 The Method of Beforeness and Afterness

Faḥr al-Dīn is now ready to move on to consider in detail another proof of time’s existence, which he says employs ‘the method of beforeness and afterness’ (*ṭarīqat al-qabliyya wa-l-ba’diyya*) (*Maṭālib*, vol. 5, p. 38). The basic idea is expressed quickly, but the arguments for and against the idea are rather elaborate. This is apparently largely the work of Faḥr al-Dīn himself, since he says that the proponents of this method speak unclearly, whereas he will present the view in a clear and well-ordered fashion. The key idea is as follows:

§3.2, *Maṭālib*, vol. 5, p. 39: There is no doubt that the father is existent before the existence of the son. This beforeness is either the same as the existence of the father and the non-existence of the son, or it is something additional to this. But the first is false.

We then get six arguments that the existence of the father and non-existence of the son is not the same thing as beforeness. Probably the simplest and most convincing rationale is that the father could later on exist without the son again, if the son died first (§3.2.1.3, *Maṭālib*, vol. 5, p. 39). So beforeness is something other than the father’s existing. The next step is to show that this something else exists, and exists not just mentally but objectively. Objective existence is proven with surprising ease: Faḥr al-Dīn simply asserts that the father’s being before his son is obviously not just a figment of our minds, but a real feature of the world (*Maṭālib*, vol. 5, p. 40). Finally, beforeness and afterness are shown to be dependent on a subject, rather than self-subsistent, since they ‘fall into the

class of connections and relations' (*min bāb al-nisab wa-l-iḍāfāt*) (*Maṭālib*, vol. 5, p. 41). To what do beforeness and afterness belong, then? Not to the father and son, since they are only accidentally before or after one another. Rather, there must be something else which is essentially the subject of beforeness and afterness, and which 'is existent, flowing and elapsing'—this is time (*Maṭālib*, vol. 5, p. 41).

The arguments mounted against this method of beforeness and afterness are rather familiar. First, Faḥr al-Dīn argues on several grounds that beforeness and afterness themselves are not 'existing intentions' (*ma ʿānī mawḡūda*). For instance, non-existence can be 'before' something else, and if before is an attribute of the non-existent then it too is non-existent (§3.2.2.1.1, *Maṭālib*, vol. 5, pp. 41–2). We have seen exactly this argument above, in the first *faṣl* (§1.12, *Maṭālib*, vol. 5, p. 19). More interesting are arguments that focus on the relational nature of beforeness and afterness. Faḥr al-Dīn points out (§3.2.2.1.3, *Maṭālib*, vol. 5, pp. 42–3) that since beforeness and afterness are correlative, they must exist simultaneously (*ma ʿan*: a parallel case would be that whenever A is to the left of B, B is simultaneously to the right of A). But in that case, the things that are related as being before and after are also simultaneous,⁴² which is absurd. Again (§3.2.2.1.4, *Maṭālib*, vol. 5, p. 43) if beforeness and afterness are simultaneous, then we will need a second-order time to explain how these two temporal relations can themselves bear a temporal relation to each other. This is just the latest version of the regress threat that has presented itself frequently in this part of the *Maṭālib*.

3.2 Time as Subject of Division

We are still searching, then, for a way to prove the objective existence of time. As that last argument brings home to us, there are certain dangers to which the theories we have been considering repeatedly succumb. One of the most prominent is this threat of infinite regress. What is wanted, then, is a conception of time according to which time does not happen *at another time*. In the remainder of the third *faṣl*, Faḥr al-Dīn provides two more arguments for time's existence that can avoid this consequence. He will endorse the final argument; it is less clear what he thinks about the penultimate one, since it goes without criticism after he presents it. On the other hand, he makes no positive remark about it apart from noting its immunity to regress arguments.

42 The point here is that attributes cannot exist without their subjects' existing. So if beforeness and afterness are simultaneously existent, and if the father is the subject of beforeness, while the son is the subject of afterness, then the father and son must exist simultaneously.

This time, the key insight is that we routinely make use of temporal divisions, like years, months, and days—and these must be divisions of something (§3.3, *Maṭālib*, vol. 5, pp. 43–4). Whatever it is that is divided in this fashion (their ‘source’ or ‘basis’ (*mawrid*), *Maṭālib*, vol. 5, p. 44, line 11) will be time. Of course this cannot be non-existent, since non-existence cannot be divided into parts, to say nothing of parts of different lengths (as years are longer than months). Furthermore, we know that it is not purely non-existent, because ‘if this thing had no presence or occurrence whatsoever, then the mind could not possibly judge it to be past or future’ (*Maṭālib*, vol. 5, p. 44). On the other hand, time’s existence is qualified in a certain sense. We are told next that there are two kinds of existence, those that are *qārr* and those that are not. Helpfully, we are told exactly what this means. Something is *qārr* ‘if its parts are present simultaneously’⁴³. I therefore propose to translate this word interpretively as ‘integral’ (rather than a more literal translation like ‘stable’ or ‘permanent’). So is time integral or not? Obviously not, because different moments of time do not occur together. This will help the proponent of this proof avoid arguments like the one analyzed above, where the time occurring tomorrow wound up occurring now (§3.1.3.2).

From the non-integral nature of time we can furthermore conclude that time is not to be identified with any integral existent, such as body or its predicates (*maqūlāt*—and examples are given from the list of 10 categories, *Maṭālib*, vol. 5, p. 45). Nor is time motion or any of motion’s attributes. This is less obvious, since motion is itself presumably a non-integral existent. But we have already seen good grounds for saying that time is prior to motion, and Faḥr al-Dīn repeats them here: motion involves succession, which presupposes time as a ‘vessel’. Finally, as already mentioned, Faḥr al-Dīn asserts that regress arguments will be ineffective against this proof. For the time we are envisioning here is nothing other than the container for motions, which can be divided into years and so on. This time is not ‘like this and like that’ (*laysa ka-dā wa-lā ka-dā*) (*Maṭālib*, vol. 5, p. 46). By this, I suppose that he means that times do not on this view need to be recognized as ‘before’ or ‘after’ one another, for instance. So minimal is the understanding of time here that times have no further temporal properties that would give rise to a second-order kind of time.

Faḥr al-Dīn goes through this whole exposition without naming a source, but the ideas seem to go back at least as far as Abū l-Barakāt al-Baḡdādī. At the beginning of his treatment of time in *Muṭabar*, Abū l-Barakāt writes about the intuitive view of time shared by most people:

43 Notice that the distinction is the same as that between actual and potential infinities; we could say that the infinite is possible only if it is ‘non-integral’, that is, potential.

Kitāb al-Muʿtabar, vol. 2, pp. 69–70: They [sc. people in general] divide time into past, present and future, and into parts which they call days, hours, years, and months. They define these divisions by means of motions, like days through the risings and settings of the sun, and months through the cycles of the moon, and years through the cycles of the sun, or through some other temporal features, for instance periods of heat or cold.

The technical term *qārr* is also found in Abū l-Barakāt, who likewise denies that time is ‘integral’ (*qārr*) (*Muʿtabar*, vol. 3, p. 40, line 1).⁴⁴ Faḥr al-Dīn has, however, made several alterations to the view to present it here in the third *faṣl*. For one thing, he drops the idea of tying divisions of time to (heavenly) motions, albeit that one could see this as implicit in the reference to years, months and days. For another, he is more explicit that time is something with an independent existence being divided by us, and he finally adds that the method is proof against regress arguments. In short, Faḥr al-Dīn is presenting this as a robust theory that can withstand criticism, whereas Abū l-Barakāt’s presentation is more that of an intuitive, popular conception of time.

Since Faḥr al-Dīn does not attempt any criticisms of this third proof, we will have to do it for him. One worry might be that this proof looks remarkably like considerations that were offered in support of time’s epistemic immediacy (especially §2.1.6). Faḥr al-Dīn even speaks repeatedly of our ‘necessary’ knowledge in presenting the proof, for instance remarking that the division of time into years and so on ‘is immediate and patently evident’ (*Maṭālib*, vol. 5, p. 44). Why then does this count as a proof of time’s existence rather than another consideration in favor of its epistemic immediacy, that is, of time’s needing no proof? The answer, I think, is that although it is immediately obvious that we distinguish time spans like years, months and days, it requires an inference to realize that there is something existent which is being so divided. A further worry, though, might be that years, months and days seem evidently to be mentally imposed and arbitrary divisions. How, then, could the need for a subject of

44 Cf. his discussion of the question at vol. 2, pp. 76–7; here *qārr* is paired with the term *ṭābit*, and a duration that has this ‘integral’ nature is said to be *dahr* (and to apply to God) rather than *zamān* (which applies to created things). For Abū l-Barakāt’s understanding of the term see also vol. 3, p. 19, where accidents are divided into mental and existential, the latter being divided into those that are *qārr* and those that are not. This is then used to classify the ten categories into three groups. Action and being-acted-on are said to be not *qārr*. Accidents that count as *qārr* are those that ‘exist for a period of time according to the same, or approximately the same, defining limits (*ḥudūd*).’ Thus Abū l-Barakāt explains *al-qārr* more in terms of persistence over time (as is also suggested by *ṭābit*), but the notion seems to be the same as that in Faḥr al-Dīn, given that it is contrasted to such things as actions, which are not fully actual as they are occurring. See also above, n. 5, for his use of the term when setting out various views about time, and also *Maṭālib*, vol. 5, p. 90, for further use of this language in the context of Avicenna’s definition of the words *dahr* and *sarmad*.

division lead us to assert the objective, and not just mental, existence of time? Again, a spatial analogy might be useful: we can mentally impose divisions on a spatial magnitude, and these divisions are arbitrary. But for this to be possible, there must be an objectively real magnitude to be divided, that is, a body.⁴⁵

The Stipulative *kalām* View

Finally, Faḥr al-Dīn comes to his favorite demonstration of time's objective existence:

§3.4, *Maḥālib*, vol. 5, p. 47: A man might say to someone else, 'I will come to you when the sun rises', or 'I will come to you when spring is here.' In fact what this means is that the coming of the man is unknown, but the rising of the sun is known. Thus, this unknown thing is being connected to this known thing, so that the unknown thing may become known thanks to that connection. With this in mind, right-thinking people (*ahl al-tahqīq*) said, 'reckoning time is equivalent to connecting an imagined (*mawhūm*) event to a known event, so as to remove doubt'⁴⁶.

This is not an idea that Faḥr al-Dīn invented himself. It goes back to pre-Avicennan *kalām*, as is reported by al-Aṣ'arī:⁴⁷

Some say that the moment (*al-waqt*) is that which one stipulates (*tuwaqqitu*) for something, so that when you say, 'I will come to you when Zayd arrives,' you have made Zayd's arrival the moment for your showing up. They claim that moments are the motions of the celestial sphere, because God, the great and mighty, stipulated them for things. This is the statement of al-Ġubbā'ī.

Avicenna then took up this theory in his discussion of time in the *Physics* of the *Healing*, at II.10.1, describing it as the view that 'time is the collection of moments, the moment (*al-waqt*) being some event that happens, which is posited to exist along with another event, so that it is a moment for the other'.

Notice though that al-Ġubbā'ī seems to have set out his 'stipulative' understanding of moments only as the first half of a two-component theory of time. The second half adds that God stipulates the moments at which heavenly motion

45 Cf. Avicenna, *Healing: Physics*, III.3.1: 'Before the division, every body lacks parts entirely, and it is the existence of division that makes the part, whether that division is by severing the continuity ... or by the act of the estimative faculty and positing'.

46 The view is also mentioned at *Mabāḥiṭ*, vol. 1, p. 761, which similarly emphasizes that the unknown or obscure is being made known through the act of stipulation.

47 Al-Aṣ'arī, *Maqālāt al-islāmiyyīn*, p. 443. Cited also as background for Avicenna in McGinnis, *The Topology of Time*, p. 9.

will occur. I take this to be a way of securing the traditional association of time with celestial motion, as opposed to motion in general (see my discussion of this above in section 2). It may seem that Avicenna's version simply eliminates this aspect of the original *kalām* theory, but if we turn ahead to the critique of the theory at *Healing: Physics* II.10.6, we notice that the example has changed. Now, we agree that I will meet you *when the sun rises*. This would build both parts of al-Ġubbā'ī's theory into a single move: God has already stipulated moments by associating them with heavenly motions, and we can avail ourselves of those moments to coordinate events such as our meeting.

Now on the one hand, similar examples involving celestial phenomena are used by Faḥr al-Dīn (§3.4): 'I will arrive when the sun rises' or 'when spring is here'. But when he considers the relation between stipulated moments and heavenly motions, we lose the sense that celestial motion is primary in understanding time. He insists that the moment is a 'vessel' (again, the word is *zarf*) not only for my arrival but also the sunrise. The moment does not depend on the heavens in order to exist objectively. For instance, Faḥr al-Dīn suggests, it is conceivable that God could make the heavens grind to a halt and then perform some further action while they were at rest. The implication is that, were He to do so, He would be acting at some moment, despite the absence of heavenly motion (cf. the arguments of Abū Bakr al-Rāzī discussed in *faṣl* 2). So the moment is not to be identified with either the heavenly motion or any attribute thereof (*Maṭālib*, vol. 5, pp. 47–8). What survives of al-Ġubbā'ī's theory is only the basic notion that time is made up of stipulated moments. Even the idea that God has primacy in stipulating such moments seems to have vanished; it is already eliminated from the theory by Avicenna's summary in the *Šifā'*, and Faḥr al-Dīn makes no move to restore it.

Avicenna does not just summarize the stipulative view in the *Šifā'*, he also refutes it. At first, what he says seems at least compatible with the theory of al-Ġubbā'ī: 'simultaneity indicates something different from the two [simultaneous] motions' (*Healing: Physics* II.10.9). This something would be precisely that which al-Ġubbā'ī designates as a 'moment'—it is stipulated to serve as a link, by means of which two events are coordinated. But Avicenna now says that this very observation leads us to see a problem (II.10.10). He describes the *kalām* view by saying that it 'makes moments events (*a'rād*) that give moments to other events'. But obviously, the moment will not be able to bestow temporal properties like simultaneity just by being an event. *Qua* event, it too has to be 'given a moment', just as much as the sunrise stands in need of something to coordinate it with other events temporally. We could think of this as a regress argument: if a moment needs to be stipulated in order to coordinate my arrival and the sunrise, then something further will be needed to coordinate that stipulated moment with my arrival, or with the sunrise.

Rather surprisingly, given his own fondness for regress arguments, Faḥr al-Dīn does not explicitly raise Avicenna's objection, let alone respond to it. Instead he proposes two other avenues of refutation, and dismisses both of them in fairly short order. The first objection (§3.4.1.1) is that we could simply assert a direct connection between the two events, e.g. my arrival and the sunrise, rather than postulating a third thing that would help to connect them. To this Faḥr al-Dīn retorts that the connection in question is nothing more nor less than 'occurring at one and the same *moment* and *time*' (§3.4.2.1, *Maṭālib*, vol. 5, p. 49). The reason this seems rather unsatisfying is well articulated in the second objection (§3.4.1.2), which is that Faḥr al-Dīn is basing himself on conventional use of language. His answer is very interesting:

§3.4.2.2, *Maṭālib*, vol. 5, p. 49: Debates are meaningless unless one puts together necessary pieces of knowledge (*tarkīb 'ulūm ḍarūriyya*), for the sake of reaching sought conclusions that are not known innately. This will never be achieved unless one acknowledges the soundness of immediate judgments. In this case, when we consider it, we know that all intact intellects endorse the soundness of stipulating a moment (*tawqūt*) in this way. Then, when we consider it, we know that these immediate premises imply asserting the existence of time.

Notice how his answer implies an explanation of why the stipulative view belongs here in the third *faṣl*, and not in the second where we considered the view that time's existence is acknowledged immediately. Faḥr al-Dīn tells us that immediate knowledge is relevant, but an inferential step is needed to get from there to time's existence: time is needed in order to explain how we are able to stipulate moments.⁴⁸ That we do indeed stipulate moments, though, is something we know necessarily and immediately.

In light of this, Faḥr al-Dīn may have felt no need to rebut Avicenna's critique in the *Šifā'*. Bear in mind, he is not trying to demonstrate the nature or quiddity of time, only to prove that there is such a thing as time. Avicenna said in his refutation of the stipulative view that the moment's occurrence is not the 'true nature (*ḥaqīqa*) of earlier, later, or simultaneous' (*Healing: Physics* II.10.10). Perhaps not, Faḥr al-Dīn might reply, but the moment's occurring does show that time exists. It is however also worth recalling his remark at the end of the third, unrefuted proof of time as that which is divided into years, months and so on. What he said there was (*Maṭālib*, vol. 5, p. 46) that the vessel

48 It seems likely that Faḥr al-Dīn is taking al-Ġubbā'ī's idea in a rather different spirit than originally intended. One can understand this earlier proposal to be not an attempted proof of time's existence, but rather an epistemic point: God mercifully provides us with celestial motions to help us coordinate other events. Al-Ġubbā'ī was not necessarily arguing for the existence of time as a thing distinct from both the rising of the sun and some other event, which seems to be the point Faḥr al-Dīn wants to take from the example.

(*ẓarf*) for motions stands in need of no further vessel. He may be thinking the same thing here: the moment (*al-waqt*) which is a vessel for events like the sunrise would not itself have temporal properties that need to be explained with reference to a further vessel. In other words, Avicenna would be wrong in supposing that a moment considered in itself is just another kind of event that needs to be coordinated with other events in terms of beforeness, simultaneity, and afterness. That we are invited to see the fourth proof as at least compatible with the third proof is indicated by the fact that the fourth proof speaks of time as 'something flowing', (*Maṭālib*, vol. 5, p. 48) which seems to mean the same as the denial that it is 'integral' in the third proof. Still, it seems to be this fourth and final proof that Faḥr al-Dīn finds most persuasive. He concludes the *faṣl* by saying, 'this discussion (*kalām*) is among the most evident of proofs, and strongest demonstrations for affirming what was sought' (*Maṭālib*, vol. 5, p. 49).

4 Conclusion

The sophistication of Faḥr al-Dīn's treatment of time's existence does not lie only in its abundance of detailed and sometimes technical argumentation. It is also remarkable for its methodological rigor and consistency. He adheres to several basic distinctions throughout. First, that between mental and objective existence. As we have seen, he is careful to say whether a proof (or in the second *faṣl*, a consideration that is not intended as proof) can establish objective existence. Underlying this scruple is a tacit metaphysical principle of parsimony, which is especially evident in the first, skeptical *faṣl*: the default assumption should be that time has only mental existence. If we are to believe in its objective existence, we will need to be offered a good reason to do so. This is Faḥr al-Dīn's version, we might say, of Ockham's Razor, albeit set forth several generations earlier and in terms of the Avicennan contrast between mental and objective existence. In addition, when it comes to the objectively existent Faḥr al-Dīn is scrupulous in observing the difference between asserting epistemic immediacy and actually offering proof. The two proofs he prefers at the end in fact come fairly close to accepting the epistemic immediacy of time. In both proofs, we are told that only one inferential step is needed to get us from something immediate and necessarily known (making divisions like years,⁴⁹ and stipulating a moment to coordinate two events) to the existence of time.

A further fundamental distinction goes back to Aristotle's discussion of time: asking whether time exists, as opposed to saying what it is. In the section

49 Cf. Faḥr al-Dīn al-Rāzī, *al-Risāla al-kamāliyya*, p. 68: 'most of the philosophers have affirmed time, saying that we know by necessity of the intellect that today exists, yesterday is past, and the future is yet to come. The difference between today, yesterday and the present is known by the necessity of the intellect, and whatever is like this cannot be doubted'.

we have examined, Faḥr al-Dīn is remarkably, perhaps unprecedentedly careful to adhere to the first of these two projects. This is something we might explain not only with reference to his *kalām* method, but also the Avicennan background. It would be natural to proceed this way if one habitually worked with a distinction between existence and essence. Of course, Faḥr al-Dīn does have something to say about time's essence too. The next section of the *Maṭālib* is devoted to it. In that section he mentions the idea that 'time' in the broader sense is in fact three things, one of which is 'time' in a narrow sense:

Maṭālib, vol. 5, p. 63: The relation of the changing (*al-mutaḡayyir*) to the changing is time (*zamān*), the relation of the changing to the unchanging (*al-tābit*) is everlastingness (*dahr*), and the relation of the unchanging to the unchanging is eternity (*sarmad*).⁵⁰

This is stated to be Avicenna's view in 'many of his books' (*Maṭālib*, vol. 5, p. 79)—here one might think for instance of *Healing: Physics* II.13.7 where Avicenna indeed explains the difference between *zamān*, *dahr*, and *sarmad*.⁵¹ Faḥr al-Dīn also declares his own preference for the teaching of Plato, according to whom 'time is a self-subsisting substance' (*Maṭālib*, vol. 5, p. 77). In the *Šarḥ 'Uyūn al-ḥikma* he makes the same threefold distinction and associates it with the (supposed) view of Plato that time 'exists in itself and is self-subsisting'.⁵² These claims, it seems to me, fit very well with what we have seen in his discussion of whether time exists. He thinks that we grasp time (in the narrow sense) by relating events in the changing world one to another, but resists proofs of the existence of time (in the broader sense that includes eternity) that imply its dependence on motion. But a full discussion of his view on the essence of time is something for another time.⁵³

50 Cf. id., *Maṭālib*, vol. 5, pp. 79–80. For this division of time into these kinds, cf. Abū l-Barakāt, *Mu'tabar*, vol. 3, p. 41, where he reports that certain people who want to say that God is not in time distinguish between *zamān* on the one hand, and *dahr* and *sarmad* on the other. He himself however thinks that there is a single notion of time or duration that can be applied to the changing and unchanging. The distinction between the eternity (*dahr*, *sarmad*) of the unchanging and the time (*zamān*) of the changing was already mentioned at *Mu'tabar*, vol. 2, p. 80, which is close in wording to the quotation here from *Maṭālib*, vol. 5, p. 63.

51 Cf. Avicenna, *al-Nağāt*, vol. 1, p. 147 for the difference between *zamān* and *dahr*. This idea will be further elaborated in the Safavid period by Mīr Dāmād; see Rizvi, *Between Time and Eternity*.

52 Faḥr al-Dīn al-Rāzī, *Šarḥ 'Uyūn al-ḥikma*, part 2, pp. 127 and 147.

53 This is offered in a forthcoming paper jointly authored by myself and Andreas Lammer, and entitled Fakhr al-Dīn al-Rāzī's Platonist Account of the Essence of Time. I am grateful to the editors of this volume for their careful reading of the piece and numerous helpful suggestions. I would also like to acknowledge the support of the Leverhulme Trust and DFG for the research that yielded the present paper, and members of an Arabic reading group at Munich devoted to the relevant sections of the *Maṭālib*. Finally I would like to thank Lukas

Appendix

Outline of the Arguments Concerning Time's Existence in *al-Maṭālib al-ʿāliya*

Faṣl 1: Arguments of those who deny time (*Maṭālib*, vol. 5, pp. 9–20): twelve proofs.

Introductory remark: time is not required either for successive or enduring entities; we need only the basic distinction between the eternal and the originated-and-successive.

- 1.1: Time itself can be neither persistent nor elapsing.
- 1.2: Time's existence cannot emerge from the existence of its parts, since this will lead either to atomism or non-existing parts.
- 1.3: Time can be neither generated nor eternal.
- 1.4: Regress: temporal priority can be explained only via second-order time.
- 1.5: God is prior to events, but this priority cannot be temporal. If this is possible in His case then in general priority does not require time.
- 1.6: If there were time then God's eternity would depend on time's existing, so He would not be the Necessary Existent.
- 1.7: If time existed it would exist necessarily, but only God exists necessarily.
- 1.8: An originated thing's being after non-existence would be necessary.
- 1.9: Time would be either continuous or discontinuous quantity; neither is possible.
- 1.10: Time would be either concomitant to motion or not; neither is possible.
- 1.11: Time would be either the measure of motion or not; neither is possible.
- 1.12: The non-existent can be temporally prior, so temporal priority is a feature of the non-existent. But features of the non-existent do not exist.

Muehlethaler, who helped me track down passages in Abū l-Barakāt referred to in the notes to this paper.

Faṣl 2: Arguments of those who claim that time needs no proof (*Maṭālib*, vol. 5, pp. 21–32)

2.1 Time is self-evident: ten proofs.

- 2.1.1: Thought experiment about the motionless man in the dark house.
- 2.1.2: Everything is either eternal or created, and either way time is presupposed.
- 2.1.3: One immediately understands time through notions like ‘before’ or ‘simultaneous’.
- 2.1.4: One immediately understands time by understanding motion.
- 2.1.5: The created and eternal are defined in terms of having or lacking a ‘beginning’ so time is presupposed by these notions.
- 2.1.6: The divisions of time (year, month, day, hour) presuppose time.
- 2.1.7: We innately compare stretches of time in terms of length.
- 2.1.8: The notion of consecutivity, past, future, present presuppose time.
- 2.1.9: It is necessary to understand that two motions can start or end simultaneously which presupposes time.
- 2.1.10: It is necessary to understand that two motions can vary in speed, which presupposes time.

2.2 Time is not asserted on the basis of any motion (e.g. of the sphere): eleven proofs.

- 2.2.1: Return to the house example: man is aware of time passing without reference to heavenly motion. Second thought experiment of the deaf and blind man.
- 2.2.2: Motion has no intrinsic priority; time is thus presupposed by direction.
- 2.2.3: It is obvious that time has always existed, doubtful whether heavenly motion has. Therefore they are not identical.
- 2.2.4: There are multiple heavenly motions but not multiple times.
- 2.2.5: Motion can be fast or slow, whereas time cannot.
- 2.2.6: Many-world hypothesis: a plurality of heavens would not imply a plurality of time.
- 2.2.7: Motion happens *at* a time and nothing can happen ‘at itself’.
- 2.2.8: Time would pass in the absence of a universe.
- 2.2.9: Our grasp of motion presupposes an antecedent grasp of time.
- 2.2.10: It would be possible for the universe to exist *before* it does, but this presupposes that there is (or at least could be) time before any motion.

- 2.2.11: The beginning of a motion does not presuppose prior motion, whereas the beginning of duration does imply previous duration. So they are not the same.

Concluding remark: If time is not motion, neither is it any of motion's attributes. The measures of time do not bring time into existence but only divide it.

Faṣl 3: Time's existence can be proved: four kinds of proof.

3.1: Avicenna's proof: time is proven to exist as a function of speed and distance (*Maṭālib*, vol. 5, pp. 33–6). Three cases considered: (a) Two motions which coincide in distance and speed. (b) Two motions equal in speed, one of which starts after the other. (c) Two motions that begin together but at different speeds. Case (a) establishes that there is time, case (b) establishes that time is not the same as motion, speed, or the size of what moves, and case (c) establishes that it is not the same as the distance covered. Conclusion of the proof: The possibility of moving a certain distance at a certain speed is quantitative—this is a *mawǧūd miqdārī*.

Three objections (*Maṭālib*, vol. 5, pp. 36–8):

- 3.1.1: The three cases (a) (b) and (c) already presuppose time, so this is either all circular or presupposes that time is self-evident (as held by the proponents of *faṣl 2*).
- 3.1.2: The time that can be extended and is thus quantitative has no external existence, but only mental existence.
- 3.1.3: Containment problems:
- 3.1.3.1: Each time can contain another time: regress.
- 3.1.3.2: Problem of overlapping future temporal durations.
- 3.1.3.3: The same argument could show that the possibility to contain bodies in a cup would be existent in its own right, which is absurd.

3.2: Second Proof. One thing's being before another (e.g. father and son) is not just reducible to the existence and non-existence of the two things; something else is needed, namely time (*Maṭālib*, vol. 5, pp. 38–43).

- 3.2.1: Six arguments in favor of this distinction:
- 3.2.1.1: We can conceive of father and son without being aware of temporal relation.
- 3.2.1.2: Beforeness is a relation and relations are distinct from the relata.

- 3.2.1.3: What happens before possibly happens after what comes later, but the before as such does not possibly occur after the after as such.
- 3.2.1.4: Things of different quiddities share beforeness (e.g. men, horses and donkeys are all ‘before’ their offspring), so beforeness is not the same as the quiddity of that which is before.
- 3.2.1.5: The father and son are non-relational items so they cannot be identified with relational items like beforeness and afterness.
- 3.2.1.6: God can also be before and after, but obviously time cannot be identified with Him or His essence.

Concluding remarks: Beforeness and afterness must be existing things, and exist in reality, not just in the mind. However they are not self-subsistent, but relational and accidental to something that does exist in its own right. This is not motion, but time, which is ‘something flowing and elapsing in itself.’

3.2.2 Two objections to the proof

- 3.2.2.1: Beforeness and afterness do not in fact exist, for four reasons:
 - 3.2.2.1.1: Non-existence can precede existence, so beforeness is a property of the non-existent. Therefore it doesn’t exist (cf. 1.12).
 - 3.2.2.1.2: Beforeness is itself before other things: regress.
 - 3.2.2.1.3: If beforeness and afterness exist they are simultaneous, so their relata must co-exist; but if A is before B, A and B don’t co-exist.
 - 3.2.2.1.4: The simultaneity of beforeness and afterness is a further temporal property: regress.
- 3.2.2.2: Parts of time are themselves before and after others, just like father and son: regress.

3.3: Third Proof. There is something that is divided into years, months, etc. This must exist since the non-existent cannot be divided at all, never mind into sections of different extent. This will be not an ‘integral’ (*qārr*) existent, i.e. something whose parts exist simultaneously, but something none of whose parts are co-present—this distinguishes it from body and most of its predicates. This thing is not motion or one of its attributes (for reasons already given) but a *zarf* for motions. No regress argument can be

brought against this proof, since time needs no further *zarf* (*Maṭālib*, vol. 5, pp. 43–6; this proof is not critically discussed).

3.4: Fourth Proof. When e.g. I say ‘I will come to you when the sun rises’ time is needed as a third thing to link my arrival with the rising of the sun: ‘reckoning time is equivalent to connecting an imagined event to a known event’. This third thing is not enduring, since it is not yet present when we make the future arrangement. Rather it is ‘something flowing’ and not to be identified as heavenly motion or one of its attributes (*Maṭālib*, vol. 5, pp. 46–9).

3.4.1: Two objections:

3.4.1.1: No third thing is needed, rather the two items (my arrival and sunrise) are directly connected.

3.4.1.2: This is based on conventional intuitions.

3.4.2: Replies to the objections

3.4.2.1: The things in themselves do not constitute the connection; rather the connection ‘has no meaning apart from the two things occurring at the same time’.

3.4.2.2: The debate can only proceed on the basis of such intuitions.

Concluding remark: ‘This discussion (*kalām*) is among the most evident of proofs, and strongest demonstrations for affirming what was sought.’

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Time and Mind-Dependence in Sayf al-Dīn al-Āmidī's *Abkār al-afkār*

Andreas Lammer¹

1 Introduction

It is not easy to acquire a unique place in the history of philosophy. Plato and Aristotle surely did, and there is no doubt about their importance and centrality. The same is true of Avicenna, whose works mark the beginning of a new philosophical tradition. And within the Avicennian tradition, Faḥr al-Dīn al-Rāzī (d. 606/1210), too, holds a unique position, as his way of responding to Avicenna and restructuring Avicennian philosophy deeply influenced the philosophical and theological debates in the following centuries.² Finally, Sayf al-Dīn al-Āmidī (d. 631/1233) could also be said to occupy a unique place, as he may well have been the first to react critically to his older contemporary Faḥr al-Dīn.³ His works, however, have hardly been examined, and the precise nature of his relation to both Avicenna and Faḥr al-Dīn (or to other earlier figures) has not yet been studied. There are a number of Turkish articles on al-Āmidī, only a handful of articles in English, and just two pages of scholarship about his concept of time in Arabic.⁴

In the following pages, I shall examine al-Āmidī's chapter on time in one of his main works, *Abkār al-afkār fī uṣūl al-dīn* (*First-Born Thoughts on the Principles of Religion*), discussing his exposition of Avicenna's account of time as well as his own contribution to the topic. I have prefaced my analysis with a historical outline of two important aspects which are relevant for understanding the background of al-Āmidī's discussion of time and indeed of any such discussion in the thirteenth century. In an appendix, I provide the Arabic text of al-Āmidī's chapter together with a facing English translation.

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 - 2 See for example Eichner, *The Post-Avicennian Philosophical Tradition*, and ead., *Essence and Existence*.
 - 3 See ead., *Al-Amidi and Fakhr al-Din al-Rāzi*, pp. 333–4.
 - 4 For the latter, see al-Šāfi'ī, *al-Āmidī wa-ārā'uhū l-kalāmiyya*, pp. 422–3.

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2 Two Old Traditions in the Philosophy of Time

There are two particularly relevant major traditions about time that have been espoused by thinkers in the philosophical tradition before al-Āmidī. The first of these takes the existence of time as obvious, denying the need to provide an explicit argument to demonstrate its existence, while the second regards time not as a physical but metaphysical, even transcendent, feature of reality.

2.1 Time as Obvious in Its Existence

Aristotle began his discussion of time in *Physics* IV.10 by casting severe doubts on the existence of time. While it is not unusual for his method to present critical ἔνδοξα at the onset of a new subject, it is unusual that he does not seem to return to these puzzles or to attempt an answer.⁵ Aristotle either chose to remain altogether silent about the question *whether* time is or he intended to answer it implicitly by his subsequent inquiry into *what* time is.

Aristotle approached this latter question about the essence of time by realising that time, being neither motion nor without motion, must be ‘something belonging to motion’ (τῆς κινήσεώς τι). He argued that we recognise time when we mark off motion into what is prior and what is posterior, so that whenever we perceive something prior and something posterior in motion, we realise that time is passing and this passing of time becomes a means to apprehend, and to measure, the motion. On this basis, Aristotle defined time as ‘the number of motion in respect of the prior and posterior.’⁶

The Greek commentators did not usually complain that Aristotle failed to resolve the puzzles about the existence of time. Instead, they endorsed his apparently deliberate negligence. Simplicius (d. ~ 560) reported that according to Alexander of Aphrodisias (fl. ~ 200), time ‘unquestionably exists.’⁷ He himself agrees with Alexander’s claim; the existence of time, he wrote, is ‘totally obvious, not just to the learned but to all.’ It is only the question ‘what time is [to which] even the most learned would scarcely have an answer.’⁸ We

5 On the Aristotelian puzzles concerning the existence of time, see Sorabji, *Time, Creation and the Continuum*, esp. cc. 1–5; McGinnis, *Making Time Aristotle’s Way*, and Sorabji and Kretzmann, *Aristotle on the Instant of Change*. On Aristotle’s account generally, see the recent monographs by Coope and Roark.

6 Aristotle, *Phys.* IV.11, 219b2; cf. 220a24–5. Aristotle repeats this definition in other works, too.

7 Alexander *apud* Simplicium, *In Phys.*, p. 696, line 6, transl. Urmson.

8 Simplicius, *In Phys.*, p. 695, lines 14–20, transl. Urmson. Simplicius agrees with his teacher and friend Damascius that Aristotle deliberately intended not to refute the puzzles about the existence of time in book IV, since they will be resolved through the contents of book VI

find a similar remark also in Simplicius' contemporary and rival John Philoponus (d. ~ 575), who noted that 'it is manifest to all that time and place exist, but the task is to discover what these actually are.'⁹

In the Arabic tradition, we see a continuation of the tradition of regarding time as evident or obvious in existence. The foremost figure of this continuation is probably Abū Bakr al-Rāzī (d. 313/925), who argues as follows:

The nature of time is of such certain existence in itself (*ta'akkud al-wuğūd fī dātihā*) and by force of the stability in its substance that its nonexistence is immediately inconceivable, there being no way it could ever have been non-existent. (Abū Bakr al-Rāzī, *al-Qawl fī l-Qudamā' al-ḥamsa*, p. 199, lines 9–11, transl. McGinnis/Reisman)¹⁰

In a certain way, this view is shared by subsequent thinkers as well. Naṣīr al-Dīn al-Ṭūsī (d. 672/1274), for instance, being one of Avicenna's most important commentators, states in his commentary on Avicenna's *al-Iṣārāt wa-l-tanbīhāt* II.5.4:

Know that time is evident in being (*ẓāhir al-anniyya*) but obscure in essence (*ḥafīy al-māhiyya*).¹¹ The Ṣayḥ has provided a reminder about its being in this chapter and will point out its essence in the following chapter. For this reason, he marked the first of the two chapters as a *tanbīh* ('reminder') and the other as an *iṣāra* ('pointer'). (al-Ṭūsī, *Ḥall muškilāt al-Iṣārāt* II.5.4, vol. III, p. 650, lines 14–16 (ed. al-Amolī) / vol. III, p. 72, lines 8–10 (ed. Dunyā))

Avicenna employed the terms *tanbīh* and *iṣāra* not only in the title of his work *al-Iṣārāt wa-l-tanbīhāt* but also as headings of the majority of its chapters. It is generally assumed that Avicenna's intention within a given chapter is indicated by its heading. This is apparently also al-Ṭūsī's view, for he maintains that the appropriate heading for the chapter on the existence of time is *tanbīh*, whereas for the chapter on the essence of time it is *iṣāra*. About the meanings of these two terms, al-Ṭūsī further agrees with Faḥr al-Dīn, as he paraphrases his predecessor's explanation of them in his own comments on chapter I.2.5—which is the first chapter in the logical part of *al-Iṣārāt wa-l-tanbīhāt* that bears the heading *tanbīh*—and quotes it in his comments to the first chapter of the second

anyway; see *ibid.*, p. 800, lines 21–4; cf. also Sorabji, *Time, Creation and the Continuum*, pp. 61–2.

9 Philoponus, *In Phys.*, p. 206, lines 3–4, transl. Lacey; cf. p. 708, line 23–p. 709, line 1, and p. 702, lines 15–18.

10 McGinnis and Reisman, *Classical Arabic Philosophy*, pp. 46–7.

11 It may be noted that Abū l-Barakāt al-Bağdādī uses the same expressions (*ẓāhir* and *ḥafīy*) to express the obvious existence of time in contrast to the apparent difficulties in defining its essence; cf. *al-Mu'tabar* II.1.17, p. 69, lines 14–17.

part. In the first case, al-Ṭūsī's paraphrase of Faḥr al-Dīn's explanation reads as follows:

Investigation indicates that in this book the Šayḥ uses *išārāt* for describing those chapters which contain judgements established with difficulty but *tanbīhāt* for describing those chapters [in which] the reflection about its terms and about what has previously been stated about related things is sufficient for establishing its judgements. (al-Ṭūsī, *Ḥall muškilāt al-Išārāt* I.2.5, vol. I, p. 200, lines 8–11 (ed. Dunyā))¹²

Accordingly, we can interpret al-Ṭūsī's remark that Avicenna used a pointer (*išāra*) for his chapter on the essence of time but a reminder (*tanbīh*) for his chapter on the existence of time as supporting his claim that time is 'evident in being,' as, apparently, no more than a simple *tanbīh* is required to remind the reader of the obvious existence of time, whereas the essence of time requires some clear demonstration provided in the form of an *išāra*.¹³ This is strikingly close to the remarks by Simplicius and Philoponus, both of whom stressed that it is the essence of time, rather than its existence, that requires examination. Apparently, the Greek tendency to take time's existence for granted has been continued, in varying degrees, by Muslim philosophers inside and outside the Avicennian tradition. Even Avicenna himself states that instead of first establishing the existence of time, he shall determine its essence, because it is 'from there' (*min hunāka*) that its existence will likewise become clear.¹⁴

Yet, there is an additional spin to the entire question which comes in only with Avicenna and which will dominate the discussion in the following centuries. In *al-Madḥal*, the first work on logic in Avicenna's *al-Šifā'*, Avicenna draws an important distinction. Not only do we have to differentiate between a thing's essence taken as such and that essence's existence, we also have to keep apart two ways in which its essence can exist: either in the mind or in concrete reality.¹⁵ With regard to time, then, we need to inquire not only into *what* time

12 Cf. al-Ṭūsī, *Ḥall muškilāt al-Išārāt* II.1.1, vol. II, p. 29, lines 6–9 (ed. al-Amolī) / vol. II, p. 152, lines 8–13 (ed. Dunyā) ≈ Faḥr al-Dīn al-Rāzī, *Šarḥ al-Išārāt wa-l-tanbīhāt* II.1.1.2, vol. II, p. 10, lines 1–4: 'Know that an investigation of the chapters of this book indicates that every proposition that requires for its establishment a distinct demonstration, the Šayḥ calls a chapter containing these by the name *išāra*. Every proposition, however, which does not require for its establishment a distinct demonstration but for whose assent it is sufficient to abstract its subject and its predicate from the concomitants and accidents, he calls [a chapter containing these] by the name *tanbīh*.'

13 For a philosophical analysis of Faḥr al-Dīn's and al-Ṭūsī's commentaries on the chapter on time's eternal existence, see Mayer, Avicenna against Time Beginning.

14 Avicenna, *al-Samā' al-ṭabī'ī* II.10.13. I discuss this in more detail in *The Elements of Avicenna's Physics*.

15 See Avicenna, *al-Madḥal* I.2, p. 15, lines 1–5; I.12, p. 65, line 11–p. 66, line 11; id., *al-Nafs* II.2, p. 50, line 1–p. 51, line 8, and id., *al-Ilāhiyyāt* V.1–2; see also Marmura, Avicenna

is and *whether* it exists, as Aristotle suggested—we also need to investigate *how* or *in which way* time exists, i.e. we have to establish whether time exists as instantiated in concrete reality (*fī l-a'yān* or *fī l-hāriġ*) or as only in our minds (*fī l-taṣawwur* or *fī l-adhān*).

It should be noted that existence in the mind is in an important sense a 'weak' form of existence. It does not take much to affirm the existence of something in the mind, for we can conceptualise phoenixes, heptagonal houses, and perfect triangles regardless of their concrete external existence. Thus, when a Greek commentator asserts that it is unquestionable that time is not non-existent, he commits himself to the view that time does exist and that there is no need for a separate argument to demonstrate its existence. In contrast, when a philosopher in the Avicennian tradition claims that it is unquestionable that time is not non-existent, he may merely affirm that time exists at least as something in the mind—and so, he may *still* require an argument that demonstrates the existence of time as something in the concrete reality.

In post-Avicennian philosophy, the distinction between what exists *fī l-a'yān* and what exists merely *fī l-adhān* becomes very popular. Virtually all concepts can be—and many actually have been—investigated with regard to whether their mode of existence is only one or also the other.¹⁶ The distinction is particularly relevant for the discussion of time and will be shown to be a crucial, if not central, aspect in al-Āmidī's discussion.

2.2 Time as Transcendent in Its Existence

The second tradition about time has its roots in Plato. In the *Timaeus*, Socrates' interlocutor Timaeus explains that the demiurge intended to create a universe which is in every respect as much as possible 'like' its model.¹⁷ The universe's model, however, is unchanging and eternal, which are attributes exclusive to what has *being*—not to what has *becoming*.¹⁸ The universe, on the other hand, unambiguously belongs to the latter category of becoming, as Timaeus states.¹⁹ Since it is not possible to confer the eternity of the model's being to the becoming existence of the universe, the demiurge has to face the crucial question of

on the Division of the Sciences, esp. pp. 247–50; id., Avicenna's Chapter on Universals, esp. pp. 34–9; Black, Avicenna on the Ontological and Epistemic Status of Fictional Being, and ead., Mental Existence in Thomas Aquinas and Avicenna, esp. pp. 47–51. For the relevance of the distinction in post-Avicennian works, see Eichner, *The Post-Avicennian Philosophical Tradition*, e.g. pp. 23–7.

16 See also Eichner, *Essence and Existence*.

17 See Plato, *Tim.* 29e2–3.

18 For the distinction between being and becoming, see *ibid.* 27d5–28a1.

19 See *ibid.* 28b7.

how he could ever be able to make his creation ‘like’ its model in this respect. His solution to this dilemma is ingenious:

So, he took thought to make a moving likeness of eternity and, at the same time that he ordered the heavens, he made, of eternity that remains in unity, an eternal likeness moving according to number—that to which we have given the name ‘time.’ (Plato, *Tim.* 37d5–7, transl. Cornford, modified)

What the demiurge decided to do is to contrast eternal being with perpetual becoming. Just as the universe is a likeness of its paradigm, time (χρόνος) is a likeness of eternity (αἰών) insofar as it moves according to number, thereby imitating the single, static, and indeed timeless eternity of being by a perpetually progressing temporal movement of becoming. In this way, what truly *is* and what merely *becomes* can both be eternal, though in different ways: the paradigm *is* eternal, while the created cosmos *partakes* in this eternity through an everlasting motion of perpetual becoming. Accordingly, time is something which ‘has come-to-be’ together with the heavens, and their planetary motions are explicitly designed to map out and reveal the vast eternity comprised by being.²⁰ Through their revolutions, the heavens introduce a measure which numbers and renders intelligible through numerical proportions, such as months and years, the otherwise incomprehensible αἰών.²¹

It might be said that for Plato, time is a subordinate concept, i.e. a mere likeness or necessarily insufficient copy of something much more fundamental, because it is derived from timeless eternity. Plato’s followers, though, read the situation more favourably: far from being merely derivative, time is firmly *rooted* in something much more fundamental. Subsequent philosophers learned from Plato that the term ‘time’ can have at least two senses: an absolute sense as an unlimited duration beyond motion which some call ‘eternity’ and others ‘absolute time,’ and a relative sense as a determined and measured time which some call ‘time’ and others ‘relative time.’ This situation is suitably exemplified by Iamblichus (d. ~ 320) in his commentary on the *Timaeus*, where these two senses of time are related by the common Neoplatonic distinction between what is ‘there’ as eternity and ‘here’ as time.²²

In the Arabic tradition this view is associated with Plato and with Galen (d. ~ 216), the author of the most important source for Plato’s *Timaeus* in the

20 Ibid. 38b6; cf. also Plotinus, *Enn.* III.7.12, lines 49–52, where we, indeed, read that time is ‘revealed’ (δηλωθεῖς) through the heavenly motion; cf. further ibid. III.7.13, lines 9–18.

21 Plato, *Tim.* 38b6–e2; cf. ibid. 37e1–3; see also Johansen, *Plato’s Natural Philosophy*, pp. 57–8.

22 Iamblichus, *In Tim.*, frgm. 68, in Dillon, *In Platonis dialogos commentariorum fragmenta* [= Iamblichus *apud* Simplicium, *In Phys.* p. 794, lines 30–31.].

Arabic world.²³ Galen was famous for his position that time is not an accident of motion but an unlimited duration (*mudda*) and 'a substance subsisting through itself' (*ḡawhar qā'im bi-nafsihī*).²⁴ It is this idea which Abū Bakr al-Rāzī picked up when he formulated his theory of absolute and relative time. Both Galen and Abū Bakr are said to have claimed their allegiance to Plato.

What we see here in these Platonist accounts of time is a coherent concept of time as an eternal and motionless duration, which is revealed through motion (ultimately the planetary motion). Time on that reading is something that enjoys a much more fundamental and transcendent status. Ibn Bāḡḡa (d. 533/1139) even claimed that Galen conceived of time as something divine (*amr ilāhī*). Although Galen may never have said this, Plotinus did that for him when, drawing a distinction between timeless eternity (αἰών) and everlastingness (ἀιδιότης), he called the former 'majestic ... and identical with the god.'²⁵ Proclus (d. 485), as is reported by Simplicius, followed him as he 'strives to demonstrate that [time] is not only intellect but also a god.'²⁶

It should be realised that this Platonist account of time is the exact reverse of the Aristotelian account. Whereas Aristotle claimed that time, being an accident, is *measuring* motion, the Platonist account states that time, being a substance, is *measured by* motion. Nonetheless, the Platonist implication that time is measured by motion was (arguably unwittingly) accepted by leading Peripatetics and conceived as genuinely Aristotelian in both the Greek and the Arabic tradition. There are two reasons for this.

First, it is not unusual for Aristotle to differentiate between three categories of being: eternally unmoved, eternally moved, and occasionally moved beings.²⁷ The first category comprises God as the Unmoved Mover who is eternally at rest and entirely beyond motion. He is eternal in a non-temporal sense. This sense of eternity can be labelled as αἰών.²⁸ The second category describes

23 See Adamson, Galen and al-Rāzī on Time; Hasse, *Plato arabico-latinus*, p. 32, and Arnzen, *Plato's Timaeus in the Arabic Tradition*. The Arabic translation of Galen's paraphrase has been edited and published by Kraus and Walzer as Galen, *Compendium Timaei Platonis*.

24 Cf. esp. Ibn Abī Sa'īd *apud* Yaḥyā ibn 'Adī, *Kitāb Aḡwiba Bišr al-Yahūdī 'an masā'ilihī*, p. 318, line 8–p. 319, line 3. It is difficult to assess to what extent the various testimonies about Galen's views about time are accurate. Adamson collected and discussed the available evidence in his recent paper Galen and al-Rāzī on Time.

25 *Enn.* III.7.5, lines 12–19, transl. Armstrong. Despite this distinction, Plotinus generally uses αἰών as well as ἀιδιότης and ἀιδιος rather interchangeably to refer to what is timelessly eternal; it is only in late Neoplatonism that ἀιδιος is specifically used for what is temporally eternal, i.e. everlasting, as Beierwaltes remarks (ad *Enn.* III.3.3, line 2). See also Adamson, Galen and al-Rāzī on Time, pp. 5 and 10–11.

26 Proclus *apud* Simplicium, *In Phys.* p. 795, lines 4–7, transl. Urmson.

27 Cf. Aristotle, *Phys.* II.7, 198a29–31; VIII.3, 254b4–6; id., *Cael.* I.11–12, and id., *Met.* Λ.6, 1071b3–5.

28 Cf. id., *Cael.* I.9, 279a11–30, and id., *Met.* Λ.7, 1072b29.

the heavenly bodies, which are in eternal and circular motion. Their motion is eternal and everlasting (ἄιδιος).²⁹ The third, then, refers to sublunary bodies, which both move and rest, which are generated and destructible, and whose motions and rests are measured by time (χρόνος). Thus, in Aristotle, too, one can recognise a rough distinction between a timeless (and divine) eternal realm and a concretely applied time.³⁰

Alexander of Aphrodisias is a good Peripatetic example of someone who converted Aristotle's account of time as a particular measure of a particular motion into a more universal and fundamental concept with certain similarities to the Platonist understanding of time just outlined. In a brief treatise on time, which is preserved in Arabic under the title *Maqālat al-Iskandar al-Afrūdīsī fī l-zamān*, Alexander picks up a brief remark which Aristotle made towards the end of his discussion of time in *Physics* IV.14 and makes it the very core of his understanding. Claiming to present time 'without any divergence' from the opinion of Aristotle, Alexander states the following:

We say that time is only the number of the motion of the sphere and not of any other motion, because there is no motion faster than it and something is numbered, measured, and compared only by what is smaller than it. (Alexander of Aphrodisias, *Maqālat al-Iskandar al-Afrūdīsī fī l-zamān*, p. 21, lines 1–3)³¹

On Alexander's reading, then, time is first and foremost not a measure of particular motions but is the measure of only one motion: that of the outermost heavenly sphere. All other motions are measured according to this one motion and compared to its temporal dimension. The outermost sphere not only encompasses all things that exist with regard to space, it encompasses them also with regard to time. Time is, thus, something heavenly, something that comprises the things that may occur in time. When philosophers in the Arabic tradition quote Aristotle's definition of time, they often do so in the fashion of Alexander by saying that time is the number of the motion of the sphere, even though the reference to the sphere was not part of Aristotle's original definition in *Physics* IV.11.³²

The second reason is due to a common Peripatetic confusion. Although Aristotle defined time as something which numbers motion, we already read in Alexander's treatise the following:

29 Cf. id., *Phys.* VIII.1, 251b12–13.

30 Cf. esp. the interpretations by Simplicius (*In Phys.*, p. 1154, line 27–p. 1156, line 3) and Olympiodorus (*In Meteor.* p. 146, lines 15–23). There is, however, no clear distinction between αἰών and ἄιδιος in Aristotle.

31 Cf. Aristotle, *Phys.* IV.14, 223b18–20.

32 We find this definition for example in the works of al-Kindī, Yaḥyā ibn 'Adī, the Iḥwān al-Ṣafā', (Ps.-)al-Fārābī, al-Siġistānī, Nāṣer-e Ḥosrow, Faḥr al-Dīn al-Rāzī, and Averroes.

[Time] is the number of the westbound motion of the sphere ... Thus, its definition is that it is a duration which motion numbers (*mudda ta'udduhā l-ḥaraka*). (Alexander of Aphrodisias, *Maqālat al-Iskandar al-Afrūdīsī fī l-zamān*, p. 20, lines 13–14)

This is, again, the reverse of what Aristotle had said—and precisely what the Platonist account stated: time no longer measures motion but is itself *measured by motion*.³³ We find the same misconception reflected not only in Alexander—and before Alexander already in Boethus of Sidon (fl. second half of the first century BC)—but also in many other writings of philosophers in the Arabic tradition, such as al-Kindī (d. ~ 256/870), Yaḥyā ibn 'Adī (d. 364/974), the Iḥwān al-Ṣafā' (fl. ~ 370/980), and Miskawayh (d. 421/1030).³⁴ All of them unanimously defined time as a duration which motion numbers (*mudda ta'udduhā l-ḥaraka*), using the very same expression that is found in the Arabic version of Alexander's treatise. One exception proving the rule is Abū Sulaymān al-Siġistānī (d. ~ 374/985). He was one of the few who realised the implications of this definition and explicitly criticised it as confused, because it would seem to signify an independently existing eternity (*dahr*) rather than a time depending on motion. In other words, it signifies a Platonist, rather than an Aristotelian, conception.³⁵ With this, al-Siġistānī seconds a point which Plotinus had made 600 years earlier, namely that the Peripatetics have a confused understanding of what it is in their account that is measured and what it is that does the measuring.³⁶

The view that time is actually more fundamental than motion and, taken as absolute time or eternity, transcends corporeal reality is also predominant in the later writings of Faḥr al-Dīn al-Rāzī.³⁷ Faḥr al-Dīn concludes his Platonist account of time (often referred to as 'duration') in his *al-Maṭālib al-āliya min al-ilm al-ilāhī* (*The Exalted Topics of Inquiry in the Divine Science*) as follows:

Know that we have explained that time exists in itself and in its existence without the need for motion; rather it occurs regardless of whether motion occurs or not. We say that motion has no effect on the existence of duration and time. The effect of motion is

33 Cf. however Aristotle, *Phys.* IV.12, 220b14–18; IV.14, 223b15–16 and especially 223b21–3.

34 Cf. Boethus of Sidon (?), *Περὶ τῆς τοῦ ποτὲ κατηγορίας*, p. 21, lines 8–20; al-Kindī, *Kitāb fī l-Falsafā al-ūlā*, vol. II, p. 31, lines 23–4; id., *Risāla fī hudūd al-aṣyā' wa-rusūmihā* §18, p. 167, line 6; Iḥwān al-Ṣafā', *Rasā'il Iḥwān al-Ṣafā'* XV.13, p. 43, lines 6–7; al-Tawḥīdī, *al-Muqābasāt* §91, p. 313, line 10, and id. and Miskawayh, *al-Hawāmil wa-l-šawāmil*, p. 31, line 5; see my *The Elements of Avicenna's Physics* for a more detailed discussion.

35 Al-Siġistānī's criticism is preserved in al-Tawḥīdī, *al-Muqābasāt* §73, p. 278, lines 17–19; see also Kraemer's valuable discussion in *Philosophy in the Renaissance of Islam*, pp. 166–71; see further Wolfson, *Crescas' Critique of Aristotle*, p. 655.

36 See Plotinus, *Enn.* III.7.13, lines 9–18.

37 For Faḥr al-Dīn al-Rāzī's account of time, see Adamson's contribution to this volume as well as Adamson and Lammer, Fakhr al-Dīn al-Rāzī's Platonist Account of the Essence of Time.

only on its measurement and determination ... The motion of the sphere has no effect on causing the existence of the duration but only on the measurement of the duration. The duration is measured only through the celestial motion, not by any other motions, because it is the fastest motion and the least varying. Surely, then, this motion is what measures duration. (Faḥr al-Dīn al-Rāzī, *al-Maṭālib al-‘āliya* V.11, p. 103, line 14–p. 104, line 3)

For the mature Faḥr al-Dīn, time is not the measure of motion; instead, motion is the measure of time. This is in line with the Platonist leanings which Faḥr al-Dīn makes explicit elsewhere during his discussion in *al-Maṭālib al-‘āliya* as well as in his *Šarḥ ‘Uyūn al-ḥikma*.³⁸ Moreover, he incorporates the motion of the outermost sphere into his account in precisely the same ways as Alexander has done—with one exception: the motion of the sphere is not a cause of the existence of time; it is only its measure.

Faḥr al-Dīn’s turn to a Platonist position was only one way of securing a more metaphysical grounding for the reality of time. A different strategy to a similar effect can be witnessed, half a century before Faḥr al-Dīn, in the writings of Abū l-Barakāt al-Baḡdādī (d. ~ 560/1165). Abū l-Barakāt would have agreed that time is more than merely an accident of an accident of things that exist. However, instead of replacing Avicenna’s Peripatetic definition with a Platonist account, he decided to modify it, arguing that time is the ‘magnitude of existence’ (*miqdār al-wuḡūd*), rather than the magnitude of motion.³⁹ He explains that in conceptualisation, the intelligible notion ‘time’ approximates (*yuqāribu*) the intelligible notion ‘existence’ and is associated with it (*yuqārinuhū*).⁴⁰ Time is, thus, a metaphysical concept and exists independently from merely physical phenomena such as motion and rest. Accordingly, Abū l-Barakāt’s discussion of the essence of time has its proper place in the third part of his main work *al-Mu‘tabar*, i.e. that part concerned with metaphysics and not that on physics.⁴¹

As we shall see, al-Āmidī’s treatment of time can in many ways be said to be a direct or indirect response to these two traditions. The question about the existence of time is his central concern and the distinction between concrete and mental existence will put Avicenna’s overall account, as interpreted

38 See, e.g. Faḥr al-Dīn al-Rāzī, *al-Maṭālib al-‘āliya* V.6, p. 76, lines 17–19; V.8, p. 91, lines 6–17, and id., *Šarḥ ‘Uyūn al-ḥikma*, II.8, p. 148, line 15–p. 149, line 3; cf. Setia, Time, Motion, Distance, and Change, p. 27.

39 Abū l-Barakāt al-Baḡdādī, *al-Mu‘tabar* III.1.8, p. 39, lines 17–18.

40 Ibid., III.1.8, p. 39, lines 10–11.

41 On another aspect of Abū l-Barakāt’s motivation for discussing time in the metaphysics of *al-Mu‘tabar*, see now also my remarks in Two Sixth/Twelfth-Century Hardliners. There is also a chapter on time in the physics part of *al-Mu‘tabar*. The precise relation between the two chapters still needs to be determined.

by al-Āmidī, to the test. In addition, al-Āmidī actively opposes the view that time is an independent substance. For him, time is not a metaphysical duration that exists apart from motion but is, as Aristotle wrote, 'something belonging to motion' or, more precisely, the magnitude of motion (*miqdār al-ḥaraka*), as Avicenna had it.

3 The Chapter on Time in *Abkār al-afkār fī uṣūl al-dīn*

Abkār al-afkār are al-Āmidī's major work in the field of *kalām*. They are very voluminous and attempt to encompass the relevant topics of its subject in their entirety. This work has recently been published twice, first in a five-volume edition by Aḥmad Muḥammad al-Mahdī, of which a second printing appeared in 2004, and in a three-volume edition by Aḥmad Farīd al-Mazīdī in 2003. Both editions are mediocre and their exact relationship is not entirely clear. I have consulted them both and compared their text with the text of a manuscript from the Staatsbibliothek in Berlin, MS Petermann I.233 = Ahlwardt 1741.

The chapter on time in *Abkār al-afkār* contains a number of passages which occur without or with slight alteration in another major work of al-Āmidī, called *al-Nūr al-bāhir fī l-ḥikam al-zawāhir*, which is an equally extensive but unfortunately badly transmitted *summa* of philosophy. Of its five volumes, four are known to be extant as a single manuscript at the university of Ankara. The manuscript has been published in 2001 as a facsimile by Fuat Sezgin under the title *Splendid Light on Bright Wisdom*.

The work contains a detailed account of philosophy consisting of two volumes on the *Isagoge* and the works corresponding to the Aristotelian *Organon*, a third volume on the exposition of the natural world up to his treatment of mineralogy, and a final fifth volume on metaphysics. The missing fourth volume probably contained al-Āmidī's views on animated natural bodies, including his account of the soul, of plants, and of animals.

Fuat Sezgin states that the manuscript was copied in 592/1196, which would indicate a rather early date of composition, twenty years before al-Āmidī completed his *Abkār al-afkār* and thirty-seven solar years before he died in Damascus.⁴² Syamsuddin Arif, however, suggests on the basis of some remarks on the opening pages of the first volume of the work that 'it must belong to his latest works, probably composed during the last period of his life.'⁴³ Sadly, insufficient evidence for dating the work is not the only issue we are confronted with when reading *al-Nūr al-bāhir*. The text of the manuscript is deficient, and the strict black and white reproduction of the facsimile at times is presumably even

42 See Sezgin's remarks in his introduction to al-Āmidī, *al-Nūr al-bāhir*, vol. I, p. vii.

43 Arif, *Al-Āmidī's Reception of Ibn Sīnā*, p. 213.

more difficult to read than the original. In addition to all that, al-Āmidī's style is involved and demanding. In any case, I was not yet able to form a coherent enough understanding of the twenty pages of that work that are concerned with the concept of time.⁴⁴ Nonetheless, I shall repeatedly refer to the exposition in that work throughout my analysis of the chapter on time in *Abkār al-afkār* and, in particular, point out a number of parallel (or identical) passages.

The chapter on time in *Abkār al-afkār*, to which I shall now turn, is the sixth 'branch' (*far'*) of the second 'root' (*aṣl*) within the second 'part' (*qism*) of the first 'chapter' (*bāb*) of the fourth 'basis' (*qā'ida*) of the work.⁴⁵ At several places, the text of the editions had to be corrected.

3.1 Introducing the Topic (§§1–3)

Al-Āmidī begins the chapter on time with a survey of earlier positions regarding both the existence and the essence of time. The first reported option is that time does not exist at all (*lā wuġūda lahū aṣlan*). To exist not at all seems to mean—at least since Avicenna—to not even exist in the mind. So, something which does not exist 'at all' would not only be not instantiated but actually inconceivable, which may be one of the reasons why al-Āmidī does not explain or discuss this option any further. He seems to mention it here at the very beginning merely for the sake of completeness. Moreover, it is unclear which group of thinkers may have argued for the absolute non-existence of time. In the history of philosophy up to al-Āmidī, those who flirted with that position often drew upon the above-mentioned arguments with which Aristotle had begun his discussion in *Physics* IV.10. Al-Āmidī himself will later discuss variations of these arguments, but he does not take them as establishing the *absolute* non-existence of time.⁴⁶ The most these arguments can accomplish is to suggest that time does not exist in extra-mental reality but only in our minds—a 'weak' form of existence, as we have seen, but existence nonetheless. Still, it is with these arguments that we shall see al-Āmidī introducing the final, more sceptical, stage of his discussion.

The second option is that time does not have existence in anything other than the mind (*lā wuġūda lahū fī ġayr al-aḏhān*).⁴⁷ This is contrasted with the

44 The chapter on time is located in the third *fann* of the second *maqāla* of the second 'ilm and is contained in volume three of Sezgin's facsimile edition; I shall refer to it as *al-Nūr al-bāhir* II.2.3.

45 The chapter begins on p. 224 of the third volume of al-Mahdī's edition, on p. 431 of the second volume of al-Mazīdī's edition, and on fol. 177v in the Berlin manuscript.

46 See §§22–5.

47 Cf. also Avicenna, *al-Samā' al-ṭabī'ī* II.10.5–6.

view that time does in fact exist in concrete reality (*fī l-a'yān*). Here we see for the first time how al-Āmidī explicitly applies the distinction between what exists *fī l-a'yān* and what is only *fī l-adhān* to the discussion of time. The view that time exists in the concrete reality is, then, further subdivided by al-Āmidī.

The first subdivision arranges theories about time into those treating it as a substance, those treating it as an accident, and those treating it as neither. While the last option is not taken into account any further, al-Āmidī states that regarding the first option, there are two alternatives: time can be a substance which either 'is renewed and does not persist' (*mutaḡaddid ḡayr bāqin*) or 'does persist and is not renewed' (*bāqin ḡayr mutaḡaddid*).⁴⁸ This latter option, then, has been said to be the body of the sphere (*ḡirm al-falak*), a position also reported by Aristotle and identified by his interpreters with the view of some Pythagoreans.⁴⁹ On this account, the sphere itself may certainly be in motion, even though its body persists and is not renewed. It is more difficult to assess what the other option, that time is a renewed and non-persistent substance, amounts to. Perhaps this view is related to Abū Bakr al-Rāzī, who took time to be a self-subsisting substance whose constant progression can be illustrated by someone saying 'taf-taf-taf'.⁵⁰ In fact, any position which takes time to be both a substance and intrinsically structured by what is before and after may fit this description.⁵¹

Alternatively, if time is an accident, we get four options: time is either a relation (*nisba*), an association (*muqārana*), the motion of the sphere (*ḡarakat al-falak*), or the magnitude of the spherical motion (*miqdār al-ḡaraka al-falakiyya*). The last two options seem to refer, respectively, to another view reported by Aristotle and sometimes identified with Plato's,⁵² and to Aristotle's own account with the above-mentioned enhancement by Alexander which makes

48 The terminology is reminiscent of Avicenna, who describes time (and motion), in practically all his major works, as being subject to elapsing (*taḡarrum* or *taqaddin*) and renewal (*taḡaddud*), and as being unstable and not integral (*ḡayr tābit* or *ḡayr qārr*). Historically, the idea is rooted in Aristotle, who described the constant other-and-other-ness (ἄλλο καὶ ἄλλο) of time, and influenced by the Neoplatonists, who mentioned the 'flow' (ῥύσις) of time and maintained that time 'has its being in becoming' (ἐν τῷ γίνεσθαι τὸ εἶναι ἔχειν).

49 See Aristotle, *Phys.* IV.10, 218b1; cf. the commentaries of Simplicius, Ross, and Hussey, *ad loc.*

50 Abū Bakr al-Rāzī, *al-Munāzarāt bayna Abī Ḥātīm al-Rāzī wa-Abī Bakr al-Rāzī*, p. 304, line 13; see also Pines, *Studies in Islamic Atomism*, p. 60; Kraemer, *Philosophy in the Renaissance of Islam*, pp. 168–9.

51 Cf. also the related discussion in Faḡr al-Dīn al-Rāzī's early *al-Mulaḡḡaḡa fī l-ḡikma*, for which see Adamson and Lammer, Fakhr al-Dīn al-Rāzī's Platonist Account of the Essence of Time.

52 See Aristotle, *Phys.* IV.10, 218a33–b1; cf. the remarks in the commentaries of Simplicius, Ross, and Hussey, *ad loc.*

time ‘the number of the motion of the sphere.’ The remaining views of time as a *nisba* or as a *muqārana* require more explanation.

In Faḥr al-Dīn al-Rāzī’s commentary on Avicenna’s *‘Uyūn al-ḥikma*, in a passage in which he outlines the ‘truth about time’—later identified with Plato’s position—we read:

If we consider the relation (*nisba*) of the essence of [time being a self-subsisting substance] to the essences that exist perpetually and free from change, it is called eternity (*al-sarmad*) ... If we consider the relation of its essence to that which is susceptible to the occurrence of motions and changes, then this is everlasting eternity (*al-dahr al-dāhir*). If we consider the relation of its essence to the changing things as they are associated⁵³ with it, then this is what is called time (*al-zamān*). (Faḥr al-Dīn al-Rāzī, *Šarḥ ‘Uyūn al-ḥikma* II.8, p. 148, lines 22–6)

A similar thought has already been expressed by Avicenna in both his *al-Samā’ al-ṭabī’ī* and *‘Uyūn al-ḥikma*. There, Avicenna likewise determines the meaning of *dahr* and *sarmad* by means of a relation (*nisba* or *qiyās*) of the stable to the non-stable (*tābit ilā ḡayr tābit*) and a relation of the stable things to each other, respectively.⁵⁴ It is not clear whether this view was made popular through Avicenna or whether it was already established in the tenth century. In any case, the distinction between *sarmad*, *dahr*, and *zamān* very closely resembles the Greek Neoplatonic distinction between αἰών, αἰδιος, and χρόνος as well as the Aristotelian distinction between eternally unmoved, eternally moved, and occasionally moved beings. Thus, when al-Āmidī writes that some have taken time to be a relation (*nisba*) between an imperishable eternal existent and a perishable temporal existent, he means that these people regard time as that which is recognised when the temporal motion of non-eternal changing things is brought into a relation with—or understood as occurring within—the unchanging eternity of God and the perpetual eternity of the heavens.⁵⁵ Thus, on the view that time is a *nisba*, changing things derive their temporality through their relation to an unchanging temporal framework in which they are embedded.

In contrast to this, the other alternative, that time ‘is an association (*muqārana*) of an existent to [another] existent,’ seems to denote a form of mutual correlation or interconnection of changing temporal things with each

53 Reading *muqārana* for *mutaqārina*, following the suggestion in al-Zarkān, *Faḥr al-Dīn al-Rāzī*, p. 456 and the parallel passage in Faḥr al-Dīn al-Rāzī, *al-Maṭālib al-‘āliya* V.8, p. 91, lines 1–17.

54 Cf. Avicenna, *al-Samā’ al-ṭabī’ī* II.13.7, and id., *‘Uyūn al-ḥikma* II.8, p. 28, lines 12–17. Faḥr al-Dīn criticises Avicenna for adding this idea to his Aristotelian account, because it has strong Platonic implications; cf. Faḥr al-Dīn al-Rāzī, *Šarḥ ‘Uyūn al-ḥikma* II.8, p. 148, lines 15–16, and id., *al-Maṭālib al-‘āliya* V.8, p. 91, lines 17–18.

55 Cf. al-Āmidī, *al-Nūr al-bāhir* II.2.3, p. 142, line 12–p. 143, line 1.

other (instead of their relation to an eternal framework), so that changing things derive their temporality from their association with other changing things.⁵⁶ If this is right, then this position resembles what al-Aš'arī reported in the name of Abū 'Alī al-Ġubbā'ī (d. 303/916):

Some say: 'Time (*al-waqt*) is whatever you appoint as the time (*tuwaqqituhū*) for something. So, when you say 'I come to you when Zayd arrives,' then you have made the arrival of Zayd a time for your own coming.' They claim that the times are the motions of the sphere, because God—strong and exalted is He—appointed them as times for the things. This is the assertion of al-Ġubbā'ī. (al-Aš'arī, *Maqālāt al-islāmiyyīn*, p. 443, lines 4–6)⁵⁷

Accordingly, the difference between the view that time is a *nisba* and the view that time is a *muqārana* is that in the former case, the relation is a relation of the eternal to the temporal or of the unchanging and stable to the changing and non-stable, whereas in the latter case we get a more pragmatic, down-to-earth association of changing things with other changing things, like 'I come to you when Zayd arrives' or 'He woke up when the cock crowed.' In all these instances, we use the occurrence of an event as the moment of another, thereby associating both events. That al-Āmidī thinks of al-Ġubbā'ī here is further suggested by the fact that he later also mentions the idea that we take 'the moment (*waqt*) of the sun's rising or its descending' as 'associated' (*qārana*) with other events, which seems to approximate al-Aš'arī's report about al-Ġubbā'ī's position even further.⁵⁸ In al-Āmidī, however, this idea is employed to substantiate the thesis that time may exist only in the minds, as we shall see.

These are al-Āmidī's introductory remarks. They are by and large modelled on Avicenna's own detailed enumeration of available positions in *al-Samā' al-ṭabī'ī* II.10. This being said, they are also typical for *kalām* discussions, which often begin with a more or less exhaustive overview of the available options before going into detail and analysing most of them. This is what al-Āmidī now promises to do when he states his intention to go through those positions, in order to 'verify the true and to falsify the false' (*taḥqīq al-ḥaqq wa-ibtāl al-bāṭil*).

56 This, in turn, seems to approximate Faḥr al-Dīn's (and Avicenna's) description of *zamān*, as just quoted from the *Šarḥ 'Uyūn al-ḥikma*.

57 Cf. also al-Ġuwaynī, *Kitāb al-Iršād* V.1, p. 32, lines 12–15.

58 See §25.

3.2 Time as Obviously Existent (§4)

Having presented a variety of views concerning the existence and the essence of time, al-Āmidī approaches the epistemological position that the knowledge of time's existence is 'necessary' (*darūrī*).⁵⁹ He presents two arguments. The first is that time is intuitively known by 'what is settled in the minds and fastened in the souls' (*istaqarra fī l-ādḥān wa-tarassaḥa fī l-nufūs*). We cannot but notice time as an essential aspect deeply rooted in our daily experience of reality. This claim is substantiated by the commonly accepted division of time into years, months, days, hours, and minutes. This fundamental way of dividing, and indeed visualising, time makes it virtually impossible to deny that there is something that we call time. Al-Āmidī also refers to ways of dividing time 'other than that' without mentioning what exactly he has in mind. One is tempted to think of the four seasons, for example, as a suitable way of illustrating time as something concrete having a bearing on the extra-mental world, because it can hardly be denied that a warm period is followed by a cold period, and that crops grow and flowers blossom only at certain times. By recognising the self-evident nature of time's existence we may not yet know *what* time is, but it becomes increasingly hard to deny that there is at least 'something' to which the term 'time' applies, whatever it may be.

The second argument is less intuitive and more philosophical in character. Al-Āmidī reports that some say that the existence of time in concrete reality is borne out by the fact that concretely existing things (*mawǧūdāt al-a'yān*) are *in* time. If time were anything other than a real existent, then we could not really say that existing things are *in* time.⁶⁰ By raising the question how we could possibly be able to *relate* and *associate* concretely existing changing things without any recourse to a concretely existing time, this argument also relates to what seems to be Avicenna's criticism of al-Ġubbā'ī's position in *al-Samā' al-ṭabī'ī*. According to Avicenna, the simultaneity or concurrence of events presupposes an already existing time. Time, then, is not the result of associating one event with another; it is a condition for our ability to do so.⁶¹ Without time, there is no simultaneity and without simultaneity we cannot understand the concurrence of events.

59 For the concept of necessary knowledge in *kalām*, see al-Bāqillānī, *Kitāb Tamhīd*, p. 26, line 12–p. 27, line 12.

60 Al-Āmidī will return to the meaning of 'being *in* time' (§§26–7). Already Plato and Aristotle reflected about what it means to be 'in time' (ἐν χρόνῳ) or to 'partake in time' (χρόνου μετέχων); cf. Plato, *Parm.*, e.g. 151e2–152b5, and Aristotle, *Phys.* IV.12, e.g. 220b32–221b25, and IV.14, 222b30–223a15.

61 Cf. Avicenna, *al-Samā' al-ṭabī'ī* II.10.9.

It should be noted that the argument through which Avicenna established the Aristotelian definition of time as 'the number of motion when it is differentiated into what is prior and posterior', as he phrased it in *al-Samā' al-ṭabī'ī* II.11.3, likewise relies on the idea of simultaneously occurring motions. That al-Āmidī now turns to this Avicennian argument is, thus, appropriate. In addition, it also seems that for him, Avicenna's argument sufficiently bears out both the essence of time and its concrete existence. There is, then, no expository break between paragraphs four and five. Moreover, al-Āmidī's version of the argument is in several crucial respects not entirely faithful to Avicenna, as we shall see.

3.3 The Possibility for Traversing a Distance (§5)

Al-Āmidī states that 'the most eminent philosophers' (*afādil al-falāsifa*) said that time is 'the magnitude of the spherical circular motion, and nothing else'. With this, he omits any reference to the 'prior and posterior', which is characteristic of the Aristotelian definition, instead adding a reference to the circular motion of the outermost sphere. This is striking but not uncommon in the tradition. He, then, presents Avicenna's argument as follows: We are asked to imagine two motions. Both motions proceed at the same speed, yet one of them began its motion earlier than the other, while they, nonetheless, end their motion together in the same instant. For al-Āmidī, this is enough to show that there is something between the moment of starting and the moment of stopping of each of the two motions which determines how much distance a moving object can cover at a given speed. If, for instance, the second motion, which started later, were faster, then it could cover just as much of the distance as the first motion even though the first motion had a head start. Since the speed of the two motions was assumed to be equal, however, the second motion will not yet have been able to finish traversing the distance at the very moment at which the first motion has. This 'something' between the motion's moments of starting and stopping, al-Āmidī writes, is 'a possibility for traversing a distance' (*imkān qaṭ' masāfa*).

The crucial point, now, is that the second motion, which at the same speed traversed less distance than the first, also had a lesser possibility than the first—not because it traversed a lesser distance, but because it had to start later. Thus, the possibility of the first motion is greater (*azyad*) than the possibility of the second. Since we can speak about these possibilities in terms of more and less, just as we can speak of the traversed distances in terms of more and less, these possibilities are magnitudes (*maqādīr*, sg. *miqdār*) allowing for measurement (*taqdīr*).⁶² Measuring occurs, for instance, when the possibility of the first

62 The Arabic noun *miqdār* can be translated as both 'magnitude' and 'measure.' Despite the fact that it is derived from the same root as *taqdīr* (the act of 'measuring'), I decided to trans-

motion is twice the possibility of the second, just as the distance covered by it may be twice the distance covered by the second, or when we divide the respective possibilities, in order to compare and measure their respective parts. Therefore, al-Āmidī argues, the possibilities which can be found between the beginning of a motion and its end are magnitudes.

Other than that, al-Āmidī alludes to the mutual correspondence between distance, motion and time, which became a widely acknowledged principle in the Arabic tradition and is familiar from Aristotle, who in *Physics* IV.11 stated that motion ‘follows’ the distance and time ‘follows’ motion.⁶³ The idea is that distance, motion, and time are together either continuous or discontinuous, i.e. atomic. If only one of them is shown to be continuous, all the others are, too.⁶⁴ Al-Āmidī takes this up with the same terminology as Avicenna and maintains that ‘whatever conforms (*tābaqa*) to something continuous is [itself] continuous,’ so that the possibility itself is a continuous magnitude, because it conforms to motion, and motion, like distance, is continuous.

With the concluding sentence of this paragraph, we encounter the first direct parallel to al-Āmidī’s *al-Nūr al-bāhir*.⁶⁵ In fact, the following paragraphs up to paragraph eighteen follow the structure and the wording in *al-Nūr al-bāhir* closely.

3.4 Identifying the Possibility: what It Is not (§§6–13)

Having shown that a possibility to traverse a given distance at a given speed exists between the moment of starting and the moment of ending a motion, al-Āmidī intends to determine more specifically what this possibility is. We know that it is a magnitude but not *of what* it is a magnitude. In paragraph eighteen, al-Āmidī will draw the conclusion that this possibility, which is time, is the magnitude of motion.

late *miqdār* as ‘magnitude’ (instead of ‘measure’), because both al-Āmidī and Avicenna emphasise the quantitative aspect of *miqdār* and describe it as a continuous magnitude (*miqdār muttaṣil*) in the category of quantity (*kāmm*). In *The Elements of Avicenna’s Physics*, I argue that ‘magnitude’ is to be preferred in this context. What is more, Avicenna’s argument—and consequently al-Āmidī’s presentation—owes much to Aristotle’s analysis of the continuity of time in *Phys.* VI.2.

63 See, e.g. Aristotle, *Phys.* IV.11, 219a10–21; 219b15–16; 219b22–3, and 220a4–6; see also *ibid.* VI.1, 232a18–22; VI.2, 232b20–233a21; 233b19–33; VI.4, 235a18–24, and *id.*, *Met.* Δ.13, 1020a32.

64 The principle cuts both ways, and so if only one of them is shown to be atomic, all others are, too. For a study of al-Āmidī’s position towards atomism, cf. Hassan, *The Encounter of falsafa and kalām*.

65 Cf. al-Āmidī, *al-Nūr al-bāhir* II.2.3, p. 136, lines 18–19.

First, al-Āmidī provides an overview of the available options in paragraph six. This paragraph is also found, almost in its entirety, in *al-Nūr al-bāhir*.⁶⁶ According to this list, the possibility must be identified either with the motion itself (*nafs al-ḥaraka*), the thing-in-motion (*al-mutaḥarrrik*), the mover of its motion (*al-muḥarrrik lahā*), or the distance (*al-masāfa*); alternatively, it may also be a magnitude of one of these things or of a state within them (*miqdār li-aḥad hādihī l-umūr aw li-ḥāla fihā*).

Al-Āmidī devotes the most effort to showing that the possibility is not identical with the motion and provides four arguments for this. Although he continues to follow the structure from his *al-Nūr al-bāhir*, only the second argument can be said to be a close parallel.⁶⁷ The first, third, and fourth arguments go back to the idea that the possibility which is between the beginning and the end of a motion is one single 'unitary' (*muttaḥid*) thing, whereas the motions which may actually happen between the moment of its beginning and end can in different ways be multiple (*muta'addid*) and diverse (*muḥtalif*). There may be several motions occurring simultaneously, they may differ in speed or even be of different kinds, such as local motion, alteration, and growth; their corresponding time, however, is one and the same. This raises the question which of these motions it is that is identical with time and why motion can be subject to different speeds, whereas time itself cannot.⁶⁸ The second argument is systematically different and emphasises that we are able to imagine (*tawahhum*) such a possibility even in the absence of an actual motion. Probably, al-Āmidī thinks of a period of rest, which we are able to imagine, perhaps even to measure, without taking recourse to a motion.

These arguments demonstrate the absurdity of the claim that the possibility (and, thus, time) is nothing other than motion. Paragraph eleven adds a methodological remark that we cannot conclude that the possibility is identical with motion just because both are 'subject to elapsing and renewal' (*'alā l-taqaddī wa-l-taḡaddud*), i.e. continuously progressing.⁶⁹ We have already seen the participle *mutaḡaddid* ('renewed') as the opposite of *bāqin* ('persisting'). Although both time and motion are not stable or persisting, this does not entail that they are identical. What it does entail, though, is that it would be incorrect to identify the possibility with some of the other candidates, viz. with the mover, the moved, or the distance, because they do remain the same and persist.

At this point, al-Āmidī allows himself a small digression and, in paragraph thirteen, reproduces a well-known argument against the 'apparently Pythago-

66 Cf. *ibid.* II.2.3, p. 137, lines 1 and 5–7.

67 Cf. *ibid.* II.2.3, p. 138, lines 1–12.

68 Cf. Avicenna, *al-Samā' al-ṭabī'ī* II.10.9. These arguments, and in particular the third, ultimately derive from Aristotle; cf. *Phys.* IV.10, esp. 218b15–18.

69 See n. 48 above.

rean' view that time is the sphere itself.⁷⁰ Aristotle had merely classified this argument ironically as 'well-meaning' (εὐηθικώτερον), i.e. as foolish and naïve, and so it was up to his commentators to point out that it rests on a syllogism of the second figure with two affirmative premises which, as is known, is inconclusive.⁷¹ Even if it were conclusive, al-Āmidī adds, relying on Avicenna, one of its premises would still be false.⁷²

3.5 Identifying the Possibility: what It Is (§§14–18)

The brief digression about the opinion that time is the sphere corresponds, albeit not verbatim, with *al-Nūr al-bāhir* II.2.3, p. 140, lines 4–8. The now following text in *Abkār al-afkār* is again to a large extent paralleled in *al-Nūr al-bāhir* II.2.3, p. 140, line 9–p. 141, line 3, covering the positive account of al-Āmidī's interpretation of the Avicennian argument to the conclusion that time is a possibility and that this possibility is the magnitude of motion. So far, we have been told what the possibility is *not*, now we will find out what it is.

Since the possibility is neither the motion itself nor the moved nor the mover nor the distance, 'it is inevitable that it is a magnitude of one of these things or of a state in them.' Immediately, al-Āmidī adds that the possibility cannot be the magnitude of the mover or the moved, for, then, two unequally large people would need different amounts of time to traverse the same distance regardless of their respective speed.⁷³ Similarly, it cannot be the magnitude of the distance, for any objects traveling along the distance would, then, again take the same time regardless of their speed.⁷⁴ These arguments resemble those already known from paragraphs seven to twelve, with the difference that they are now concerned with the *magnitude* of, for example, the mover instead of the mover as such.

In paragraph fifteen, al-Āmidī provides another familiar argument, which will now also reject the alternative that the possibility may be related to some further state (*ḥāla*), whatever it may be, in any of these things. He argues that we can imagine (*tawahhum*) such a possibility even in the absence of imagining anything else that may be assumed about the mover, the moved, or the distance either as such or in terms of some state in them. In other words, we may think

⁷⁰ See n. 49 above.

⁷¹ See Aristotle, *Phys.* IV.10, 218b5–9. Alexander explained the invalidity of the argument in *Commentaire perdu à la Physique d'Aristote*, frgm. 144; cf. already Boethius' discontent in the first century BC (Huby, *An Excerpt of Boethius of Sidon's Commentary*, p. 400).

⁷² Cf. Avicenna, *al-Samā' al-ṭabī'ī* II.10.12.

⁷³ Cf. al-Āmidī, *al-Nūr al-bāhir* II.2.3, p. 140, lines 9–11.

⁷⁴ Cf. *ibid.* II.2.3, p. 140, lines 12–15.

about a trip which we are planning for tomorrow between a certain moment of beginning and a certain moment of ending that trip without necessarily having a clear idea—or any idea at all—about whether to take the car or the bike, with whom we want to go, what exact route we would like to take, which destination we want to go to, or whether we want to take the umbrella with us. The consideration of our possibility for traversing a certain distance tomorrow at a certain speed is entirely unaffected by any such further considerations.

Yet, there is a potential difficulty here. Above, the argument from imagination showed the impossibility of identifying the possibility with four things, viz. mover, moved, distance, and motion. Here, however, the modified argument from imagination applies only to *three* things: the magnitudes of the mover, of the moved, and of the distance but not to the magnitude of the motion. Why is this? Can we not likewise argue that it is possible to imagine said possibility without ‘all that which is assumed about’ motion? Apparently not, but it is not clear why. It can only be surmised that the reason why we can imagine the possibility without imagining a motion but not without imagining a *magnitude* of a motion is that even our considered trip tomorrow requires that we imagine together with it a moment of beginning and a moment of ending the trip, for without any beginning and end, there is no trip—whether an actual currently occurring or a potential trip planned for tomorrow. It is the consideration of the magnitude between the beginning and the end of a motion which brings about the imagined possibility, and so it is impossible to consider time or the possibility without also considering the magnitude of a motion.

Finally, al-Āmidī brings in yet another familiar argument. The magnitudes of the mover, the moved, and the distance are not ‘subject to elapsing and renewal,’ whereas the possibility is precisely that, as we have already been told. Consequently, the possibility cannot be identified with any of these things, al-Āmidī concludes. Yet, the possibility can also not be anything related to the speed, because two motions may differ in their possibilities, i.e. in their time, by having different moments of starting and ending their motion.

After that, al-Āmidī ends this discussion in paragraph eighteen with a remark that can also be found in his *al-Nūr al-bāhir*:

Therefore, it [sc. time] is nothing but the magnitude of motion, and it is that to which the motion conforms and in which it occurs, and it is concurrent (*musāwīq*) with [motion] in existence and is subject to elapsing and renewal. (al-Āmidī, *Abkār al-afkār* §18)⁷⁵

This paragraph states that the magnitude of motion is the last remaining candidate for the identification with that possibility which we have found between the beginning of a motion and its end. The conclusion is established through a

75 Cf. *ibid.* II.2.3, p. 141, lines 2–3.

process of elimination of all other candidates. What is more, al-Āmidī reminds us of the intimate relation this possibility has to motion. He explains that the possibility is ‘that to which the motion conforms and in which it occurs’ (*mā yuṭābiqihū l-ḥaraka wa-taqa ‘u fīhi*). This is not easily understood. For Aristotle, it is time which conforms to motion, while motion itself conforms to the distance.⁷⁶ Likewise, Avicenna is very clear that time depends on motion and states that there will be no time if there were no motion, i.e. if there were no ‘renewal of some state’ (*tağaddud ḥāl*).⁷⁷ It would, thus, seem that time should conform to motion, rather than motion to time. One may recognise here in al-Āmidī’s wording a tendency similar to the above mentioned Platonist trend which considers motion as actually taking place in time and as mapping out or revealing time. This would, as Plotinus and al-Siğistānī pointed out, reverse the Aristotelian idea. Does al-Āmidī, then, express such a Platonist view here? It does seem so—yet only insofar as Avicenna’s own conception is not free of that idea either. Indeed, Avicenna (unwittingly) strove to bring the appeal of that Platonist conception in line with his own Aristotelian conviction that time is no substance but an accident of motion. Since time is a magnitude of motion, spanning from the beginning of the motion to its end, it can indeed be said that motion occurs in time. This is all the more true if time is actually the magnitude only of the motion of the outermost sphere, so that all other motions happen within this universal time and conform to it. This, then, is the reason why al-Āmidī can say that the motion conforms to the possibility—because for him, time is just that possibility—and not the other way around.

Throughout the exposition of his interpretation of Avicenna’s discussion, al-Āmidī, like Avicenna, never mentioned the term *zamān* (‘time’). In *al-Šifā’* as well as in *al-Nağāt* and *al-Ḥikma al-‘Arūḍiyya*, Avicenna introduced the term for the first time *after* time had been shown to be the magnitude of motion.⁷⁸ Afterwards, Avicenna employs the term regularly. Similarly, al-Āmidī employed the term *zamān* so far only in passages in which he reported other ideas. From now on, al-Āmidī, too, will use the term more often.

3.6 Time Is not a Substance (§19)

Al-Āmidī is almost done with presenting his interpretation of Avicenna’s account. Before he concludes his exposition, he argues against the view that time is a substance. In *al-Nūr al-bāhir*, he likewise set off at this point an involved

76 See n. 64 above.

77 Avicenna, *al-Samā’ al-ṭabī’ī* II.11.6.

78 The chapters on time in *al-Nağāt* and *al-Ḥikma al-‘Arūḍiyya* are largely identical.

discussion of various views about whether time is a substance or an accident.⁷⁹ Here in *Abkār al-afkār*, he is content with a brief—perhaps too brief—argument against that view. One of the reasons for his brevity on this point may be that the result of the discussion so far already entails that time cannot be a substance, because it is the magnitude of something else, thus attaching to it like an accident. In other words, the mere fact that he has been following Avicenna rather closely is already reason enough to consider al-Āmidī as opposing the above-outlined Platonist tradition of regarding time as a substance or even as a transcendent, self-subsisting substance—a position to which he explicitly alludes in his discussion in *al-Nūr al-bāhir* and which his slightly older contemporary Faḥr al-Dīn al-Rāzī shall come to embrace in his later works.⁸⁰

The argument al-Āmidī presents here is a recycled version of one of the arguments Avicenna had reported in *al-Samā' al-ṭabī'ī* against the existence of place.⁸¹ He says that if time were a substance, it would have to be either sensible or non-sensible. The former, however, would itself require being in time, so that time needs to be in time, thus yielding an infinite regress.⁸² If the latter, then other sensible substances could not exist in it, which they, undoubtedly, do; and that is a contradiction. Al-Āmidī does not elaborate further, but we shall come across a similar argument again below, in paragraph twenty-three, in a slightly more developed version.

In addition, it should be noted that the chapter on time in *Abkār al-afkār* is the sixth chapter of the subdivision concerned with the accidents and properties (*fī l-a'rāḍ wa-aḥkāmihā*) of the possible existent. It should immediately be clear even from the position of the chapter within the work as a whole that, for al-Āmidī, time is not a substance.

79 Cf. al-Āmidī, *al-Nūr al-bāhir* II.2.3, p. 141, line 7–p. 144, line 17. One of the interesting points in the elaborate discussion in *al-Nūr al-bāhir* is that al-Āmidī argues that the eternity of time does not entail that it is a substance, unless it would have necessary existence through itself, which it does not have because of its being subject to elapsing and renewal; see esp. *ibid.*, II.2.3, p. 144, lines 1–12; cf. also §22. It seems that al-Āmidī is not troubled by the worry we repeatedly find in Faḥr al-Dīn's writings that a necessary time would rival God's unique position as a necessary existent, because on any conception, time must be subject to elapsing and renewal and, thus, cannot be necessary through itself; cf. also Adamson and Lammer, Fakhr al-Dīn al-Rāzī's Platonist Account of the Essence of Time.

80 Cf. *ibid.*, II.2.3, p. 142, line 12–p. 143, line 1.

81 See Avicenna, *al-Samā' al-ṭabī'ī* II.5.2. This may not be surprising, as both Avicenna and al-Āmidī stress the similarities between the investigation into place and that into time (cf. Avicenna, *al-Samā' al-ṭabī'ī* II.10.1, and al-Āmidī, *al-Nūr al-bāhir* II.2.3, p. 135, lines 12–18).

82 The regress argument has also strong parallels to Avicenna's reasoning in *al-Samā' al-ṭabī'ī* II.11.4.

3.7 The Avicennian Conclusion (§20)

After two thirds of his chapter on time, al-Āmidī draws the following conclusion:

Thus, it is already established that time is an accident (*‘araḍ*), and of all the accidents it is a magnitude (*miqdār*), and of the magnitudes it is continuous (*muttaṣil*), and despite its continuity it is subject to elapsing and renewal (*‘alā l-taqaḍḍī wa-l-tağaddud*), and so it is one of the kinds of quantity (*aḥad anwā‘ al-kamm*). Everything that is said by [other] teachings about it is false (*wa-baṭala kull mā qīla min al-maḍāhib fīhi*). (al-Āmidī, *Abkār al-afkār* §20)

This conclusion is thoroughly Avicennian, which conveys the general impression that the rest of al-Āmidī’s exposition of the argument was similarly faithful to Avicenna’s intention. Yet, on closer inspection, it emerges that al-Āmidī’s account deviates in a number of important respects from Avicenna’s—so much so that it can be asked whether al-Āmidī merely misrepresented the argument, fundamentally misunderstood it, or deliberately developed it. In addition, I said above that al-Āmidī probably took Avicenna’s argument, whose presentation he was about to begin, as sufficiently demonstrating both the essence and the existence of time. This, too, is inadequate in several respects, so let me now digress a little, in order to provide a critical assessment of al-Āmidī’s purportedly Avicennian position.

For al-Āmidī, Avicenna’s argument first establishes the existence of a possibility (or of several possibilities). This possibility is time and it exists between the beginning of a motion and its end. The question, then, is how this possibility (i.e. time) can further be specified. Eliminating a large number of options, al-Āmidī concludes that this possibility must be the magnitude of motion. This seems reasonable, as earlier arguments have likewise indicated that the possibility is quantitative and continuous. Thus, time exists and is the magnitude of motion, because the possibility exists, and this possibility is the magnitude of motion.

This, however, is something which Avicenna never said or argued for. He never identified the possibility with a magnitude in any of his major works. Instead he wrote that between a motion’s moment of starting and its moment of stopping, there is a magnitude—and this magnitude, being the magnitude of motion, is time. The moving object, in turn, has a number of contingent possibilities; for example, it can go at five, ten, or fifteen kilometres per hour. All these possibilities ‘occur in’ (*yaqa‘u fī*) the mentioned magnitude, i.e. they occur in time, but they themselves are not time.⁸³ This is immediately appar-

83 Ibid. II.11.5.

ent when we consider that a moving object, indeed, has a very large, perhaps infinite, number of possibilities for traversing distances. Yet, this does not mean that there are equally many different times. Moreover, two simultaneously moving objects have together even more possibilities, but all these possibilities occur between the moment of starting and the moment of ending, i.e. they occur in or pertain to a single magnitude, which is the magnitude of motion which we call time:

We only have made 'time' a name for the meaning which through itself is a magnitude for the aforementioned possibility. (Avicenna, *al-Samā' al-ṭabī'ī* II.11.5)⁸⁴

Thus, the possibilities in question are nothing other than the numerous contingent options for motion, speed, and distance which a moving object has prior to its being in motion, of which only one is eventually realised. This is all that is said about the possibility in Avicenna's own account of time. The possibility is not time nor is it its essence nor does it demonstrate its existence. It is nothing but a contingent possibility of an actually or potentially moving object.

The difference between al-Āmidī's approach and Avicenna's is immediately apparent in the eliminating process. For Avicenna, the question was whether one could further specify the *magnitude* between a motion's beginning and end: is it the magnitude of the distance or that of the moving thing, or that of motion? In contrast, al-Āmidī seeks to determine further what the *possibility* is: is it the distance or the moving thing or motion itself *or* is it the magnitude of one of these? In other words, for Avicenna, the magnitude is the *determinatum*, i.e. that which is specified—for al-Āmidī, it is the *determinans*, i.e. that which specifies something else, viz. the possibility. Consequently, Avicenna's argument considers a magnitude which pertains to motion, whereas al-Āmidī establishes time as a possibility which is the magnitude of motion.⁸⁵

In this regard, it is also apparent why al-Āmidī omits all mention of the actual core of Avicenna's conception: the notions of 'before' (*qabl*) and 'after'

84 My interpretation offered here greatly differs from earlier interpretations which, indeed, claim that for Avicenna time is nothing other than this possibility. Jon McGinnis, for example, translates that sentence so that it makes time 'only a name for the possibility noted above', thus omitting the crucial words '... the meaning which through itself is a magnitude for ...'.

85 It should be noted that in his longer discussion in *al-Nūr al-bāhir*, al-Āmidī first seems to be more careful and writes that 'that in which there is a possibility for traversing that distance is between the beginning of that motion and its end,' which is close to writing that the possibility occurs in the magnitude between the beginning of a motion and its end, rather than being the magnitude itself. Yet shortly after that, he continues to talk about the possibilities, to describe them as magnitudes, and to call them 'time'; see *al-Nūr al-bāhir* II.2.3, p. 136, line 9–p. 137, line 4.

(*ba'd*), which make up the essence of time and through which, ultimately, the existence of time is demonstrated. While for al-Āmidī, time is the possibility, Avicenna argues that time is that which through itself is characterized by the before and after.⁸⁶ For Avicenna, the before and after is the essence of time. Al-Āmidī's version of the argument consequently not only misconstrues the importance of the possibility, it also mistakes it for the essence of time, thus making any mention of the before and after negligible.⁸⁷

Finally, Avicenna announced his intention, first, to investigate the essence of time (*māhiyyat al-zamān*), so that its existence (*wuġūduhū*) shall become clear 'from there' (*min hunāka*).⁸⁸ This means that the existence of time will emerge from a consideration of its essence. Since its essence is that which through itself is before and after, its existence will become clear from considering what this means. Thus, Avicenna demonstrates the existence of time by showing that things derive their temporal qualifications from time and that there is nothing else that actually can provide these qualifications other than time. Since things have these qualifications, time must exist.⁸⁹ In al-Āmidī's chapter on time, the argument for time's existence is different. Since time is the possibility for traversing a distance at a certain speed, its existence is sufficiently demonstrated by the argument which establishes that very possibility in paragraph five. As a result, al-Āmidī's chapter first demonstrates the existence of time by showing that such possibilities exist and 'from there' bears out its essence by identifying the possibility with the magnitude of motion—this obviously reverses the order of the Avicennian argument.

One aspect which is conspicuously absent from al-Āmidī's exposition is the now (*al-ān*). There was only one brief mention of the now in paragraph eighteen, but this could hardly be seen as giving full due to the complexity of Avicenna's exposition of that notion in *al-Samā' al-ṭabī'ī* II.12. Yet, since for Avicenna, the now is only of subordinate importance for his account of time, it may be justified that al-Āmidī dropped it altogether in his discussion in *Abkār al-afkār*, while discussing it in more detail in *al-Nūr al-bāhir*, where he follows the Avicennian text rather closely.⁹⁰

86 See Avicenna, *al-Samā' al-ṭabī'ī* II.11.4.

87 In *al-Nūr al-bāhir*, al-Āmidī introduces the before and after as 'another meaning' (*'ibāra uḥrā*) one could formulate, and discusses Avicenna's argument that the before and after must belong to time through itself (p. 145, line 9–p. 146, line 10).

88 Avicenna, *al-Samā' al-ṭabī'ī* II.10.13.

89 See *ibid.* II.11.5. This is also the argument in *al-Iṣārāt wa-l-tanbīhāt* II.5.4, where it has for centuries been taken to demonstrate the existence of time, as already noted.

90 Against the commonly accepted interpretation that the now is of crucial importance for the existence of time, I argue in *The Elements of Avicenna's Physics* that Avicenna's exposition of the now is overall a less relevant appendix to an already established theory.

Overall it seems to me that al-Āmidī did not deliberately develop the Avicennian account by putting more conceptual weight on the notion of the possibility and by identifying possibility with time. Instead, he misunderstood the argument and, thus, misrepresented it in his discussion. This means that al-Āmidī thinks that the account he has provided, culminating in the conclusion in paragraph twenty, is an accurate exposition of Avicenna's argument.

What we shall now have to see is whether this account also reflects al-Āmidī's own position, and if so, to what extent it does. In other words, we need to examine whether the fact that he thinks that he has faithfully expounded the Avicennian argument also means that he himself is a faithful follower of Avicenna with regard to time.

Above, al-Āmidī introduced his exposition with the words 'the most eminent philosophers said' (*qāla afādil al-falāsifa*). This resembles his terminology in *al-Nūr al-bāhir*, where he attributes the view that 'time is the magnitude of motion and that it is what is between the beginning of a motion and its end in terms of possibilities for traversing distances' to 'the group of those who arrived at the correct opinion (*tā'ifat al-muḥaqqiqīn*) and the most eminent of the ancients (*fuḍalā' al-mutaqaddimīn*)'.⁹¹ Seven pages later, he concludes the discussion of this view in *al-Nūr al-bāhir* thusly: 'In verification (*wa-fī l-tahqīq*), then, the accurate meaning (*al-'ibāra al-muḥarrara*) of time is that it is the magnitude of motion and its number.'⁹²

The terms used for introducing and concluding the discussion of the Avicennian account in both works testify to al-Āmidī's respect towards Avicenna and the Peripatetic doctrine. In particular, *muḥaqqiq* and *tahqīq* may be key terms in the vast number of arguments and counter-arguments the post-classical Avicennian tradition offers its interpreters that help to identify a position close to the own conviction of the author. If this is true, then al-Āmidī reveals himself in these passages as a loyal follower of Avicenna's teaching. However, with the next paragraph in his *Abkār al-afkār*, he immediately makes it clear that the conclusion he just drew is not the end of the story.

From here, the accounts in *Abkār al-afkār* and *al-Nūr al-bāhir* go separate ways for a while, though they will to some extent reunite later.⁹³

91 Al-Āmidī, *al-Nūr al-bāhir* II.2.3, p. 137, line 18–p. 138, line 1.

92 Ibid., II.2.3, p. 144, line 19–p. 145, line 1.

93 In *al-Nūr al-bāhir*, al-Āmidī now begins to discuss the now (II.2.3, p. 145, line 9–p. 149, line 4). He largely draws on material from Avicenna's *al-Samā' al-ṭabī'ī* II.12, esp. 3–5.

3.8 Essence vs Existence (§21)

Al-Āmidī claims to have reported practically all relevant information regarding time. Yet, he exclaims that despite his efforts there is still room for debate and consideration (*wa-ma 'a hādā fa-fīhi nazar*), because someone might step forward and question the concrete, i.e. extra-mental, existence of time. The complaint reported by al-Āmidī is that from knowing the essence of something we cannot yet be sure that this essence exists as *wuḡūdī*, i.e. as extra-mentally existent in concrete reality. That the essence of time exists in our minds seems to be incontestable. We have defined its essence as the magnitude of motion and that essence can exist in our minds like a triangle, a heptagon, a horse, and a goat-stag do. It is here that we recognise that al-Āmidī, too, continues the tradition of taking time's existence for granted, yet he does so in the distinctly post-Avicennian manner by taking for granted only its existence in the mind. Accordingly, we can, indeed, claim to have 'knowledge ... of that which is understood about time' (*al-'ilm ... bi-mafhūm min al-zamān*), but we cannot claim to have 'knowledge ... of the [mode of] existence of that which is understood about time' (*al-'ilm ... bi-wuḡūd mafhūm min al-zamān*), for this latter knowledge is not entailed in the former. In other words, what al-Āmidī provides here is a worry which concerns the validity of Avicenna's explicit strategy that once the essence of time has been determined, it is 'from there' (*min hunāka*) that its existence shall likewise become clear. With this, al-Āmidī implicitly also challenges the appropriateness of Aristotle's approach of not answering his own sceptical doubts about the existence of time and, finally, the attitude of the entire tradition of accepting, and even supporting, Aristotle's laxity. Thus, al-Āmidī criticises the more-than-a-millennium old attitude of answering the question of *whether* time is with an answer to the question of *what* time is. Without further investigation, we are effectively unable to go beyond a mere acceptance of time's mental existence.

The central term in this paragraph is *wuḡūdī*. Unfortunately, neither this term nor its history and implications have yet been studied.⁹⁴ The same is true of its counterpart *'adamī*, which we shall also come across. What al-Āmidī's text suggests is that *mawḡūd* ('existent') can apply to any form of existence, be that existence in the mind (*fī l-adhān*) or in the concrete reality (*fī l-a'yān*), whereas *wuḡūdī* applies only, or at least more appropriately, to the latter. Conversely, something seems to be *ma'dūm* ('non-existent') if it does not have any form of existence, but it is *'adamī* if it lacks concrete existence. If we paraphrase al-Āmidī's concern in this kind of language, we might say that all we know from the foregoing analysis is that time is *mawḡūd*, but we do not yet know whether it is *wuḡūdī*.

94 See, however, the recent remarks in Shihadeh, *Doubts on Avicenna*, ch. 4.

This is a particularly pressing question, because other concepts of natural philosophy, such as motion, place, the elements, and even the phenomenon of causation can directly be observed, whereas—the intuitive knowledge we may claim to have about the existence of time notwithstanding—time cannot.⁹⁵ In fact, time may seem to exist only fleetingly or dimly and is, as Avicenna put it in *al-Samā' al-ṭabī'ī*, 'more tenuous in existence than motion' (*aḍ'af wuḡūdan min al-ḥaraka*).⁹⁶ Avicenna's remark clearly derives from Aristotle, who introduced his doubts about the existence of time with the following words:

That [time] is either not at all or only tenuously and faintly (μόλις καὶ ἀμυδρῶς), could be suspected from the following [considerations]. (Aristotle, *Physics* IV.10, 217b32–3)

Avicenna's and Aristotle's careful remarks about the tenuous existence of time, contrasting it with the clearly observable phenomenon of motion, provide a good reason for being hesitant about the precise nature of time's existence, especially when bearing in mind all the arguments which, indeed, challenge the real existence of time. Many of these arguments are ultimately known from Aristotle's *Physics* IV.10. Now, however, they have been made applicable to the distinction between mental and concrete existence. It is one of these arguments to which al-Āmidī turns now.

3.9 Arguments for the Nonexistence of Time (§§22–5)

Two kinds of arguments suggest that time is 'not extra-mentally existent' (*ḡayr wuḡūdi*). The first is that time, if it exists, must be either possible or necessary. It cannot be necessary, because it is essentially 'subject to elapsing and renewal' (*'alā l-taqaddī wa-l-taḡaddud*). If it is possible, however, it must be either a substance—a position which has already been disproven—or an accident. Yet, it cannot be an accident either, as every accident requires a subject (*mawḍū'*) and that subject must be either sensible or non-sensible.

If that subject were sensible, then we would have to explain how a single unitary time relates to the plurality of sensible substances which exist in time. This worry resembles what may be the major objection in Faḥr al-Dīn al-Rāzī's works against Avicenna's position. If time were the magnitude of motion, Faḥr

⁹⁵ The question is even more pressing since, as Avicenna argues, the motion as an extended whole exists only in the mind, whereas the instantaneous fact of an object's current being in motion exists in concrete reality; cf. *al-Samā' al-ṭabī'ī* II.11.5–6. So, if time is the magnitude of motion, then it would appear to be the magnitude of the extended motion and, thus, existent only in the mind.

⁹⁶ Ibid. II.13.1.

al-Dīn reasons, then each and every motion would bring about its own time. Time, however, is one and single, and equally encompasses all motions.⁹⁷ Al-Āmidī's present argument seems to continue this line of thought. If there was only one time, then it would have to subsist equally through all the different and numerous motions, which he considers to be absurd, or it would have to subsist only through some of them—but then why does time exist as an accident of *this* or *these* substances but not of *that* or *those* other substances?

If time were to exist as an accident of a non-sensible substance, then other sensible substances, al-Āmidī claims, could not subsist through or exist in time as being in some kind of 'vessel' (*zarf*).⁹⁸ Although this argument is a slightly developed version of a thought already expressed in paragraph nineteen, it is still difficult to understand. What is so problematic with a non-sensible substance to which time attaches as an accident that makes it impossible for other substances to exist in time as being in a 'vessel'? In order to understand this argument, we not only need to know that it draws on one of the arguments Avicenna reported in his discussion of place, we also have to realise that in Avicenna, the contrast was not between a sensible and a non-sensible substance but between a sensible and an intelligible (*ma'qūl*) substance.⁹⁹ If, accordingly, time were an accident of an intelligible substance, it would exist only in the mind. Thus, it would, indeed, be problematic to describe concretely existing sensible things through time, in particular if time was supposed to be some kind of 'vessel' (*zarf*) in which these things exist. In other words, sensible extra-mental things cannot exist in a merely intelligible 'vessel.' Once, understood in light of Avicenna's text as working on the dichotomy between what is sensible and what is intelligible, the argument is in line with both al-Āmidī's current agenda of presenting arguments against time's supposed extra-mental existence and with the general thrust within this last third of the chapter on time in his *Abkār al-afkār*.

Following this, al-Āmidī brings in a second well-known consideration showing that time is not *wuġūdī*. This proof is introduced as being particularly characteristic of the teaching (*madhhab*) of the philosophers. This description is

97 Cf. Faḥr al-Dīn al-Rāzī, *al-Mulāḥḥaṣ* II.1.5.4.2, MS Leiden or. 132, fol. 169v; id., *Šarḥ 'Uyūn al-ḥikma* II.8, p. 128, lines 1–12, p. 140, line 6–p. 142, line 25, p. 150, lines 1–3, and id., *al-Maṭālib* V.4, p. 52, line 8–p. 57, line 18, and V.6, p. 75, lines 4–15. Avicenna himself discusses the objection in *al-Samā' al-ṭabī'ī* II.13.2. Faḥr al-Dīn applies the same argument to Abū l-Barakāt al-Baġdādī's conception; cf. Adamson and Lammer, Fakhr al-Dīn al-Rāzī's Platonist Account of the Essence of Time.

98 Here al-Āmidī employs for the first time the technical term *zarf*. It is to be noted that it is not entirely clear why the previous argument demanded that time subsists through sensible things, whereas the current argument now demands the opposite. Perhaps, this can be explained precisely through the difference between what is a *ṣifa* and what is a *zarf*, which is discussed below; cf. pp. 132–5.

99 See Avicenna, *al-Samā' al-ṭabī'ī* II.5.2.

fitting, because the proof is reminiscent of Aristotle's question how time can be said to exist when its parts, viz. the past and the future, exist either no longer or not yet.¹⁰⁰ Al-Āmidī employs it, in order to prepare for the main question of his chapter in paragraph twenty-five. Moreover, with this argument, the accounts of *Abkār al-afkār* and *al-Nūr al-bāhir* continue to proceed in tandem for a little while.¹⁰¹

The argument states that according to the philosophers, time must be divisible, because of its mutual conformity to motion and to the distance, both of which are infinitely divisible and, thus, continuous. Al-Āmidī writes that 'time conforms (*muṭābiq*) with its parts to the parts of motion and motion conforms with its parts to the parts of the distance.' Since time is divisible, it may exist with all its parts at the same time, but then the past would be together with the present and the future, and what was, what is, and what will be would be simultaneous and together (*ma'an*). Alternatively, it may exist only with some of its parts, but then the parts of these parts again would have to face the same question, whether or not they all exist together or only some of them. Since the question repeats itself, we are headed for an impossible regress (*tasalsul mumtani*). All this, we are told, is absurd on the philosophers' own principle (*muḥāl 'alā aṣlihim*). Since these absurdities 'follow only from the assertion of time's existence,' we are bound to say *fa-lā wuġūda lahū*—no existence belongs to time.¹⁰²

If this is correct, al-Āmidī argues, we approximate the opinion of Abū 'Alī al-Ġubbā'ī. As we have seen above, al-Ġubbā'ī maintained that time is whatever somebody has appointed as the time for something (*tuwaqqituhū li-l-ṣay*).¹⁰³ Thus, al-Āmidī writes, one may claim the following:

On these [grounds], then, there is nothing improbable in the assertion of one who says that time is whatever someone measures or assumes in terms of an association (*muqārana*) of an existent to [another] existent and whatever among accidents is just the same; and this is what is meant by their assertion: 'Such is in the moment (*waqt*) of the sun's rising or its descending,' i.e. that it is something whose existence is associated (*qārana*) with [the sun's] rising and its descending. If we accept that it is existent, however, what prevents that its existence is [only] in the mind (*fī l-aḡḥān*) and not in concrete reality (*fī l-a'yān*)? (al-Āmidī, *Abkār al-afkār* §25)

100 This version of the argument imports material from the sixth book of Aristotle's *Physics* into the discussion (see, e.g. *Phys.* VI.3, 234a16–18). In *al-Samā' al-ṭabī'ī*, Avicenna appropriated this material, too (see *al-Samā' al-ṭabī'ī* II.10.2); cf. also n. 8 above.

101 Cf. al-Āmidī, *al-Nūr al-bāhir* II.2.3, p. 129, lines 4–11.

102 Of course, al-Āmidī takes 'existence' here to mean concrete, extra-mental existence.

103 Al-Aṣ'arī, *Maqālāt al-islāmiyyīn*, p. 443.

It is not entirely clear how al-Āmidī infers from Aristotle’s puzzle about the non-existent parts of time a position similar to that of al-Ġubbā’ī. Presumably, his train of thought is that if time has no concrete existence on its own, as is shown by the Aristotelian puzzles, and if time is still a central aspect of our everyday life, as it exists in our minds, then time must be something dependent upon a real person who, relying on equally real events, correlates events and occurrences with one another by appointing, postulating, or measuring them. Thus, al-Āmidī presents al-Ġubbā’ī’s position as a possible solution to the current dilemma, i.e. as a not improbable (*fa-lā ba’uda fī l-qawl*) *via media* that could save time from total non-existence at the cost of its independent concrete existence.¹⁰⁴

However, it may also seem that al-Āmidī uses al-Ġubbā’ī’s position only in order to pave the way for the central question of his chapter, which he formulates here very carefully. He does not state that time does not exist at all nor does he claim that the philosophers are wrong in their analysis. He simply voices a certain discontent, noting that he is not convinced that it has so far been sufficiently proven that time has concrete, extra-mental existence, and so, inspired by the position of al-Ġubbā’ī, he asks: whatever we might say about the existence of time, what prevents us from regarding it as existing only in the mind? Al-Āmidī effectively sounds a note of caution that one ought not judge too quickly—in particular because it seems as if, indeed, so far *nothing* seems to prevent us from regarding time as existing only in the mind.

3.10 Attempts to Save the Concrete Existence of Time (§§26–7)

Above in paragraph four we have come across the argument that time must be something existing in the concrete reality, because other concrete things exist in time and they could not be in time, if time were not something concretely existing. This argument is now picked up for discussion again. Al-Āmidī writes that the assertion that concrete things are related to time ‘by being in it’ (*bi-annahū fīhi*) can be understood in two ways. It could either mean that time is a *ṣifa* or that it is a *ẓarf* for them. Both terms are Arabic grammatical terminology. The first, *ṣifa*, is commonly used for an attribute of something syntactically functioning as an adjective to a noun. In that case, time or temporal notions would attach as attributes to concretely existing things and describe them. Accordingly, things would correctly be said to exist ‘in time,’ because they are describable by temporal attributes. There is nothing objectionable about regard-

104 It is interesting that al-Āmidī interprets al-Ġubbā’ī’s account as an argument for the merely mental existence of time, whereas Faḥr al-Dīn employs it as a proof for time’s extra-mental existence; cf. Adamson’s contribution to this volume.

ing time as a *ṣifa*, says al-Āmidī, but it does not help either, for if time were a *ṣifa*, it would tell us nothing about whether or not time is something concretely existing (*wuḡūdī*), because it is possible to describe something with an attribute that is not concretely existing (*‘adamī*). So, if concrete existents are related to time and are described by time, like a noun is described by its adjective, a subject by its attribute, or a substance by its accident, then time could still be existent only in the mind, because an attribute can be both a concrete attribute or a mental attribute. As a result, the argument that time is concretely existent, because concrete existents are related to time as to a *ṣifa*, fails to demonstrate the concrete existence of time.

The second option, that time is a *zarf* for concretely existent things, is more difficult to understand. In Arabic grammar, *zarf* describes the syntactical function of an adverbial or a prepositional qualification with regard to time or place. The term itself, used as a noun, can mean ‘container’ or ‘vessel’. So, when time is regarded as a *zarf* for concretely existing things, then these things would exist and occur *in* time, because time is something ‘wherein’ these things can occur temporally, just as, spatially, a liquid may be *in* a jar or a car may be *in front of* a person.¹⁰⁵ It, thus, seems that if we take time to be related to existing things like a *zarf* is to the noun it describes, then we may have good reason to infer the concrete existence of time from the concrete existence of things in time, for these things could not occur *in time*, if time were not something concrete *wherein* they could occur. This seems to be the difference between time as a *ṣifa* and time as a *zarf*: in the first case, a non-existent or only mentally existent attribute could well describe a concretely existing thing, but in the second case a concretely existing thing could not be said to exist or occur in a non-existent or merely mentally existent situation or circumstance.¹⁰⁶

Nonetheless, al-Āmidī wants to reject that option as well, but neither the text established by the editions of *Abkār al-afkār* nor the Berlin manuscript tells us why. All of them rather unexpectedly provide the noun *nafy* (‘denial’) before *an yakūna l-zamān zarfan lahā* (‘that time is a vessel for them’). This noun, however, cannot reasonably be integrated into the sentence. In fact, it seems that the exact opposite of *nafy* is required to make sense of the sentence. It is either the result of a scribal error early in the textual tradition of the text or a marginal gloss that slid into the main body of the text, or, alternatively, we must interpret the undotted *rasm* differently.¹⁰⁷ Still, we may be able to recon-

105 See Kasher, *The Term ism*, and id., *The Term al-fi l al-muta ‘addī bi-ḥarf jarr*.

106 Cf. also p. 130.

107 Ulrich Rudolph suggested to me that the undotted *rasm* of *nafy* (نفي) could perhaps be read as *bi-fī* which may have been used as an abbreviation for *bi-annahū fīhi*, the expression al-Āmidī used in the opening line of paragraph twenty-six when he introduced the ‘assertion ... that existents of the concrete reality are related to it by being in it (*bi-annahū fīhi*)’. Jules

struct al-Āmidī's reason for rejecting this option by interpreting the example he presents:

It does not follow from their relation to time {a denial (*nafy*)} that time is a vessel for them. Because of this, then, it is correct to say 'Zayd is in [a state of] rest and comfort,' even though this is a not a vessel for him. (al-Āmidī, *Abkār al-afkār* §27)

The idea appears to be that time is not necessarily a *zarf* for extra-mental things just because they are related to time. The mere fact that Zayd is in a state of comfort and rest does not necessitate that time is a vessel for Zayd being in that state. Or expressed differently, the simple fact that orange juice is on the table does not necessitate its being in a bottle, especially when, as in the example of Zayd's being in a state of rest and comfort, the situation in question implies precisely the *absence* of any motion. Thus, if time is said to be the magnitude of motion, there is all the more reason for not believing that time is a vessel for something at rest to occur in.

What we are told here is that it is difficult, perhaps impossible, to infer the concrete existence of time from the mere fact that concrete things and processes appear or take place in time. Al-Āmidī does not deny the existence of a relation (*iḍāfa*) between these things and time, but this relation is not essential for time, nor does it provide any grounds for arguments attempting to show that time exists because of that relation.

Once again, al-Āmidī's failure to integrate the crucially important notion of the before and after impoverishes his own account of time. Avicenna understands time as that which is through itself before and after, demonstrating time's existence on that basis. Time exists in concrete reality, because nothing other than time is capable of providing temporality. Since some concrete things are in fact 'before,' while others are 'after,' time itself exists in concrete reality bestowing these notions in the first place. Moreover, time, in order to come-to-be, requires prior and posterior states that are essential to any motion. Since motion exists in concrete reality, time, being a product of motion, exists in concrete reality. In other words, had al-Āmidī observed the crucial importance of the before and after in the temporal theory of Avicenna, he may not have had to

Janssens suggested a mistake in the textual transmission caused by a homoioteleuton so that the sentence originally read something along the lines of ... *lā yalzamu min iḍāfatihā ilā zamān nafy an takūna fīhi wa-in yalzam nafy an yakūna l-zamān zarfan lahā*. A third possibility is that early in the transmission somebody wrote *nafy* in the margins which then was later accidentally included in the text. All suggestions support our contention that the text established in both editions and provided by the Berlin manuscript is untenable. The text of the Berlin manuscript, which, according to Wilhelm Ahlwardt's catalogue, was copied in 772/1371, is quite consistently dotted and clearly gives *n-f-y*, which may suggest the third alternative that the word used to be a marginal gloss.

worry about the looming merely mental existence of time. Maybe, however, he simply (or additionally) misunderstood another particular remark by Avicenna. In claiming that a relation to concrete things is not essential for time, al-Āmidī may have intended to refer to a passage in Avicenna's *al-Samā' al-ṭabī'ī* which states that although time may be in a relation to other things, 'time insofar as it is time is not relative' (*lam yakun zamān min haytu huwa zamān muḍāḡāfan*).¹⁰⁸ That al-Āmidī thinks of this passage is all the more probable, as Avicenna himself discusses nothing other than the rather tenuous (*aḡ'af*) existence of time in the same passage.

Apart from this probable misunderstanding and the omission of crucial aspects of the Avicennian theory, al-Āmidī generally appears to be rather sceptical whether the ability to describe things and events by time—either in form of a *ṣifa* or of a *zarf*—sufficiently bears out the concrete, extra-mental existence of time. Of course, we may measure events and compare different sorts of change and motion with respect to their duration, but these processes ultimately rely on the human mind to perform certain operations, such as stipulating moments, measuring time, and numbering motion. All this is reminiscent of the last chapter of *Physics* IV, in which Aristotle discussed the relation between time and soul, claiming that time exists only when there is something 'to do the counting,' i.e. when there is a rational soul that recognises time. In the absence of such a soul, however, only the substrate of time remains, viz. motion.¹⁰⁹

Al-Āmidī argues in a similar way. Time does not come-to-be through motion nor does time exist independently from motion. Rather, time is something that is first and foremost dependent upon the mind and certain operations performed by the mind. That does not mean that time does not exist, but it may mean that time does not exist externally to the mind as something concrete. Indeed, Avicenna's novel approach of beginning his investigation of time by determining certain 'possibilities' between the beginning and the end of a motion may not be the best strategy, if one wanted to show that time is not only something *possible* but something that is *actually* concrete. Precisely along these lines, al-Āmidī proceeds with more doubts about Avicenna's general strategy.

3.11 The Possibility Strikes Back (§28)

Towards the end of the chapter, al-Āmidī's remarks become more and more loosely connected, and the last two paragraphs, in particular, are nothing more than a collection of miscellaneous arguments or afterthoughts.

108 Avicenna, *al-Samā' al-ṭabī'ī* II.13.1.

109 Aristotle, *Phys.* IV.14, 213a21–9.

The first argument attempts to show a conceptual gap between two aspects of Avicenna's account of time. It seems as if al-Āmidī claims that we have to choose between the conception of time as a concrete existent and as the magnitude of motion. Indeed, there is something to this thought. Either time is something that measures motion, in which case it is also something that comes about through our mental operation of measuring the motion and comparing it to other motions and, thus, is not existent as something concrete; or time is something concrete, in which case it also exists apart from our attempts to measure motion, and so is no longer adequately defined as the measure or magnitude of motion.¹¹⁰

With this argument, al-Āmidī effectively turns the tables. While he so far only doubted whether one could infer from the definition of time as the magnitude of motion that time is something that exists as something concrete, he now reverses the situation. Assuming that time exists as something concrete, how could anyone maintain that it is the magnitude of motion on the basis of Avicenna's proof as understood by al-Āmidī? He argues that it is not reasonable to claim both that time is an actually existing thing and that it is a mere possibility, for 'actual' and 'possible' are mutually exclusive categories. The *imkān* between the beginning and the end of motion is a possibility, and a possibility is not *wugūdī*, i.e. something concrete, but *'adamī*, i.e. not concretely existing.¹¹¹ This, indeed, is a genuine worry for anyone who does not merely use the possibility for traversing motion as a way to begin the discussion of the magnitude wherein that possibility occurs (as Avicenna did) but who identifies time with that possibility itself (as al-Āmidī does), for 'possibility' does not sound like a mind-independent entity.¹¹²

This is not to say that al-Āmidī doubts that time is the magnitude of motion, which still seems to be 'the accurate meaning' (*al-'ibāra al-muḥarrara*), as he wrote in *al-Nūr al-bāhir*, or that Avicenna's account (as he understood it) is misled. What this passage does, though, is to emphasise the gap between the definition of time as the magnitude of motion and the claim of its concrete existence, as the one may not *as such* follow from the other. Conversely, he is not arguing that it does not follow *at all* from the other, yet he seems to note

110 Cf. also n. 95 above.

111 In his argument, al-Āmidī refers to 'what has been determined before.' This is probably no reference to a passage within the chapter on time but to some other place within the *Abkār al-afkār*.

112 It should be noted that the question whether possibility can be a real feature of the extramental world has already been subject to discussion at least since al-Gazālī's *Tahāfut al-falāsifa*, where it figures prominently in the chapters about the eternity of the world and Avicenna's proof for God's existence. Similar discussions can be found in the works of, for example, Šaraf al-Dīn al-Mas'ūdī, Faḥr al-Dīn al-Rāzī, and Naṣīr al-Dīn al-Ṭūsī; cf. also Shihadeh, *Doubts on Avicenna*, ch. 4, esp. pp. 141–2.

that there is more work to be done before we can conclude that time exists in concrete, extra-mental reality. That this work has already been done by Avicenna and that al-Āmidī, for one reason or another, merely omitted it here is an unfortunate aspect of an otherwise interesting story.

3.12 More Doubts and a Sudden Conclusion (§29)

Finally, al-Āmidī questions the entire setup of the argument he draws from Avicenna. This setup essentially relied on assuming several motions with different speeds or different moments of starting or ending, which, then, are shown to be measurable by one another. It is from this measurement and from the comparison of two different motions that al-Āmidī derives the notion of time as a possibility that is the magnitude of motion. Now, however, he writes that the difference between two such motions need not be due to the possibility itself but may well be merely the consequence of a difference in distance or speed. Two motions with different moments of beginning and ending either proceed at the same speed, in which case the distances they have covered are different, or they do not proceed at the same speed, in which case the distance they have covered may be the same. Thus, the difference which is actually measured and compared is either a difference of distance or a difference of speed. Time does not come up in these considerations and is, as such, not required for understanding the respective situations. All that happens can sufficiently be accounted for by recourse to distance and speed.

This is an interesting objection to Avicenna's argument that time is a *tertium quid*, i.e. something that cannot be explained by the already known factors of a given motion but is something *in addition* to these factors. This is exactly what, as mentioned above, al-Āmidī thought Avicenna's argument was designed to establish. He takes Avicenna to establish both essence and existence through an examination of different motions with different possibilities for traversing different distances at different speeds. Since this argument relies on the correlation between time and some other factors, especially distance and speed, it may be taken to present time as if it were some sort of a function of these two factors. Time is shorter if the distance is shorter or if the speed is greater. In turn, different motions having the same time must differ in either distance or speed. This description strikingly resembles our modern scientific definition that time equals distance over speed. One can certainly interpret the possibility along the lines of this modern understanding. Yet, this also means that it could be argued that time is *nothing but* that ratio of distance and speed and is, thus, precisely not a *tertium quid* that exists in addition to these factors. Rather, time so understood could be explained solely by two known factors involved in any motion, being merely the result of their combination. Al-Āmidī seems to be arguing

precisely in this direction. Since time is the only one of these three factors that cannot be witnessed or perceived, its existence is, indeed, rather ‘tenuous,’ as Aristotle and Avicenna have written. Speed and distance, on the other hand, are real and observable features in the outside world. Thus, al-Āmidī asks the following: if every increase or decrease of time comes along with a perceptible increase or decrease in either distance or speed or both and if, moreover, there is no difference in time regardless of speed and distance, how could it be said that time is something in addition to speed and distance? Are we really able to infer the existence of time by means of a thought-experiment that employs different distances and different speeds? Al-Āmidī’s verdict is blunt:

On these [grounds], then, we do not accept that it is possible to assume a difference [in terms of the possibility] regardless of (*ma ‘a qaṭ’ al-naẓar*) any difference in distance or speed; let, then, be true what they have reported. (al-Āmidī, *Abkār al-afkār* §29)

What al-Āmidī is referring to with the last words ‘let, then, be true what they have reported’ (*li-yaṣihh mā dakarūhu*) is obscure. Neither is it clear what it is that should be true nor who, in fact, said it. We may have to accept this last clause as al-Āmidī’s all-too-sudden conclusion of his chapter on time from the second part of *Abkār al-afkār*.

4 Conclusion

Even though al-Āmidī’s chapter on time in his *Abkār al-afkār* is relatively brief, it is complex and draws on a variety of sources, which are often not explained and only alluded to. Nonetheless, al-Āmidī’s indebtedness to Avicenna is apparent and he devotes almost two thirds of the chapter to a thorough exposition of his interpretation of Avicenna’s famous argument best known from *al-Samā’ al-ṭabī’ī* as well as *al-Nağāt* and *al-Ḥikma al-‘Arūḍiyya*. The crucial bit in al-Āmidī’s chapter is without doubt the transition from paragraph twenty to twenty-one. The former provides the Avicennian result, concluding the exposition by saying that everything else that has been maintained by other teachings is false (*wa-baṭala kull mā qīla min al-madāhib fīhi*). The next paragraph, then, begins with the words:

Know that this is very much like what is said about time, yet despite [all] this, there is [still something left] to consider, since someone might say ... (al-Āmidī, *Abkār al-afkār* §21)

What follows is a number of arguments, which in various degrees question crucial aspects of the theory as it has been outlined by al-Āmidī and, in particular, of the claim that time exists in concrete reality. It is the transition between

these two paragraphs which determine how al-Āmidī's own position ought to be understood. Overall, there seem to be three possible interpretations.

First, one could favour a 'strong' reading of the critical last third of the chapter and maintain that only this part reveals al-Āmidī's personal opinion. Al-Āmidī would, consequently, emerge as a highly critical thinker who is ready to destroy Avicenna's argumentation even to the point of doubting the validity of the very setup and foundation on which the argument for time rested. The reason why al-Āmidī devoted so much space and effort to outline and portray Avicenna's argument in the first two thirds of the chapter was, then, only to provide the basis for rejecting it in its entirety. That he calls Avicenna one of the 'most eminent philosophers' would not imply that he agrees with him but would simply be a matter of respect to an eminent figure of the Arabic philosophical tradition. However, it remains an open question how a 'strong' reading can integrate assertions such as that all other teachings about time are 'false.'

Another possible reading would be that al-Āmidī regards Avicenna's argument, which on his understanding identifies time with a possibility between the beginning of motions and their end, as valid and sound. Thus, he makes an effort to outline it as accurately as possible and, eventually, states his adherence to that position by saying that everything else maintained by other schools is 'false.' Yet, some people—but not al-Āmidī himself—remain sceptical and argue against that position, so that 'there is [still something left] to consider.' The criticism which follows, then, would not express al-Āmidī's own view but would merely be his report of what 'someone might say.' On this reading, the last third of the chapter would only reflect al-Āmidī's situation within a highly dialectical intellectual milieu, in which several objections against certain aspects of Avicenna's doctrine, or al-Āmidī's interpretation, were known. Al-Āmidī considers these forms of criticism as worth noting but not discussing. This interpretation constitutes a 'weak' reading of that last third of the chapter and considers al-Āmidī's own position to have been concluded in paragraph twenty. However, the strong language about what 'we' do and do not 'accept' towards the end of al-Āmidī's chapter would, then, have to be merely dialectical.

A third option may be a middle course between these two extremes, trying to acknowledge both the criticism of the 'strong' reading and the Avicennism of the 'weak' reading. On that interpretation, al-Āmidī follows and accepts Avicenna's argument in the way he understood it. Yet, he is also aware of certain ways to criticise this argument and was himself deeply troubled by these doubts. Thus, he both accepts Avicenna's conclusion in paragraph twenty but also states that 'there is [still something left] to consider.' He, then, goes on to report these counter-arguments one by one, even though he does not respond to them, perhaps because he himself is not entirely sure how to respond to them.

The third way of interpreting the chapter on time from *Abkār al-afkār* seems to be the one which is forced upon us in the absence of more detailed knowledge about al-Āmidī as a person and thinker, about his general strategy and tendencies, about his style of writing and arguing, and about his intellectual environment.

What we do learn, however, and what emerges clearly from our reading is that al-Āmidī responds to both lines of analysis about time that were prevalent in the Greek tradition and are continued in the Arabic tradition, which I have outlined above. Almost at the same time as Faḥr al-Dīn al-Rāzī proclaims his allegiance to Plato's doctrine that time is an essentially independent substance that subsists through itself, al-Āmidī rejects the notion of time as a substance and classifies time as among the accidents of that which is possible in existence. Time is neither a substance nor transcendent in any way. This is a clear sign of al-Āmidī's Avicennism. Not even in the critical last third of his chapter in *Abkār al-afkār* does he consider the position commonly attributed to Plato nor can we find any statement that lets us assume that he might have adhered to it. There is, furthermore, no sign of the position of Abū l-Barakāt al-Baġdādī, who in his own way conceived of time as metaphysical by defining it as the magnitude or measure of existence. Time, for al-Āmidī, is the magnitude of motion, even though 'there is [still something left] to consider.' Since he remains sceptical about it, while retaining what he takes to be Avicenna's definition of time, al-Āmidī reveals himself as both an Avicennian and a critic.

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Abkār al-afkār fī uṣūl al-dīn

by Sayf al-Dīn al-Āmidī

Fourth Basis: On the Division of the Objects of Knowledge into Existent, Non-Existent,
and What Is neither Existent nor Non-Existent

First Chapter: On the Existent

Second Part: On the Existent which Is Possible with Regard to Existence

Second Root: On the Accidents and their Properties

Sixth Branch: On Time

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177v–178v.

أبكار الأفكار في أصول الدين لسيف الدين الآمدي في الزمان

(١) قد اختلف الناس فيه فمنهم من قال إنه لا وجود له أصلاً ومنهم من قال إنه موجود. ثم اختلف القائلون بالوجود فمنهم من قال إنه لا وجود له في غير الأذهان ومنهم من قال إنه موجود في الأعيان. ثم اختلف القائلون بوجوده في الأعيان فمنهم من قال إنه جوهر ومنهم من قال إنه عرض ومنهم من قال إنه ليس بجوهر ولا عرض.

(٢) فأما القائلون بكونه جوهرًا فمنهم من قال إنه متجدد غير باقي [ق ٢٣٥] ومنهم من قال إنه باقي غير متجدد وهو جرم الفلك. وأما القائلون بكونه عرضاً فمنهم من قال: «الزمان نسبة لموجود لم يزل ولا يزال إلى ما ليس بأزلي ويزول» ومنهم من قال إنه مقارنة لموجود لموجود 10 ومنهم من قال إنه حركة الفلك ومنهم من قال إنه مقدار الحركة الفلكية.

(٣) وإذا أتينا على شرح المذاهب بالتفصيل فلا بدّ من تحقيق الحقّ وإبطال الباطل منها.

(٤) فنقول: [ب ٤٣٢] أمّا القائلون بوجود الزمان فقد زعموا أنّ العلم بوجود الزمان ضروري وذلك لما استقرّ في الأذهان وترسّخ في النفوس من الزمان وتقسيم العقلاء له إلى أعوام وأشهر وأيام وساعات ودقائق إلى غير ذلك ممّا لا يمكن معه منع وجود الزمان. قالوا: «وإذا ثبت أنّه موجود فيبيان أنّ وجوده في الأعيان هو أنّ موجودات الأعيان تضاف إليه بأنّها فيه. ولو لم يكن وجوده وجوداً عينياً لما كان الموجود العيني فيه». قالوا: «وإذا ثبت أنّ وجوده عيني».

4 قد [وقد ب ق 6-7 موجود في الأعيان. ثم اختلف القائلون بوجوده في الأعيان فمنهم من قال إنه جوهر ومنهم من قال إنه عرض ومنهم من قال إنه [om 12 منها] منه ب ق 15 وساعات [om م 16 موجودات] موجوات ق تضاف [مضاف م 17 الموجود] الموجود م أنّ وجوده [أنّه وجود م

Abkār al-afkār fī uṣūl al-dīn
by Sayf al-Dīn al-Āmidī

On Time

Edited and translated by Andreas Lammer

(1) People have disagreed about it [sc. time], and so some of them say that it does not have existence at all (*lā wuġūda lahū aṣlan*), whereas some of them say that it is existent. Moreover, those asserting [its] existence [also] disagreed, and so some of them say that it does not have existence in anything other than the mind (*lā wuġūda lahū fī ġayr al-adhān*), whereas some of them say that it is existent in concrete reality (*mawġūd fī l-a'yān*). Moreover, those asserting its existence in concrete reality [again] disagreed, and so some of them say that it is a substance (*ġawhar*), some of them say that it is an accident (*'araḍ*), and some say that it is neither a substance nor an accident.

(2) Among those who assert its being a substance, some say that it is renewed and does not persist (*mutaġaddid ġayr bāqin*); [Q 225] while some of them say that it does persist and is not renewed (*bāqin ġayr mutaġaddid*), and is the body of the sphere (*ġirm al-falak*). Among those who assert its being an accident, some say: 'Time is a relation (*nisba*) of an existent which never did nor ever will cease (*lam yazal wa-lā yazālu*) to something which is not eternal and does cease (*mā laysa bi-azalī wa-yazūlu*),' some of them say that it is an association (*muqārana*) of an existent to [another] existent, some of them say that it is the motion of the sphere (*ḥarakat al-falak*), and some of them say that it is the magnitude of the spherical motion (*miqdār al-ḥaraka al-falakiyya*).

(3) If we [want to] accomplish an exposition (*ṣarḥ*) of the [various] teachings in detail, it is inevitable to verify the true and to falsify the false among them.

(4) So, we say: [B 432] Those who assert the existence of time have claimed that the knowledge of time's existence is necessary (*darūrī*) and [that] that is so, because of what is settled in the minds and fastened in the souls about time, and [because of] the reasonable men's division of it into years, months, days, hours, and minutes, [or] into other [divisions] than that through which it is not possible to deny the existence of time. They said: 'If it is established that it is existent, then the proof that its existence is in concrete reality is that existents of concrete reality are related to it by being in it. If its existence were not a concrete existence (*wuġūdan 'ayniyyan*), then no concrete existent could be in it.' They said: 'Therefore, it is established that its existence is concrete.'

(٥) قال أفاضل الفلاسفة: «هو مقدار الحركة الدورية الفلكية لا غير». وبيان ذلك أنا لو فرضنا حركتين متساويتين في السرعة والبطء وهما متفاوتتان في الأخذ متساويتان في القطع فإننا نعلم أنّ بين ابتداء كلّ واحدة منهما وانتهائها إمكان قطع مسافة وأنّ ما بين ابتداء الحركة الأولى وانتهائها من إمكان قطع المسافة أزيد ممّا بين ابتداء الحركة الثانية وانتهائها. ولهذا تفاوتتا في قطع المسافة حتّى كانت المسافة المقطوعة بالحركة الأولى أزيد من مسافة الثانية منهما. فإذا 5
 هذه الإمكانيات الواقعة بين ابتداء الحركات وانتهائها ممّا يدخلها التقدير والتجزئة [ق ٢٣٦] فإنّه ممّا يمكن تجزئتها وتقدير بعضها ببعض. فهي من المقادير وليست من غير المقادير المتّصلة لمطابقتها للحركات المتّصلة وما طابق المتّصل متّصل.

(٦) ثمّ قالوا: «وهذه الإمكانيات المتّصلة التي بين ابتداء الحركات وانتهائها إمّا أن تكون هي نفس الحركة أو المتحرّك أو المحرّك لها أو المسافة أو ما هو مقدار لأحد هذه الأمور أو لحالة فيها». 10

(٧) لا جائز أن يكون هي نفس الحركة لوجوه أربعة. الأوّل هو أنّا إذا فرضنا وقوع حركة من الحركات فالإمكان الذي [ب ٤٣٣] بين ابتدائها وانتهائها متّحد لا يختلف وما يمكن أن تقع فيه من الحركات المختلفة بالسرعة والبطء متفاوتة ولذلك [م ١٧٨] كانت متفاوتة في قطع المسافة.

3-4 إمكان قطع مسافة وأنّ ما بين ابتداء الحركة الأولى وانتهائها من إمكان قطع المسافة أزيد ممّا بين ابتداء الحركة الثانية وانتهائها [om. ب 4 أزيد] لديه تفاوتتا [تفاوتتا م 5 فإذا ب 6 والتجزئة] والتجزئة ب ق 6-7 فإنّه ممّا [فإن ب: فإنّه ق 9 الحركات] الحركة م 10 لأحد [أحد م] لحالة [الحالة ب ق 11 يكون] يكون ب ق 13 تقع [يقع م متفاوتة] متفاوت م

7-8 ففي من المقادير وليست من غير المقادير المتّصلة لمطابقتها للحركات المتّصلة وما طابق المتّصل متّصل [al-Nūr al-bāhir II.2.3, 136-19-19 هذه الإمكانيات المتّصلة التي بين ابتداء الحركات وانتهائها] [137.1 al-Nūr al-bāhir II.2.3, 9-10 إمّا أن تكون هي نفس الحركة أو المتحرّك أو المحرّك لها أو المسافة أو ما هو مقدار لأحد هذه الأمور أو لحالة فيها] [al-Nūr al-bāhir II.2.3, 137.5-7

(5) The most eminent philosophers said: ‘It is the magnitude of the spherical circular motion, and nothing else.’ The proof of this is that we, if we were to assume two motions equal in speed (*al-sur‘a wa-l-but‘*), both different in the [moment of] starting (*al-aḥd*) but equal in the [moment of] stopping (*al-qat‘*), then we would know that between the beginning of each one of these two and its end there is a possibility for traversing a distance (*imkān qat‘ masāfa*), and that what is between the beginning of the first motion and its end in terms of a possibility for traversing the distance is greater (*azyad*) than what is between the beginning of the second motion and its end. Because of this, they differ in traversing the distance, so that the distance traversed by the first motion is greater than the distance of the second of the two. So, therefore, these possibilities occurring between the beginning of motions and their end are among [those things] to which measuring and division applies, [Q 226] for they are among [those things] whose division is possible as well as the measuring of one another. Thus, they belong to magnitudes and not to anything other than continuous magnitudes (*al-maqādīr al-muttaṣila*) because of their conformity (*li-muṭābaqatihā*) to the continuous motions, and whatever conforms to something continuous is [itself] continuous.¹

(6) Moreover, they said: ‘These continuous possibilities (*al-imkānāt al-muttaṣila*) which are between the beginning of the motions and their end² are either the motion itself (*nafs al-ḥaraka*) or the moved (*al-mutaḥarrik*) or its mover (*al-muḥarrik lahā*) or the distance (*al-masāfa*) or something that is a magnitude (*miqdār*) of one of these things or of a state³ in them.’⁴

(7) It is not possible that they are the motion itself, for four reasons. The first is that if we assume the occurrence of some motion, then the possibility which [B 433] is between its beginning and its end is unitary (*muttaḥid*) and does not vary (*lā yaḥtalifu*), yet that which is possible to occur in it in terms of motions varying in speed are different [things] (*mutafāwuta*) and, because of this, [M 178r] are different in the traversal of the distance.⁵

1 ‘Thus, they belong ... is [itself] continuous’ = *al-Nūr al-bāhir* II.2.3, p. 136, lines 18–19.

2 ‘These continuous possibilities ... and their end’ = *al-Nūr al-bāhir* II.2.3, p. 137, line 1.

3 Both editors of *Abkār al-afkār* render the text in §6 and §14 as *miqdār li-aḥad hādihī l-umūr aw al-ḥāla*. I read with the Berlin manuscript and two corresponding passages in *al-Nūr al-bāhir* (II.2.3, p. 137, line 7 and p. 140, line 9), *aw li-ḥāla* for *aw al-ḥāla*.

4 ‘either the motion ... state in them’ = *al-Nūr al-bāhir* II.2.3, p. 137, lines 5–7.

5 Cf. *al-Nūr al-bāhir* II.2.3, p. 138, lines 1–5.

- (٨) الثاني أنّ ما مثل هذا الإمكان قد يمكن فرض توهمه مع عدم توهم وقوع الحركات. ولو كان هو نفس الحركة لكان متناقضاً.
- (٩) الثالث أنّ هذه الإمكانيات لا توصف بالسرعة والبطء بخلاف الحركات فلا تكون هي نفس الحركة وإلا كان متصفاً بما لا يكون متصفاً به وهو محال.
- (١٠) الرابع هو أنّ هذا الإمكان قد يكون متّحداً وما يطابقه من الحركات متعدداً والمتّحد 5 غير المتعدد.
- (١١) وعلى هذا فقد بطل أن يكون الزمان شيئاً من الحركات. ولا يلزم من كونه على التقضي والتجدد ومن كون الحركة كذلك أن يكون هو الحركة فإنه لا مانع من اشتراك شيئين مختلفين في عارض واحد.
- (١٢) ولا جائز أن يكون هو المحرك ولا المتحرك ولا المسافة ولا شيء من الأجسام لأنّ 10 ما من جسم يُفرض من الأجسام إلا ويمكن فرضه باقياً مع تجدد هذه الإمكانيات وتعاقبها والمتجدد غير ما ليس بمتجدد.
- (١٣) فإن قيل: «كلّ جسم فهو موجود في الزمان وما يشاهد فيه وجود جميع الأجسام ليس غير الفلك فكان هو الزمان» فهو خطأ [ق ٢٢٧] لأنّه ليس كلّ جسم في الفلك فإنّ الفلك من جملة الأجسام وليس هو في نفسه. وبتقدير أن يكون كلّ جسم في الفلك وكلّ جسم في 15 الزمان فليس في إثبات هذه الصفة لهما ما يوجب الاتّحاد بينهما ولا الاختلاف فإنه على نمط الشكل الثاني من موجبتين وهو غير منتج.

1 أنّ [آته م هذا] هذه م يمكن [يقدر ب ق 3 تكون] يكون م 5 هذا [هذه م 7 شيئاً] مسيّباً ب ق 8 الحركة [الحركات ب ق 13 جميع] جميع [م 16 لهما] لها ب ق

1-2 قد يمكن فرض توهمه مع عدم توهم وقوع الحركات. ولو كان هو نفس الحركة لكان [*al-Nūr al-bāhir* II.2.3, 138.7-9]
 10 هو المحرك ولا المتحرك ولا المسافة ولا شيء من الأجسام [*al-Nūr al-bāhir* II.2.3, 139.15-17] 11 [إلا ويمكن فرضه باقياً مع تجدد هذه الإمكانيات وتعاقبها] [*al-Nūr al-bāhir* II.2.3, 140.3f.]

(8) The second is that whatever is like this possibility, it may be possible to assume the imagining of it (*tawahhumihī*) even without imagining the occurrence of motions. If [the possibility] were the motion itself,⁶ then it would be contradictory.

(9) The third is that, unlike motions, these possibilities are not described by speed. So, they are not the same as motion, for otherwise what is described by something is not described by it—and this is absurd.⁷

(10) The fourth is that this possibility may be unitary (*muttaḥīdan*), whereas what conforms to it in terms of motions is multiple (*muta ‘addīdan*)—but what is unitary is different from what is multiple.⁸

(11) On this [basis], then, it is already falsified that time is any motion. It does not follow from its being subject to elapsing and renewal (*‘alā l-taqaḍḍī wa-l-taḡaddud*) and from motion’s being [also] like this that it is motion, for nothing prevents two different things from sharing in one [common] accident.

(12) And it is not possible that it is the mover or the moved or the distance or some body,⁹ because whatever pertains to a body is assumed for [all] bodies, unless it were possible to assume it as persisting despite the renewal of these possibilities and their succession¹⁰—but what is renewed is different from what is not renewed.

(13) So, if it is said: ‘Every body, then, exists in time and that wherein the existence of all bodies is observed is nothing other than the sphere, and so it [i.e. the sphere] is time’—then this is a mistake, [Q 227] because not every body is in the sphere, for the sphere belongs to the whole of bodies but is not in itself. Yet, [even] on the assumption that every body is in the sphere and that every body is in time, there is nothing in the affirmation of this attribute to these two [i.e. time and the sphere] that necessitates the identity between the two instead of [their] difference, for it would be [a syllogism] in the fashion of the second figure [consisting] of two affirmative [premises], which is not conclusive.¹¹

6 ‘it may be ... the motion itself’ = *al-Nūr al-bāhir* II.2.3, p. 138, lines 7–9.

7 Cf. *al-Nūr al-bāhir* II.2.3, p. 138, lines 9–11.

8 Cf. *al-Nūr al-bāhir* II.2.3, p. 138, lines 11–12.

9 ‘the mover or ... or some body’ = *al-Nūr al-bāhir* II.2.3, p. 139, lines 15–17.

10 ‘unless it were ... and their succession’ = *al-Nūr al-bāhir* II.2.3, p. 140, lines 3–4.

11 Cf. *al-Nūr al-bāhir* II.2.3, p. 140, lines 4–8.

(١٤) فإذاً لا بدّ وأن يكون مقداراً لأحد هذه الأمور أو لحالة فيها. وليس [ب ٤٣٤] هو مقدار المحرك ولا المتحرك وإلا كان ما هو متفاوت لغيره في مقداره متفاوتاً له في قطع المسافة. ولا هو مقدار المسافة وإلا لما تفاوتت الحركة السريعة والبطيئة مع اتّحاد المسافة في هذا الإمكان وهو محال.

(١٥) كيف وأنّ هذا الإمكان مما يمكن فرض توهمه مع عدم توهم كل ما يُفرض من هذه 5 الأمور وكذا كل ما يُفرض لها من الأحوال؟

(١٦) فلا يكون شيئاً منها لما تحقّق قبل ولأنّ هذه الإمكانيات على التقضي والتجدّد وكل ما يُفرض من هذه الأمور باقٍ غير متجدّد والمتجدّد غير ما ليس بمتجدّد.

(١٧) ولا جائز أن يكون هو نفس ما يقع به التفاوت بين الحركات من السرعة والبطء فإنّه ممّا يقع الاختلاف فيه مع تساوي الحركات المفروضة في السرعة والبطء المتفاوتة للأخذ أو القطع. 10

(١٨) فإذاً ليس هو إلا مقدار الحركة وهو ما يطابقه الحركة وتقع فيه وهو مساوق لها في الوجود وهو على التقضي والتجدّد. [ق ٢٢٨] وبين كلّ جزئين منه آن وهو نهاية الزمان ومقطعه وهو ما يتصل به الماضي بالحال.

1 حالة [الحالة ب ق 2 المحرك] الحركة م متفاوت لغيره في [متفاوت لغيره وفي ب ق 6 وكذا] وكذلك م 8 باقي [باقية ب ق متجدّد] متجددة ق: متجددة ب 9-10 فإنه مما يقع الاختلاف فيه مع تساوي الحركات المفروضة في السرعة والبطء [om. م 11 ليس هو] هو ليس ب ق وهو [وهي ق يطابقه] تطابقه ق: تطابقه ب مساوق [مساوب ق 12 منه آن] مقدار م

1-2 فإذاً لا بدّ وأن يكون مقداراً لأحد هذه الأمور أو لحالة فيها. وليس هو مقدار المحرك ولا المتحرك وإلا كان ما هو متفاوت لغيره في مقداره متفاوتاً له في قطع [3-6 *al-Nūr al-bāhir* II.2.3, 140.9-11] ولا هو مقدار المسافة وإلا لما تفاوتت الحركة السريعة والبطيئة مع اتّحاد المسافة في هذا الإمكان وهو محال. كيف وأنّ هذا الإمكان مما يمكن فرض توهمه مع عدم توهم كل ما يُفرض من هذه الأمور وكذا كل ما يُفرض لها من الأحوال [7-8 *al-Nūr al-bāhir* II.2.3, 140.12-17] فلا يكون شيئاً منها لما تحقّق قبل ولأنّ هذه الإمكانيات على التقضي والتجدّد وكل ما يُفرض من هذه الأمور باقٍ غير متجدّد والمتجدّد غير ما ليس بمتجدّد [*cf. al-Nūr al-bāhir* II.2.3, 140.17-19] 9 ولا جائز أن يكون هو نفس ما يقع به التفاوت بين الحركات من السرعة والبطء [*al-Nūr al-bāhir* II.2.3, 141.1] 11-12 فإذاً ليس هو إلا مقدار الحركة وهو ما تطابقه الحركة وتقع فيه وهو مساوق لها في الوجود [*al-Nūr al-bāhir* II.2.3, 141.2f.

(14) Therefore, it is inevitable that it is a magnitude of one of these things or of a state in them. Yet, neither is it [B 434] the magnitude of the mover nor of the moved, for otherwise whatever was different from something else in its magnitude would [also] be different from it in the traversal¹² of the distance. Neither is it the magnitude of the distance, for otherwise a fast motion and a slow one with the same distance would not be different in this possibility—and this is absurd.¹³

(15) How is it that this possibility belongs to that whose imagining can be assumed even without imagining all that which is assumed about these things and, likewise, of all that which is assumed about them in terms of states?¹⁴

(16) Thus, it is none of these things, because of what has been verified before and because these possibilities are subject to elapsing and renewal, whereas all that which is assumed about these things is persisting and not renewed—but what is renewed is different from what is not renewed.¹⁵

(17) Nor is it possible that it is the same as that through which a difference between motions in terms of speed occurs,¹⁶ for it belongs to that [sort of thing] in which a variation occurs despite the equality of the assumed motions in terms of speed [when being] different in the moment of starting or stopping (*li-l-ahḍ aw al-qaṭ*).

(18) Therefore, it is nothing but the magnitude of motion, and it is that to which the motion conforms and in which it occurs, and it is concurrent (*musāwīq*) with [motion] in existence¹⁷ and is subject to elapsing and renewal. [Q 228] Between each of two parts of it is a now (*ān*), which is the limit of time (*nihāyat al-zamān*) and its demarcation, and which is that through which the past is connected with the present.

12 ‘Therefore, it is ... from something else’ and ‘in the traversal’ = *al-Nūr al-bāhir* II.2.3, p. 140, lines 9–11.

13 ‘Neither is it ... this is absurd’ = *al-Nūr al-bāhir* II.2.3, p. 140, lines 12–15.

14 ‘How is it ... terms of states’ = *al-Nūr al-bāhir* II.2.3, p. 140, lines 15–17.

15 Cf. *al-Nūr al-bāhir* II.2.3, p. 140, lines 17–19.

16 ‘Nor is it ... of speed occurs’ = *al-Nūr al-bāhir* II.2.3, p. 141, line 1.

17 ‘Therefore, it is ... [motion] in existence’ = *al-Nūr al-bāhir* II.2.3, p. 141, lines 2–3.

(١٩) وليس بجوهر لأنه لو كان جوهرًا لم يخل إمّا أن يكون من الجواهر المحسوسة أو لا من المحسوسة. فإن كان الثاني خرج عن أن يكون فيه الجوهر المحسوس والزمان ففيه الجواهر المحسوسة وإن كان محسوساً فلا بدّ وأن يكون في زمان. فإن كان في نفسه فهو محال [ب ٤٣٥] وإن كان في غيره لزم التسلسل.

(٢٠) فقد ثبت أنّ الزمان عرض ومن جملة الأعراض مقدار ومن المقادير متصل ومع 5 اتّصاله فعلى التقضي والتجدد فهو أحد أنواع الكمّ. وبطل كلّ ما قيل من المذاهب فيه.

(٢١) واعلم أنّ هذا هو أشبه ما قيل في الزمان ومع هذا ففيه نظر إذ لقائل أن يقول: «لا نسلم أنّ المفهوم من الزمان أمر وجودي وما ذكرتموه من دعوى الضرورة لها إمّا أن تدعوا العلم الضروري بوجود مفهوم الزمان أو بمفهوم الزمان. فإن كان الأوّل فهو غير مسلم وإن كان الثاني فهو مسلم لكن لا يلزم أن يكون وجودياً لأنّ العلم بالمفهوم أمر أعمّ من العلم بكونه 10 وجودياً».

(٢٢) ثمّ الدليل على أنّه غير وجودي وجهان. الأوّل أنّه لو كان موجوداً فهو إمّا واجب أو ممكن. لا جائز أن يكون واجباً وإلا لما كانت أبعاضه على التقضي والتجدد وإن كان ممكناً فإمّا جوهر أو عرض لما سبق من الحصر. [ق ٢٢٩]

3 نفسه [زمان م 8 لها] om. م تدعوا [تدعوب ق: يدعوم 10 لكن] ولكنّ ب ق لأنّ [فإنّ ب ق 12 وجهان
[من وجهين ب ق أو] وإمّا ب ق

5-6 فقد ثبت أنّ الزمان عرض ومن جملة الأعراض مقدار ومن المقادير متصل ومع اتّصاله فعلى التقضي والتجدد فهو أحد أنواع الكمّ. وبطل كلّ ما قيل من المذاهب فيه [cf. *al-Nūr al-bāhir* II.2.3, 144.16-145.1

(19) It is not a substance, because if it were a substance, then it would have to be either among the sensible substances or not among the sensible [substances]. So, if it is the second, it cannot be that in which [there] is sensible substance—but time [is such that] sensible substances are in it. If, however, it is sensible, then it inevitably is [itself] in time and, thus, is in itself—but this is absurd. [B 435] If, [however] it is in some other thing, a regress follows.

(20) Thus, it is already established that time is an accident, and of all the accidents it is a magnitude, and of the magnitudes it is continuous, and despite its continuity it is subject to elapsing and renewal, and so it is one of the kinds of quantity (*aḥad anwāʿ al-kamm*). Everything that is said by [other] teachings about it is false.¹⁸

(21) Know that this is very much like what is said about time, yet despite [all] this, there is [still something left] to consider, since someone might say: ‘We do not accept that that which is understood about time (*al-mafhūm min al-zamān*) is something which is extra-mentally existent (*wuḡūdī*) and that the claims of necessity for them,¹⁹ which you have reported, are either that you claim necessary knowledge of the existence of that which is understood about time or [only] of that which is understood about time. So, if it is the first, then this is not acceptable, and if it is the second, then this is acceptable, but it does not follow that it is extra-mentally existent (*wuḡūdiyyan*), because the knowledge of that which is understood is something more general than the knowledge of its being extra-mentally existent.’

(22) Furthermore, there are two sorts of proof that it is not extra-mentally existent (*ḡayr wuḡūdī*). The first is that if it were existent (*mawḡūd*), then it would be either necessary (*wāḡib*) or possible (*mumkin*). It is not possible that it is necessary, for otherwise its parts could not be subject to elapsing and renewal. If, however, it is possible, then it is either a substance or an accident, due to restrictions [we have stipulated] before.²⁰ [Q 229]

18 Cf. *al-Nūr al-bāhir* II.2.3, p. 144, line 16–p. 145, line 1.

19 It is not clear to what al-Āmidī is referring here. It seems that with ‘of them’ (*lahā*) he means other (false) teachings; the pronoun cannot refer to people.

20 Once more, it is not clear to what al-Āmidī is referring here. Probably the reference is to an earlier discussion in *Abkār al-afkār* rather than to some place within the chapter on time.

(٢٣) لا جائز أن يكون جوهرًا لما ذكرتموه ولا جائز أن يكون عرضاً وإلا فلا بدّ له من موضوع وذلك الموضوع لا بدّ وأن يكون جوهرًا أو قائمًا بالجوهر وذلك إما محسوس أو غير محسوس. فإن لم يكن محسوساً استحال أن يقوم به الزمان الذي هو ظرف المحسوسات. وإن كان محسوساً فجميع الجواهر المحسوسة في الزمان ونسبة الزمان إليها نسبة واحدة. [ب ٤٣٦] وعند ذلك فإما أن يكون قائمًا بكلّها أو ببعضها. الأوّل محال لأنّ الزمان الحاضر متحد وقيام 5 المتحد بالمتعدّد محال. وإن كان الثاني فليس قيامه بالبعض مع اتّحاد النسبة أولى من البعض.

(٢٤) الثاني ويخصّ مذهب الفلاسفة هو أنّه لو كان الزمان موجوداً فإمّا [م ١٧٨ظ] أن يكون منقسماً أو غير منقسم. فإن كان منقسماً فإمّا أن يوجد لجميع أجزائه معاً أو أنّه لا يوجد منه في الحاضر إلاّ البعض. الأوّل محال وإلاّ كان الماضي منه مع الحاضر وهو ممتنع. وإن كان الثاني فذلك البعض إمّا أن يكون منقسماً أو غير منقسم. فإن كان الأوّل عاد التقسيم وهو 10 تسلسل ممتنع. وإن كان الثاني فهو محال على أصلهم لأنّ الزمان مطابق بأجزائه لأجزاء الحركة والحركة مطابقة لأجزائها لأجزاء المسافة وأجزاء المسافة عندهم متجزّئة إلى غير النهاية. والمطابق لما طابق المتجزّئ لا بدّ وأن يكون متجزّئاً. وهذه المحالات إمّا لزمّت من القول بوجود الزمان فلا وجود له. [ق ٢٣٠]

3 ظرف [طرف ب ق م 4 إليها] لها ب ق 7 هو [om. ب ق فإمّا] iter. م 12 متجزّئة [متجزّئة عقلاً ب ق 13 متجزّئاً] متجزّء ق 14 وجود [وجوده ق

7-12 الثاني ويخصّ مذهب الفلاسفة ... إلى غير النهاية [cf. *al-Nūr al-bāhir* II.2.3, 149.4-11

(23) It is not possible that it is a substance, because of what you have already reported, nor is it possible that it is an accident, for otherwise, then, it would be inevitable for it to belong to a subject and that subject would inevitably be either a substance or subsistent through a substance, and that would be either a sensible [substance] or a non-sensible [substance]. If it is not a sensible [substance], it is impossible that time, which is a vessel (*ẓarf*) for sensible objects, subsists through it. If it is a sensible [substance], then all sensible substances are in time and time's relation to them is a single relation. [B 436] On that [understanding], then, it subsists either through all of them [i.e. the sensible substances] or through some of them. The first is absurd, because the present is unitary (*muttaḥid*)—but the subsistence of something unitary through something multiple (*muta'addid*) is absurd. If, however, it is the second, then its subsistence through some with a unitary relation would not be more appropriate (*awlā*) than [its subsistence through] others.

(24) The second [sort of proof that time is not existent], which is characteristic of the teaching of the philosophers (*madḥab al-falāsifa*), is that if time were existent, then it would be either [M 178v] divisible or indivisible. So, if it is divisible, then either it exists with all its parts together (*ma'an*) or only a portion of it exists in the present. The first is absurd, for otherwise its past would be together with the present—and this is impossible. If it is the second, then that part [of time] is [itself] either divisible or indivisible. So, if it is the first, the division is repeated—and this is an impossible regress. If, however, it is the second, then this is absurd on their own principle (*muḥāl 'alā aṣlihim*), because time conforms (*muṭābiq*) with its parts to the parts of motion and motion conforms with its parts to the parts of the distance and the parts of the distance are, according to them, infinitely divisible. Yet, whatever conforms to something which conforms to something divisible is inevitably [also] divisible. These absurdities follow only from the assertion of time's existence—thus, it has no existence (*fa-lā wuġūda lahū*). [Q 230]

(٢٥) وعلى هذا فلا بعد في قول القائل إنّ الزمان هو ما يقدره المقدّر ويفرضه الفارض من مقارنة موجود لموجود وما بعينه من العوارض. وهو ما يعبر عنه بقولهم: «كان كذا في وقت طلوع الشمس أو غروبها» أيّ أنّه قارن وجوده لطلوعها وغروبها. وإنّ سلّمنا أنّه موجود ولكنّ ما المانع أن يكون وجوده في الأذهان لا في الأعيان؟

(٢٦) قولهم إنّ موجودات الأعيان تضاف إليه بأنّها فيه. قلنا: بمعنى أنّه صفة لها ومقارن 5 لوجودها أو بمعنى أنّه ظرفاً لها. [ب ٤٣٧] الأوّل مسلّم ولكن لا يلزم من مقارنته للموجودات العينية ولا من كونه صفة لها أن يكون وجودياً فإنّه لا امتناع في مقارنة الموجودات بالصفات العدمية واتصافها بها.

(٢٧) والثاني ممنوع ولا يلزم من إضافتها إلى الزمان {نفى} أن يكون الزمان ظرفاً لها. ولهذا 10 فإنّه يصحّ قول القائل «زيد في الراحة والخصب» وإن لم يكن ذلك ظرفاً له.

(٢٨) وإنّ سلّمنا أنّه موجود عيني فلا نسلم أنّه مقدار الحركة. وما ذكرتموه من الإمكانيات التي بين ابتداء الحركات وانتهائها فلا نسلم أنّه أمر وجودي بل عديمي فإنّ حاصله يرجع إلى إمكان قطع المسافة بالحركة والإمكان فوصف عديمي على ما سبق تقريره.

1 هو ما [وما ب ق يقدره] يقدر ب 2 وما [وما هوب ق 3 وغروبها] أو غروبها ب ق 4 ولكنّ [لكنّ ب ق 5 قولهم] قولكم ب ق الأعيان [om. م 6 ظرفاً] طرفاً ب ق: طريق م 7 بالصفات [الصفات م 9 ظرفاً] طرفاً ب ق م 10 ظرفاً [طرفاً ب ق 12 إمكان] مكان ب ق

1-4 وعلى هذا فلا بعد في قول القائل ... وجوده في الأذهان لا في الأعيان [cf. *al-Nūr al-bāhir* II.2.3, 150.11-18]

(25) On these [grounds], then, there is nothing improbable in the assertion of one who says that time is whatever someone measures or assumes in terms of an association (*muqārana*) of an existent to [another] existent and whatever among accidents is just the same; and this is what is meant by their assertion: ‘Such is in the moment (*waqt*) of the sun’s rising or its descending,’ i.e. that it is something whose existence is associated (*qārana*) with [the sun’s] rising and its descending. If we accept that it is existent, however, what prevents that its existence is [only] in the mind (*fī l-adhān*) and not in concrete reality (*fī l-a’yān*)?²¹

(26) Their assertion is that existents of concrete reality are related to it by being in it. We say: [this can be understood] as meaning that it is an attribute (*ṣifa*) of [these things] and associated with their existence or as meaning that it is a vessel (*ẓarf*) for them. [B 437] The first is acceptable, but it does not follow either from its association (*muqāranatihī*) with these concretely existing things or from its being an attribute for them that it is extra-mentally existent (*wuḡūdiyyan*), for there is no impossibility in the association of existents with extra-mentally non-existent attributes (*bi-l-ṣifāt al-‘adamiyya*) or in their being described by them.

(27) The second is impossible. It does not follow from their relation to time {a denial (*naḡy*)}²² that time is a vessel for them. Because of this, then, it is correct to say ‘Zayd is in [a state of] rest and comfort,’ even though this is not a vessel for him.

(28) If we accept that it is a concrete existent, then we do not accept that it is the magnitude of motion. What you have reported about the possibilities which are between the beginning of motions and their end, so we do not accept that it is something extra-mentally existent (*wuḡūdī*) but rather extra-mentally non-existent (*‘adamī*), for its occurring depends on the possibility for traversing the distance through motion—and possibility, then, is an extra-mentally non-existent description, according to what has been determined before.²³

21 Cf. *al-Nūr al-bāhir* II.2.3, p. 150, lines 11–18.

22 Cf. my above remarks on the term *naḡy* here, pp. 133–4.

23 Again, it is not clear to what al-Āmidī is referring here. The reference is probably to a discussion elsewhere in *Abkār al-afkār*.

(٢٩) قولهم إنّه يمكن تقدير بعضه ببعض غير مسلم. قولهم إنّ ما بين ابتداء الحركة السابقة وانتهائها من الإمكان أكثر ممّا بين ابتداء الثانية وانتهائها ليس كذلك بل التفاوت بالزيادة والنقصان إنّما هو عائد إلى المسافة التي يمكن قطعها بالحركة إن كانت المسافة متفاوتة أو إلى سرعة الحركة وبطئها إن كانت المسافة متّحدة. وعلى هذا فلا نسلم أنّه يمكن فرض التفاوت مع قطع النظر عن التفاوت في المسافة والبطء والسرعة ليصحّ ما ذكره.

5

(29) Their assertion that the measuring of one another is possible is not acceptable. Their assertion that what is between the beginning of a previous motion and its end in terms of a possibility is more than what is between the beginning of the second [motion] and its end is not the case. Rather, the difference by increase and decrease belongs only to the distance, whose traversing by motion is possible, if the distance is different, or to the fastness of [the one] motion and the slowness of [the other], if the distance remains the same. On these [grounds], then, we do not accept that it is possible to assume a difference [in terms of the possibility] regardless of (*ma'a qat' al-nazar*) any difference in distance or speed; let, then, be true what they have reported.

A Map of Averroes' Criticism against Avicenna: *Physics, De caelo, De generatione et corruptione* and *Meteorology**

Cristina Cerami

1 Introduction

The debate prompted by Averroes against Avicenna in the second half of the twelfth century AD is undoubtedly one of the most fascinating and significant in the history of philosophy, not only because it deeply influenced the subsequent Jewish and Latin philosophical tradition, but also because it constitutes a milestone of the history of Aristotelianism and, as such, of the history of western philosophy.

Several features contribute to make this debate an almost unique episode in the history of philosophy.¹ The first feature is its far-reaching scope. Criticisms of Avicenna are not limited to one philosophical discipline, with the exception of another, but deal with all the fields of Avicenna's philosophy. As a result, Avicenna is criticized in all the treatises that Averroes devoted to those same philosophical areas, either as the primary target,² or as the supporter of the wrong opinion on a given issue. The second feature is the accuracy of Averroes' reassessment. The rebuttal of Avicenna's position is not merely mentioned *en passant*. Even if the place devoted to the discussion of Avicenna's doctrines varies significantly in the different treatises, Averroes in most cases defines the main tenets of Avicenna's doctrine, he supports its refutation with detailed arguments, and he often traces the source of his presumed error to the opinion of one of his predecessors. The third feature, by far the most remarkable one, is the quite aggressive and radical character of Averroes' appraisal. Quite maliciously, Averroes often ends his criticism of Avicenna by claiming to

* I will discuss in this paper the passages present in the commentaries on Aristotle's *Physics, De caelo, De generatione et corruptione* and *Meteorology*. I plan to examine the criticisms presented in Averroes' commentaries on *De anima* and on the so-called *Book of Animals* in a future study. I wish to thank warmly A. Bertolacci and D.N. Hasse for their insightful remarks on a first version of this paper. Any possible mistake or shortfall is mine.

1 I rely for this overview on Bertolacci, Averroes against Avicenna, pp. 37–54.

2 This is notably the case in some logical treatises (cf. Street, Arabic and Islamic Philosophy, §1.4.2).

be surprised of such odd and inconsequent claims coming from a man devoted to science and to the search for truth. Conversely, when the alleged ‘wrong’ opinion of Avicenna is also shared by al-Fārābī or by Alexander of Aphrodisias, Averroes often says he is not surprised that the former missed the truth, but that the latter thinkers did.³

Even when these general features are well established, it is still not an easy task to assess the real purpose and the significance of Averroes’ polemical stance. As a matter of fact, the reasons of his choice and the violence of his attacks remain to be ascertained. Actually, it is still difficult to explain the reason why Avicenna is the privileged target of Averroes’ criticism and why his confrontation takes the form of such a harsh polemic.

During the last fifty years, the debate between Averroes and Avicenna has received increasing interest on the part of modern scholars. For the most part, however, their attention turned more to one of the several issues on which Averroes challenged Avicenna than to Averroes’ criticism as a whole.⁴ Furthermore (as indeed in the Middle Ages and the Renaissance), the question was mostly to decide whether Averroes’ criticisms were faithful and his arguments successful, or whether his interpretation of Avicenna’s doctrine was misleading.⁵ In this regard, it can also be observed that the prevailing trend has been to side with Avicenna, by claiming that Averroes’ interpretation involves numerous distortions and simplifications of his predecessor’s philosophy.

Recent scholarship has made greater efforts to study the debate in a more general context and to consider Averroes’ ‘anti-Avicennianism’ as the mark of a coherent project. It has been suggested that, in Averroes’ intention, the very

3 Concerning al-Fārābī, see Averroes, *Tafsīr mā ba’d aṭ-ṭabī‘at* (henceforth *LC Met.*) Z, c. 31, p. 885, line 17–p. 886, line 6. Concerning Alexander, see Averroes, *Talḥīṣ al-Samā’ wa-l-‘ālam* (henceforth *MC De caelo*) I, p. 183, lines 12–14 (below table 4 (3*)).

4 Among the topics that attracted the interest of scholarship are Avicenna’s distinction between essence and existence (see the note below for references), the doctrine of the so-called ‘giver of forms’ and the related doctrine concerning spontaneous generations (Freudenthal, *The Medieval Astrologisation*, pp. 111–37; Hasse, *Spontaneous Generation*, pp. 150–75; id., *Arabic Philosophy and Averroism*, pp. 125–29; Cerami, *Generazione verticale*, pp. 131–60; ead., *Génération et substance*, pp. 613–66), the particular case of human spontaneous generation (Bertolacci, *Averroes against Avicenna*; cf. Cerami, *Génération et substance*, pp. 530–34), the epistemological status of physics and metaphysics (Bertolacci, *Avicenna and Averroes*, pp. 61–97; Cerami, *Signe physique*, pp. 429–74).

5 The debate concerning Avicenna’s distinction between essence and existence is a case in point. In the last fifty years, a great number of scholars have tried to reconstruct and evaluate it, whether to defend Avicenna or Averroes, without trying to place it in a more general context. As example of this attitude, see Rahman, *Essence and Existence*, pp. 1–16; Cunningham, *Averroes vs. Avicenna*, pp. 184–218; Shehadi, *Metaphysics in Islamic Philosophy*; Leaman, *Averroes and His Philosophy*, pp. 104ff., and Menn, *Fārābī in the Reception*, pp. 51–96.

project of commenting the whole of Aristotle's philosophical *corpus* aims at constituting 'an alternative encyclopaedia', to replace the one constituted by Avicenna's works.⁶ In the same line, it has been concluded that Avicenna is not just *one* of Averroes' targets, but the main target. Accordingly, it has been said that Averroes' philosophical project has to be understood as having two main poles: a positive pole, represented by Aristotle, and a negative pole, constituted by Avicenna.⁷

Elsewhere I have put forward a partially revised reading of this general framework.⁸ I have suggested that in order to account for the persistent and aggressive character of Averroes' attacks, one has to realize that by refuting directly Avicenna Averroes aims indirectly at rebutting al-Ġazālī and Aš'arite theology. In fact, the reason why Averroes attacks Avicenna so fiercely is that he considers his fundamental philosophical principles dangerous. Averroes judges that, insofar as some of Avicenna's tenets come closer to Aš'arite claims, his doctrine exposes Aristotelian philosophy to al-Ġazālī's criticism. This is the main reason of Averroes' quite severe condemnation.⁹ It is not far-fetched to say that if the rejection of Avicenna's philosophical system is Averroes' 'proximate' and direct goal, its 'remote' and indirect goal is the 'destruction' of al-Ġazālī's 'destruction' of *falāsifa*. In other words, the refutation of Avicenna's doctrine is necessary in order to rebut al-Ġazālī's allegations against philosophy. In this sense, the stake of the debate with Avicenna stands even beyond the horizon of Aristotelianism.

By an in-depth examination of Averroes' attacks on Avicenna's doctrines in the contexts of physics, metaphysics, and epistemology, I have drawn attention to the fact that many of the criticisms converge towards one single doctrine that Averroes attributes to Avicenna: a strict assimilation of sensible dispositions to accidental properties and of substantial forms to essential principles. From Averroes' point of view, Avicenna's philosophy entails this assimilation and, as a consequence, it involves an ontological split between these two kinds of principles. Because of this ontological split, Averroes judges that Avicenna is forced to consider the link between sensible dispositions and substantial forms as non-necessary. This single doctrine does not exhaust the wide scope

6 Endress, *The Cycle of Knowledge*, pp. 103–33.

7 Bertolacci, *Averroes against Avicenna*, p. 39. See also id., «The Andalusian Revolt against Avicennian Metaphysics» (forthcoming).

8 Cerami, *Génération et substance* (notably pp. 320–36, 524–34, 633–53 and 672–5).

9 To this reason, as A. Bertolacci rightly suggests, one must add that Averroes criticizes Avicenna any time the latter's doctrines are too distant from Aristotle's, regardless of their alleged proximity to Aš'arite doctrine. This is all the more true since, according to Averroes, the only 'real' philosophy, identified with *the* truth, is the Aristotelian one. From this point of view, it must be emphasized that any debate inside the Aristotelian heritage concerns for him the search for the truth and not merely the understanding of Aristotle's text.

of Averroes' criticisms, but it is for him Avicenna's main 'ontological' error and the principal reason why his doctrine gets dangerously closer to the Aš'arite thesis.¹⁰ Within the same context, I have explained that this reading is not unambiguously stated in Avicenna's texts, but in the works of two thinkers who faced Avicenna before Averroes: al-Ġazālī and Ibn Bāġġa. I have concluded that Averroes' criticisms are neither ideological, nor totally illegitimate, but that they rest on *one* possible reading of Avicenna's doctrine, which Averroes inherited from his predecessors.

In the present article, my aim is partially different. I would rather provide a synthetic survey of Averroes' critiques against Avicenna than assess the legitimacy of his interpretation of Avicenna's doctrine. As Amos Bertolacci has correctly emphasized, a broad map of Averroes' objections to Avicenna is necessary in order to better evaluate the importance that Avicenna's philosophy had for Averroes, as well as the reasons of his polemic.¹¹ Following Bertolacci's suggestion and carrying on a project that he already launched,¹² I will analyse Averroes' commentaries on Aristotle's *Physics*, *De caelo*, *De generatione et corruptione*, and *Meteorology*.

I will take into account the criticisms present in these commentaries following the received order of Aristotle's treatises. Concerning each one of them, I will first point out the passage in the Aristotelian text to which Averroes' criticism is appended; afterwards, I will give an account of the criticism, displaying its main purport; finally, I will indicate the doctrine of Avicenna which is at stake and the place in which it is discussed. From a methodological point of view, the results of this analysis will show that each one of these three steps is necessary. As far as Aristotle's text is concerned, Averroes' choice of a passage for a criticism of Avicenna is never accidental. As to Avicenna's doctrine, Averroes' criticism hits the main elements of Avicenna's reworking of Aristotle's doctrine and the issues on which he explicitly diverges from Aristotle and his followers. As a result of this survey, I will draw some general conclusions concerning Averroes' polemical attitude toward Avicenna. The present study will confirm some of the conclusions outlined at the beginning, but also point out some other recurrent features of Averroes' approach.

Before plunging into the overview of the criticisms, some caveats are in order. First, I will take into account only the explicit references to Avicenna occurring in Averroes' commentaries to Aristotle's works. Other implicit refer-

10 This does not mean, however, that Averroes did not perceive the Aristotelian character of some other Avicennian tenets. On the contrary, it is precisely for this reason that he judged him 'always halfway between the theologians and the Peripatetic philosophers'; see table 1 (6) below.

11 Bertolacci, *Averroes against Avicenna*, p. 38.

12 See *id.*, *From Athens to Buḥārā*, pp. 225–9.

ences to Avicenna, not necessarily polemical, can be found in Averroes' texts. As recent studies have emphasized, Averroes often revealed his sources only after he abandoned them.¹³ The following overview will confirm this trend. For this reason, in order to obtain a complete picture of Averroes' knowledge of Avicenna, one should also take into account these implicit non-critical references. Second, the references of Avicenna's writings are not intended as proof that Averroes always knew Avicenna's text directly or in its entirety. Even if Averroes' criticisms touch the most important areas of Avicenna's philosophy, it is still challenging to establish the extent of his direct knowledge of Avicenna's writings. This point is particularly crucial when one tries to assess the legitimacy of Averroes' criticism. For all these reasons, this study must be considered as a work in progress, i.e. a tool whose purpose is to improve our understanding of the debate between Averroes and Avicenna and which can, in turn, be improved upon.

2 Averroes' Commentaries on Aristotle

During his intellectual career, Averroes tackled Aristotle's texts several times and in varying formats: first, in the so-called *Epitomes* (*ġawāmi'*, henceforth *Epit.*), which are conceived as a sort of synthesis of the discipline which the epitomized treatises belong to—more than a commentary on Aristotle's text, strictly speaking; second, in the so-called *Middle Commentaries* (*talāhīs*, henceforth *MC*), in which Averroes explains Aristotle's text in a periphrastic way¹⁴; and third, in the 'word-by-word' commentaries known as *Long Commentaries* (*tafāsīr*, henceforth *LC*).¹⁵

The historical data at our disposal show that the *Epit.* were composed during the first ten years of Averroes' intellectual career (from 1158)¹⁶. It is more difficult to date the composition of the other treatises.¹⁷ In a passage of

13 Cf. Glasner, *Averroes' Physics*.

14 I hasten to say that it is not possible to define one single form of the *MC*. However, as I have suggested elsewhere, the *MC* share some methodological and philosophical characters that allow us to consider them as a part of a unitary project (see Cerami, *Génération et substance*, pp. 6–20).

15 Averroes speaks of these kinds of commentaries as *šarḥ 'alā l-lafz*, in opposition to the commentaries that he calls *šarḥ 'alā l-mā'nā*, an expression which designates the paraphrases. On this point, see Glasner, *Review*, pp. 58–9.

16 On the date of the *Epit.* devoted to Aristotle's texts, see al-'Alawī, *al-Matn al-Ruṣdī*, pp. 55ff. and 214. Even if there is no single style of the *Epit.*, we can consider them as part of one single encyclopedic project. On the encyclopedic nature of the project that they are meant to accomplish, see Endress, «If God Will Grant Me Life», pp. 227–53.

17 For some elements of dating, see Averroes, *LC Met.*, Notice, pp. XXIII–XXV. Cf. Endress, *The Project Averroes*, pp. 13–14.

the commentary on the so-called *Book of Animals*, Averroes tells us that he completed it after he left Cordoba for Seville.¹⁸ Thus, whether we consider this commentary as the last *Epit.* or as the first *MC*, Averroes' claim gives us a *terminum post quem* for the writing of the *MC* (ca. 1169). In a passage preserved in the Hebrew translation of the *LC* on the *Physics*, Averroes tells us that he has already finished the commentary on the *Book of Animals* 'according to the signification', as well as the same kind of commentary for all Aristotelian treatises.¹⁹ He also informs us that he has already finished the *LC* on the *De anima* and that he was going to complete that of the *Physics*. For a long time the *LC* on the *Posterior Analytics* has been considered the first of the *LC*. But this is confirmed only for the commentary on the first book, which was completed in 1180.²⁰ Similarly, the *LC* on the *Metaphysics* is usually considered as the last one, since we know from Averroes that he was working on it during the last years of his life.²¹ There are some elements, however, that suggest that the *LC* on book Lambda was written before the rest of the commentary.²² With all these rectifications in mind, the only thing that we can tell is that the period of composition of the *LC* starts with 1180 and ends at 1198 with Averroes' death.

References to Avicenna occur in all three kinds of writings. However, the attitude that Averroes displays toward him is not the same. As recent studies have pointed out, we know that Averroes changes his mind on Avicenna's doctrine in the course of his intellectual career.²³ If he is largely influenced by Avicenna's philosophical options (notably the doctrine of emanation) during the period of the so-called *Epitomes*, he progressively distances himself from Avicenna's doctrine, until he considers it as a danger to the search for the truth.

Although it is difficult to identify the moment of this 'departure' from Avicenna, a comparative study of the *Epit.* with the later writings shows that it is from the late 1160s onwards that Averroes rejects Avicenna's emanationist system. These years mark the beginning of a new reading of Aristotelianism

18 For this dating, see Munk, *Mélanges*, p. 422, and Alonso, *Téologia de Averroes*, pp. 54 and 79–81.

19 See Glasner, Review, pp. 58–9.

20 According to Endress, the *LC* on the *Post. An.* is the first of the *LC* (1180), followed by that of the *Phys.* (1186) and *De caelo* (ca. 1188–90), *De an.* (ca. 1190) and, finally, of the *Met.* (1192–4 ca.). This dating has to be revised at the light of recent discoveries (cf. Averroes, *Über den Intellekt*, p. 302), p. 13. According to MS Munich, Cod. Hebr. 32, the *LC* on the *Post. An.* I has been completed in 1180.

21 See Averroes, *Commentary on Aristotle's Book on the Heaven*, p. 47, line 23; cf. Endress, If God Will Grant, p. 251. See also Averroes, *LC Met.*, Notice, p. XXV.

22 I formulated this hypothesis in Cerami, *Génération et substance*, p. 649, n. 314.

23 On the 'evolution' of Averroes, see Davidson, *Alfarabi, Avicenna*; Puig Montada, *Les stades de la philosophie*, pp. 115–37; Glasner, *The Evolution of the Introduction*, pp. 141–50; ead., *Averroes' Physics*; Freudenthal, *The Medieval Astrologisation*, pp. 111–37, and id., *Averroes' Changing Mind*, pp. 319–28.

and of a different philosophical project. Thanks to recent research, we also know that during the writing of the *LC*, Averroes comes back to the other treatises, notably the *Epit.*, in order to modify the passages which attested to an agreement with Avicenna's doctrines.²⁴

As we shall see, a comparative study of the criticisms present in the three types of commentaries confirms that the polemic with Avicenna finds its more persistent and vehement expression in the *LC*. Some of the same criticisms are also in the *MC*, but generally speaking these latter are less detailed and less fierce. As to the *Epit.*, they also contain polemical references to Avicenna, but not all of them are absolutely negative as in the other kinds of writings. Concerning the *Epit.* of the *Physics*, some evidence supports the hypothesis that at least some of the criticisms occurring in it could have been inserted later, when Averroes was reworking his texts.

3 Averroes' Commentaries on the *Physics*

Averroes wrote all three types of commentaries on Aristotle's *Physics*. The *Epit.* is preserved in the Arabic original;²⁵ the *MC* is preserved in the Arabic-Hebrew and Hebrew-Latin translations, but it is still unedited;²⁶ the *LC* is extant in the Arabic-Latin translation and accessible in the Renaissance edition.²⁷ I will begin by providing a synopsis of the doctrines of Aristotle, Avicenna and Averroes related to the criticisms occurring in the *LC*.²⁸ As we shall see, the study of these criticisms will make those in the *Epit.* more meaningful.

24 See Glasner, *Averroes' Physics*, and Puig Montada, *Averroes and Aquinas*, pp. 307–13.

25 This *Epit.* is part of a group of writings on the four treatises on natural philosophy—*Physics*, *De caelo*, *De generatione et corruptione*, *Meteorology*—conceived by the author as a whole, with a short general introduction and a closing note, which is dated 554/1159. It is preserved in the original Arabic and in the Hebrew translation (see Averroes, *Ġawāmi' ft l-falsafa*).

26 The only translation edited is the partial Renaissance Hebrew-Latin one by J. Mantino, that includes Averroes' commentary on the first three books of the *Physics* (see Averroes, *Expositio media super tres primos libros Physicorum*, pp. 434–56). There is also a complete unedited translation preserved in one manuscript (MS. Vat. Lat. 4548) and attributed to Abraham de Balmes.

27 See Averroes, *Commentarium magnum in Aristotelis De Physico Auditu*.

28 The same list will appear in Amos Bertolacci's contribution to the present volume, as a kind of shared dossier.

3.1 Criticisms in the *Long Commentary* on the *Physics*Table 1: Criticisms of Avicenna in Averroes' *LC* on the *Physics*

PASSAGE IN ARISTOTLE	PASSAGE IN AVERROES	DOCTRINE BY AVICENNA	CRITICISMS BY AVERROES	PASSAGE IN AVICENNA
(1) <i>Phys.</i> I 7, 190b5–10.	<i>LC Phys.</i> I, c. 63, fol. 38D.	What lacks dimensions (i.e. prime matter) is the subject of a form in actuality.	First matter is the being having in potency all substantial and accidental dispositions.	<i>Samā'</i> I, 1, pp. 13–15.
(2) <i>Phys.</i> I 9, 192a34–b2.	<i>LC Phys.</i> I, c. 83, fol. 47F–H (cf. <i>ibid.</i> I, c. 83, fol. 47I–K; VIII, c. 5; <i>LC Met.</i> Λ, c. 5, p. 1423, line 18–p. 1424, line 4).	The metaphysician, rather than the physicist, demonstrates the First Principle's existence.	The method according to which Avicenna proves the First Principle's existence is not demonstrative, as he contends it is. Averroes affirms having dealt with this issue elsewhere.	<i>Ilāhiyyāt</i> I, 1, p. 6, line 1–p. 7, line 6 (cf. <i>lat.</i> p. 4, line 64–p. 6, line 96).
(3) Cf. 2.	<i>LC Phys.</i> I, c. 83, fol. 47H (cf. <i>ibid.</i> II, c. 26; <i>LC Met.</i> Λ, c. 12).	Physics takes from metaphysics the proof that bodies are compounds of matter and form.	Avicenna is completely and plainly wrong.	<i>Ilāhiyyāt</i> II, 2–4.
(4) <i>Phys.</i> I 9, 192b2–4.	<i>LC Phys.</i> I, c. 83, fol. 47K.	Cf. (2) and (3).	Avicenna claims quite the opposite of what Aristotle affirms here.	Cf. (2) and (3).
(5) <i>Phys.</i> II 1, 192b20–32.	<i>LC Phys.</i> II, c. 3, fol. 49B–E (cf. <i>ibid.</i> V, c. 18; <i>LC Met.</i> Δ, c. 5, p. 508, lines 9–15; <i>LC De caelo</i> I, cc. 81–5; <i>ibid.</i> IV, cc. 22–5).	The existence of nature has to be proved by the metaphysician, since it is not evident by itself. The existence of nature in the case of elements is doubtful.	Avicenna is right only if he means that first philosophy has to refute those who deny the existence of this principle. Avicenna's assumption has as its ultimate source Plato's opinion that there are self-movers.	<i>Samā'</i> I, 5, p. 31, lines 5–6 (cf. <i>lat.</i> p. 52, lines 66–9).

PASSAGE IN ARISTOTLE	PASSAGE IN AVERROES	DOCTRINE BY AVICENNA	CRITICISMS BY AVERROES	PASSAGE IN AVICENNA
(6) <i>Phys.</i> II 2, 194a18–27.	<i>LC Phys.</i> II, c. 22, fols 56M–57B (cf. <i>ibid.</i> II, c. 26; <i>LC Met.</i> Λ, c. 5).	The natural philosopher deals only with the proximate matter; prime matter is dealt with by the metaphysician.	Avicenna's error stems from a wrong interpretation of the <i>Post. An.</i> The method that Avicenna uses in proving the existence of the First Principle is that of the theologians of <i>kalām</i> . His arguments are always intermediate between Peripatetics and Muslim Theologians.	See Bertolacci, Avicenna and Averroes, pp. 89–90.
(7) <i>Phys.</i> II 2, 194b9–15.	<i>LC Phys.</i> II, c. 26, fol. 59B–D (cf. <i>ibid.</i> I, c. 83; VIII, c. 3).	The consideration of the existence of separate forms belongs to metaphysics, not to natural philosophy.	Natural philosophy demonstrates the existence (<i>esse</i>) of separate forms; first philosophy deals with their quiddity (<i>de quidditatibus</i>). This is correct (<i>hoc est rectum</i>).	Cf. (6).
(8) <i>Phys.</i> II 5, 196b10–17.	<i>LC Phys.</i> II, c. 48, fols 66G–67A.	Chance occurs both in what is 'possibilia aequaliter' and in what is rare.	Avicenna goes against Themistius, who posits chance only in what is rare.	<i>Samā</i> ' I, 13, p. 63.
(9) Beginning of <i>Phys.</i> III or <i>Phys.</i> I	Prologue of the <i>LC Phys.</i> III, p. 177 ²⁹ (cf. <i>LC Phys.</i> I, c. 60, fol. 36D–I; <i>ibid.</i> I, c. 71; <i>LC Met.</i> A, c. 14).	The preexistence of a substrate is not necessary in substantial generation.	Avicenna partially admits this in his <i>De substantia orbis</i> .	***

29 See Schmieja, *Drei Prologe*, p. 177.

PASSAGE IN ARISTOTLE	PASSAGE IN AVERROES	DOCTRINE BY AVICENNA	CRITICISMS BY AVERROES	PASSAGE IN AVICENNA
(10) <i>Phys.</i> IV 4, 211a12–14.	<i>LC Phys.</i> IV, c. 32, fol. 134F (cf. <i>ibid.</i> IV, c. 31; VIII, c. 76).	The last sphere does not move in place as a whole, but in its part.	The assumption that the heavens do not move as a whole is nonsense.	<i>Samāʿ</i> II, 3, p. 103, lines 11–12; p. 104, lines 10–17 (cf. lat. p. 197, lines 97–8; p. 199, line 20–p. 200, line 33).
(11) <i>Phys.</i> IV 5, 212b7–20.	<i>LC Phys.</i> IV, c. 45, fol. 144E–I.	The celestial body is not in place, neither <i>per se</i> nor <i>per accidens</i> . Circular motion is not in place, but it is change in position. Change in position is change according to figure.	What Avicenna states is against what Aristotle says and against truth. Avicenna either was not aware of Aristotle's doctrine, or he puts forward his doctrine incorrectly (<i>vitiose protulit</i>). He was influenced by Alexander of Aphrodisias.	Cf. (10).
(12) <i>Phys.</i> IV 8, 215a1–14.	<i>LC Phys.</i> IV, c. 67, fol. 156B (cf. <i>LC De caelo</i> III, c. 26; <i>LC Met.</i> II, c. 2).	It is not to be admitted that, in natural bodies, forced movement is to natural movement as privation is to <i>habitus</i> and that, as such, the first is posterior to the second.	Avicenna's denial of this assumption is silly.	Cf. table 3 (1), (6).

PASSAGE IN ARISTOTLE	PASSAGE IN AVERROES	DOCTRINE BY AVICENNA	CRITICISMS BY AVERROES	PASSAGE IN AVICENNA
(13) <i>Phys.</i> VI 9, 240a33–b7.	<i>LC Phys.</i> VI, c. 85, fol. 300K–M.	The motion of the heavenly spheres is not a motion in place, but a motion in position.	Avicenna does not distinguish between being in a place <i>per se</i> and <i>per accidens</i> , i.e. according to the subject and according to the form. His argument is extremely sophistical.	Cf. (10).
(14) <i>Phys.</i> VIII 1.	<i>LC Phys.</i> VIII, c. 1, fol. 339A–B.	Aristotle's intention in <i>Phys.</i> VIII 1 is to show that motion in general is eternal.	Averroes traces Avicenna's wrong opinion to al-Fārābī's and states that Ibn Bāğğa makes the same mistake.	<i>Samā'</i> III, 11
(15) <i>Phys.</i> VIII 1, 251a5–8.	<i>LC Phys.</i> VIII, c. 3, fol. 340E–F.	The metaphysician has to prove the existence of the First Principle.	The method that Avicenna pretends to have discovered and that he follows is weak and not demonstrative. Averroes says that he devoted a special treatise to this issue. He mentions al-Ġazālī, on the one hand, as following Avicenna's method, but, on the other hand, as questioning Avicenna's position. On several issues al-Ġazālī is right in his criticisms.	<i>Ilāhiyyāt</i> I, 1, p. 6, line 1–p. 7, line 6 (cf. lat. p. 4, line 64–p. 6, line 96).

PASSAGE IN ARISTOTLE	PASSAGE IN AVERROES	DOCTRINE BY AVICENNA	CRITICISMS BY AVERROES	PASSAGE IN AVICENNA
(16) <i>Phys.</i> VIII 6, 258b12–32.	<i>LC Phys.</i> VIII, c. 46, fol. 387H.	Man can be generated from earth, even though he is generated more properly in the female's uterus.	A statement like this, pronounced by a man who devotes himself to science, is very foolish (<i>valde fatuus</i>).	<i>Ma'ādin wa-ātār</i> II, 6, p. 76, line 15–p. 79, line 6. ²
(17) <i>Phys.</i> VIII 10, 266a10–23.	<i>LC Phys.</i> VIII, c. 78, fol. 424L.	The forms of celestial bodies are forms in matter.	Modern philosophasters assume that Aristotle's demonstration implies that the forms of celestial bodies are forms in matter. But they are wrong. Their mistake comes from Avicennas' books. What Avicenna gets in his books from Aristotle is not truly Aristotelian.	<i>Ilāhiyyāt</i> IX, 2, pp. 386–7; IX, 3, pp. 405–6 (cf. <i>ibid.</i> IX, 4, pp. 407–8).
(18) <i>Phys.</i> VIII 10, 266a23–b6.	<i>LC Phys.</i> VIII, c. 79, fol. 426L–M (cf. <i>Questions in Phys.</i> , p. 33).	The heaven is necessary on account of something else, whereas the movers of the heaven are necessary on account of themselves.	Avicenna interpreted in this way the words of Aristotle in <i>De caelo</i> II (the power of the heaven is finite), after having read Alexander.	<i>Ilāhiyyāt</i> IX, 3, pp. 405–6; p. 376 (cf. <i>Nağāt</i> , p. 261).
(19) <i>Phys.</i> VIII 10, 267a21–b6.	<i>LC Phys.</i> VIII, c. 83, fol. 432C–D.	The heaven is not necessary <i>ex se</i> , but on account of something else.		Cf. (18).

30 On this criticism, see Kogan, *Averroes and the Metaphysics*, pp. 131–2; Hasse, *Spontaneous Generation*, pp. 158–9 and 161–2; Belo, *Chance and Determinism*, pp. 154–6, and nn. 70–1; Bertolacci, *Averroes against Avicenna*, and Cerami, *Génération et substance*, pp. 528–34.

(1) On the nature of the preexisting substrate of substantial generation

The Aristotelian doctrine that forms the background of criticism (1) is that there is always a substrate out of which things come to be (*Phys.* I 7, 190b5–10). In this passage, Aristotle distinguishes between ‘things that are said to come to be something’ and ‘things which simply come to be’ (τὰ γινόμενα ἀπλῶς), i.e. substances. He states that the two kinds of beings need a substrate. The nature of this pre-existing substrate, though, is hard to define and Aristotle does not provide further explanations here.

In the commentary on this pericope, Averroes first clarifies the structure of Aristotle's argument. Then he enters into a digression in which he states, against Avicenna, that in substantial generations the ‘underlying thing’ has no substantial dispositions. Averroes makes clear that the substrate of substantial generation has a ‘nature capable of receiving those substantial dispositions’, since it is ‘a being having in potency all substantial and accidental dispositions’. He states that this is the so-called first matter. He declares that the three dimensions that are inseparable from it are accidents and he infers that this is the reason why matter is devoid of ‘corporeity’ (*corporeitas*).³¹ He concludes that for this reason Avicenna is wrong in asserting that what receives the three dimensions is a subject having a form in actuality.³²

(2–4) On the epistemological status of natural philosophy (its subject-matter and its goal)

At the end of Book I (*Phys.* I 9, 192a34–b2), Aristotle claims that while natural philosophy deals with forms which can pass away, first philosophy deals with the question asking whether formal principles are one or many and of what sort they are. This is a quite ambiguous statement, since it is not clear whether natural philosophy only deals with generated and corruptible forms or whether it concerns the incorruptible forms as well.

After briefly commenting on these lines, Averroes enters into a digression in which he points out (*notandum est*) that first philosophy cannot establish the existence of separate forms, because these forms constitute the subject-matter of first philosophy. He states that the proof of their existence belongs to natural

31 Following Puig Montada's suggestion in *id.*, *Les stades de la philosophie*, pp. 122–5.

32 Averroes, *LC Phys.* I, c. 63, fol. 38D. On Avicenna's notion of prime matter and in particular on the notion of *forma corporeitatis*, see Goichon, *La distinction de l'essence*, pp. 424–39, and Hyman, Aristotle's ‘First Matter’, pp. 335–56. On Averroes' notion of prime matter, see Cerami, *Génération et substance*, pp. 382–95. On the latin reception of this debate, see Duhem, *Le système du monde*, pp. 453–74 and 532–45; Wolfson, *Crescas' Critique of Aristotle*, pp. 577–90, and Donati, *La dottrina delle dimensioni*, pp. 149–234.

philosophy, even if this science deals with ‘material forms’, that is ‘forms that are in matters’. He maintains that anyone who asserts that first philosophy demonstrates the existence of separate forms makes a mistake. For this reason—concludes Averroes—Avicenna is ‘extremely and plainly wrong’ (*peccavit maxime ... peccavit peccato manifesto*) in claiming that first philosophy demonstrates the existence of the first principle, and his arguments do not go beyond the level of probable arguments.³³

(3) In carrying on his previous criticism, Averroes goes further in stating that it is ‘even worse’ (*peius est*) to claim, as Avicenna does, that natural philosophy receives from first philosophy the proof that bodies are compounds of matter and form. First philosophy deals with matter only insofar as it deals with beings as such, i.e. insofar as they are beings; thus it cannot prove that bodies are compounds of matter and forms, since the only way to establish it is by taking into account substantial transformation, whose study pertains to natural philosophy.

(4) In the last lines of book I (*Phys.* I 9, 192b2–4) Aristotle resumes the results of the previous investigation and claims that he intends, in what follows, taking a fresh start (ἄλλην ἀρχὴν ἀρξάμενοι). The reference is to book II in which Aristotle goes on to study the four causes. The Arabic translation, though, is more ambiguous than the Greek text: it could mean either that Aristotle wishes to deal, in the second book, with another topic, or that he means to look, in the rest of the treatise, for another principle (*wa-naḥnu nastaqbilu fī kalāminā mabda’ āḥar*).³⁴

While discussing the second hypothesis, Averroes suggests that by these words Aristotle could be alluding to the separate unmoved mover, and he concludes that what Avicenna holds is almost the contrary of what this passage states (*Et totum hoc est quasi contrarium eius quod existimavit Avicenna*).³⁵

(5) On the definition of nature as an inner principle of movement

In the first lines of Book II (*Phys.* II 1, 192b8–15), Aristotle distinguishes between natural and artificial beings. He claims that the former have in themselves a source of change and staying unchanged, while the latter, as such, do not possess this kind of principle. Immediately afterwards, he states that nature is this kind of inner principle and he makes clear that it is ‘a cause of change

33 On this criticism and the following two, see Bertolacci, Avicenna and Averroes, and Cerami, *Signe physique*.

34 See Aristotle, *al-Ṭabī‘a*, p. 76, line 4; cf. Averroes, *LC Phys.* I, t. 83, fol. 47E: ‘et nos intendimus in hoc sermone aliud principium’.

35 Averroes, *LC Phys.* I, c. 83, fol. 47K.

and remaining unchanged in that to which it belongs primarily of itself and not by virtue of concurrence' (*Phys.* II 1, 192b20–32).

After having commented on lines 192b8–15³⁶ and before explaining lines 192b20–32,³⁷ Averroes inserts a digression in which he claims that this definition of 'nature' is evident (*manifesta*).³⁸ By referring to *Phys.* II 1, 193a2–9, he states that the existence of nature is self-evident (*manifesta per se*) and that it is among the principles of natural philosophy. He maintains that Avicenna is wrong in holding that this principle is not self-evident and that first philosophy must establish it. Avicenna is right only if he means that first philosophy has to refute those who deny the existence of this principle.

Afterwards, Averroes states that Avicenna uses an argument in order to confirm that this definition of nature is not self-evident, at least at this stage of the enquiry (*Et iste homo inducit signum quod ista definitio non est nota hic*). The objection is based on the case of simple bodies. Aristotle himself states in *Phys.* VII and VIII that any moved body has a mover, but he acknowledges in *Phys.* VIII that the case of simple bodies is doubtful.³⁹ Moreover, as Aristotle says in the third book of the *De caelo*, elements have lightness and heaviness. For these two reasons, says Averroes, one could challenge the idea that simple bodies have in themselves an inner source of change and conclude that they are not moved by *their* nature by themselves.

Against these objections, Averroes states that the case of simple bodies, when it is well examined, confirms that all natural beings move in virtue of an inner natural principle and by themselves, even if one has to explain whether, in their case, the mover is different from what is moved. This is what is at stake in *Phys.* VII–VIII, i.e. the question whether the internal mover in their case is itself moved or not, and not the idea that simple bodies do not move by themselves. The reason of Avicenna's doubt, concludes Averroes, stems from what Plato claims, i.e. that there is something that is a real self-mover.⁴⁰

(6–7) On the epistemological status of natural philosophy

In *Phys.* II 2, 194a18–27, Aristotle claims that it belongs to the study of nature to know both nature as form and nature as matter 'up to a certain point' (μέχρι του). It is not clear, however, which point it is.

36 Ibid. II, c. 2, fol. 48H–K.

37 Ibid. II, c. 3, fol. 49E–K.

38 Ibid. II, c. 3, fol. 49B–E.

39 The reference is to *Phys.* VII 1 and notably *Phys.* VIII 4, where Aristotle considers more directly the case of earth, fire, water and air.

40 Averroes, *LC Phys.* II, c. 3, fol. 49D–E.

After commenting on these lines, Averroes incorporates a digression in which he puts forward Avicenna's thesis according to which first philosophy deals with first matter, while natural philosophy discusses proximate matter only. Averroes retorts that Avicenna is wrong (*peccavit*), since natural philosophy has to establish the existence of first matter, as well as that of first mover, not by an 'absolute demonstration', but in virtue of a 'natural sign'. He argues that Avicenna's error stems from a wrong reading of Aristotle's *Posterior Analytics* and that Avicenna's method (*via*) is the one pursued by the *mutakallimūn*. He concludes that Avicenna's arguments are always halfway between Peripatetic philosophers and Muslim theologians.⁴¹

(7) At the end of book II 2, in resuming what has been stated so far, Aristotle declares that matter is 'something relative to something' and that one has to ask to what extent the natural philosopher 'has to know the forms of things and what they are' (δεῖ εἰδέναι τὸ εἶδος καὶ τὸ τί ἐστίν). He wonders if the natural philosopher should confine himself to the study of forms in matter, since it is always a particular substance that generates another particular substance. He closes the chapter by claiming that the study of what is separable (χωριστόν) and of the way in which it is separable belongs to first philosophy (*Phys.* II 2, 194b9–15). The Arabic text that Averroes comments on here is even more explicit than the Greek original. It asks up to what point natural philosophy can get to 'the knowledge of form and essence'⁴².

In commenting on this text, Averroes makes clear that the difficulty here is to understand how far the natural philosopher can study the forms, without overrunning the domain of 'the science of essence'. He claims that the natural philosopher has to study both matter and form, since for each form there is a different matter and since matter is always in virtue of (*propter*) form. He clarifies, though, that there are two orders of forms, i.e. forms that are separate from matter and forms that are not separate. He concludes that the natural philosopher has to deal with 'forms in matter', but that he must establish the existence of 'separate forms', whereas the first philosopher has to consider separate forms as such and to study their quiddities. Afterwards, Averroes points out that one must not infer, as Avicenna does, that first philosophy proves the existence of separate forms. For neither a universal science nor a particular one can prove its own subject-matter.⁴³

41 On this criticism, see again Bertolacci, Avicenna and Averroes, and Cerami, *Signe physique*.

42 Aristotle, *al-Ṭabī'a*, p. 99, lines 3–4.

43 On this assumption, see once again Bertolacci, Avicenna and Averroes, and Cerami, *Signe physique*.

(8) On chance and possibility

Aristotle begins *Phys.* II 5 by providing a distinction between events that always happen, those that repeat themselves regularly and those that are only rare. He points out that 'since there are other things which come to be besides these', people think that they are the outcome of luck (*Phys.* II 5, 96b10–17)⁴⁴. Aristotle does not specify which kind of events 'besides these' he is talking about.

In commenting on these lines, Averroes affirms that later Peripatetics introduced a fourth category to the three mentioned by Aristotle, i.e. the event 'which is equally possible' and that they debated about the possibility that this kind of event too counts as outcome of chance. He claims that Avicenna states, against Themistius, that chance is found among those events, for something could be 'necessary with respect to something and coincidental (*casuale*) with respect to something else'. Against Avicenna's hypothesis, Averroes replies that it is impossible that from the equally contingent (*contingens aequale*) one of two actions can come about, unless another cause is conjoined with it.⁴⁵

(9) On the necessary preexistence of a substrate

According to the Latin manuscripts, a ninth criticism occurs in the prologue of the commentary on *Phys.* III.⁴⁶ In the Giunta edition, following the suggestion of the Jewish scholar Paolo Ricci (d. 1541), this passage has been put at the end of c. 60 of *Phys.* I 7. Here, however, Avicenna is not explicitly mentioned.⁴⁷ The issue at stake is the necessary existence of a previous substrate for each type of transformation, whether substantial or accidental. Against the Muslim theologians, Averroes claims that ancient philosophers all agree that there is no generation *ex nihilo*, while 'modern thinkers' consider it possible. In the Latin manuscript tradition, the same tenet is attributed to Avicenna (*et Avicenna oboedivit huic aliquantulum in tractatu suo de substantia orbis*). In the Giunta edition, though, Averroes just claims that some people of his *entourage* (*quosdam socios*) have doubts about this question and that he challenged this assumption in his *De substantia orbis*.⁴⁸ It should be noted that nowhere else,

44 Aristotle, *Phys.* II 5, 96b10–17.

45 Belo, *Chance and Determinism*, pp. 147–54.

46 On this passage, see Schmieja, *Drei Prologe*, pp. 175–89.

47 Aristotle, *Phys.* I 7, 190a14–21. In the Hebrew translation too, the passage corresponds to *LC Phys.* I, c. 60, where the name of Avicenna is explicitly mentioned (see Glasner, *Averroes' Physics*, p. 26, n. 35).

48 Averroes, *LC Phys.* I, c. 60, fol. 36D–I: 'Et iam vidi quosdam socios dubitantes in hac quaestione, tamen obviavi huic [et Avicenna oboedivit] huic aliquantulum in tractatu [suo] de substantia orbis'. The expression *et Avicenna oboedivit* and the possessive *suo* is lacking in the Giunta edition. According to Schmieja, *Drei Prologe*, p. 182, this ascription to Avicenna

as far as I know, does Averroes blame Avicenna for having denied the necessary preexistence of a substrate. We have just seen, moreover (see criticism 1), that Averroes criticizes the nature of Avicenna's preexisting substrate, but not its necessary existence. All these considerations suggest that the mention of Avicenna is due to a Latin reader who improperly adds Avicenna's name.

(10–11) On the place of heavens and the category of their movement

At the beginning of *Phys.* IV 4, Aristotle makes some preliminary remarks about the notion of place in order to introduce his own definition. He states that place would not be a subject for inquiry if there were not change in respect of place. A first indication is the movement of the 'heavens', i.e. the sphere carrying the fixed stars, since—Aristotle states—'we think that heavens are in place, because they are always in change' (*Phys.* IV 4, 211a12–14).

In the commentary on these lines, Averroes points out that Aristotle takes into account the outermost sphere, because in its case it is difficult to understand whether it has a place considered as a whole (*secundum totum*). As a consequence, one may doubt that the outermost sphere even moves. He concludes that this is the reason why Avicenna maintains that heavens do not alter their place altogether, but that they move in their parts (*secundum partes*). This statement, chides Averroes, is nonsensical (*inopinabile*).

The problem of the place of the *ouranos* is discussed at length in *Phys.* IV 5, 212a31–b3, though it is not always clear if by this word Aristotle designates the outermost sphere or the entire universe. Averroes dwells at length on this 'great question' (*magna quaestio*) in his commentary on these lines,⁴⁹ in which he incorporates a long digression⁵⁰. He clarifies that, concerning the place of the heavens, one is necessarily faced with a dilemma: one must either assume i) that something which is in movement is not in place or ii) that place is void of dimensions. He pictures the debate prompted by the ancient commentators (*in hoc dubitaverunt omnes expositores*).⁵¹ He first reports Philoponus' and Themistius' positions, which he criticizes, then Ibn Bāḡḡa's position, which he traces back to al-Fārābī. He informs us that he has no direct knowledge of

of a treatise *De substantia orbis* (the same title of Averroes' own work) might explain the lack of the Prologue to *Phys.* III in some Latin manuscripts. However, Averroes mentions in his *De substantia orbis* a treatise by Avicenna with the same name (cf. Anawati, *Essai de bibliographie*, pp. 125–7).

49 The Arabic text adds the converse of Aristotle's assumption: Aristotle, *al-Ṭabī'a*, p. 329, lines 5–6: 'any body whatsoever out of which there is not another body is not in a place' (cf. *LC Phys.* IV, c. 43, fol. 141A).

50 Averroes, *LC Phys.* IV, c. 43, fols 141C–143I.

51 On this debate, see M. Rashed, Alexandre d'Aphrodise.

Fārābī's text on this issue. He comes back to Avicenna's position in c. 45 (cf. criticism 11 below).

(11) After having distinguished 'what is in a place in potency' from 'what is in place in actuality', Aristotle comes back to the case of the heavens and states that they are not, as a whole, somewhere or in some place, since no body surrounds them. He suggests that, as the soul, the heavens, considered as the whole universe, are accidentally in a place, since their parts are all in a sense in place, while the whole is not anywhere (*Phys.* IV 5, 212b7–20).

After commenting on the whole passage line by line, Averroes warns that Aristotle's words should not be understood as Avicenna does. He develops in a digression the reasons of Avicenna's doctrine and the counterarguments that invalidate it. First, he explains that Avicenna infers from the assumption that the heavens, as a whole, are not in a place either *per se* or *per accidens*, that the movement along a circle (*motus rotundi*) is not a movement in place, but in position (*motus in situ*). Afterwards, he contends that Avicenna's assumption is against what Aristotle says and against the truth. He puts forward four arguments in which he seeks to prove that the thesis that circular motion is not in place, but *just* 'in position', is non-Aristotelian and false at the same time. First, Aristotle states in *Phys.* V that the change in position is not a movement; second, the notion and the definition of position implies that of place; third, it is evident that the movement of the sphere is a translation and, so far, a movement in place, since its parts move. Fourth, Aristotle claims at the end of book 6 that, in circular motion, the sphere changes according to the form, thereby not according to subject. Averroes makes clear that Avicenna misunderstands this distinction in that he considers that 'movement in form', but not 'in a subject' is 'movement in position', which he also calls 'positional' (*situale*). But this—Averroes claims—is a patent mistake (*error manifestus*). He harshly concludes that Avicenna either is unaware of Aristotle's text or misinterprets it completely. He suggests that Avicenna's mistake stems from Alexander's words according to which the outermost sphere is not in a place neither *per se* nor *per accidens*.

(12) On the movement of simple bodies

In *Phys.* IV 8, Aristotle brings forward four arguments in order to prove that there is no void. The second argument consists in assuming that the existence of void cannot explain the natural movement of the elements towards their places. First of all, Aristotle proves that natural bodies have natural movements. He admits that natural movement is prior to forced movement, for 'change contrary to nature is secondary to change according to nature'. Natural bodies cannot possess only forced change, for the existence of forced change necessarily implies that of natural change (*Phys.* IV 8, 215a1–14).

In commenting on this argument, Averroes clarifies that Aristotle's statement that 'change contrary to nature is secondary to change according to nature' means that 'what has a change contrary to nature has change according to nature'.⁵² This assumption, argues Averroes, is patently true, since a thing is related to natural and forced movement as it is related to *habitus* and privation. Thus, natural movement is prior to forced movement as *habitus* is prior to privation in the thing deprived of it.⁵³

Immediately afterwards, Averroes blames Avicenna for not conceding this assumption and declares this denial silly.⁵⁴ It is not clear, however, whether Averroes accuses Avicenna for denying that '*habitus* is prior to privation' or that in all natural bodies 'natural movement is to forced movement as *habitus* is to privation'. As we shall see, the second hypothesis is more plausible. For one thing, as we have seen in criticism 5, Avicenna puts into question the existence of 'nature' as an inner principle of movement in the case of simple bodies. The criticism here seems to be related to this same objection, i.e. that there actually is a 'natural movement' prior to 'forced movement' at least in the case of simple bodies. For another thing, as we shall see in the *LC* on the *De caelo* (see table 3, criticisms 1 and 6), Averroes blames Avicenna for not admitting that simple bodies can change only if they possess a natural change.

(13) On the place of heavens and the category of their movement

At the end of *Phys.* VI 9 (240a29–b7), Aristotle argues against Zeno that in the things that move in a circle, it is not the case that they will be at once at rest and in motion (*Phys.* IV 9, 240a33–b7). He brings forward two counterarguments. First, the parts of what moves in a circle do not occupy the same place for any period of time; and secondly, the whole is always changing to a different position. Concerning the second counterargument, he makes clear that the fact of the sphere being in a certain position is comparable to an accident, and its identity in the different positions in which it moves is comparable to the identity of a substance predicated of an accident (b1–7). While turning, the sphere is the same at point A, B and C, as the man is the same as the cultivated man.

Commenting on these lines (b1–7), Averroes claims that the sphere, while turning in a circle, is not the same in its different positions *per se*, but *per accidens*, just as the man and the cultivated man are the same according to the substrate (*secundum subiectum*), but not according to form (*secundum formam*). He suggests that one must understand the case of the movement of the out-

52 Averroes, *LC Phys.* IV, c. 67, fol. 156A.

53 Ibid. IV, c. 67, fol. 156B.

54 Ibid. IV, c. 67, fol. 156B: 'haec propositio, ut mihi videtur, non conceditur ab Avicenna et est fatuitas in illo'.

ermost celestial sphere in the same way. It is possible to claim that the outermost sphere changes in place, insofar as it is, in its different positions, different 'according to form' but the same 'according to substrate'. Averroes argues that since Avicenna ignored the distinction between these two kinds of identity, he was forced to call the movement of the sphere 'movement in position'. But this, concludes Averroes, is 'trying to heal with a cure that is worse than the disease' (*sanare aegritudinem per maius aegrum*). As a matter of fact, there is no change in the category of position, since position is among relatives.⁵⁵ If Avicenna means that the movement of the sphere is in the category of position, as far as the sphere moves from a position to another, he is right. In this case, however, its movement is not 'in position', but 'from a position to another', as in the case of rectilinear movement. Thus, in claiming that the sphere moves 'in place', Avicenna either does not provide anything useful, or he states something extremely sophisticated (*valde sophisticus*).

(14) On the role of *Phys.* VIII 1 in the demonstration of the eternity of motion

In *Phys.* VIII 1 Aristotle is intent upon showing the eternity of movement. It is not clear however if the demonstration concerns movement in general, i.e. any kind of movement considered as a whole, or if Aristotle aims at demonstrating the eternal nature of one single movement, i.e. the movement of the last sphere.

The criticism exposed in the commentary on *Phys.* VIII 1 is well known. It is part of the additions that Averroes inserted in his commentary, while he was revising it.⁵⁶ Averroes asserts that the role of *Phys.* VIII 1 is not to demonstrate that movement 'in general' is eternal, as al-Fārābī, Avicenna and Ibn Bāğğa think, but to establish that the movement of the outermost sphere is eternal. As far as Averroes' polemical attitude against Avicenna is concerned, it is extremely important to remark that when Averroes endorsed the same interpretation as Avicenna, he did not mention his name and that he does so only when he decides to discard his interpretation.

(15) On the epistemological status of natural philosophy

After asking in *Phys.* VIII 1 whether motion comes into being at some time or whether it neither came into being nor perishes, Aristotle states that the study of these matters is useful not only for the study of natural philosophy, but 'for an enquiry into the first principle as well' (*Phys.* VIII 1, 251a5–8). This statement is especially problematic for Averroes, insofar as one may think that the

⁵⁵ Ibid., VI, c. 85, fol. 300K–M.

⁵⁶ On Averroes' changing mind on the role of *Phys.* VIII 1, see Glasner, *Averroes' Physics*. On the reason of his criticism, see Cerami, *L'éternel par soi*, pp. 1–36.

enquiry into the first principle does not pertain to natural philosophy at all, but to metaphysics.

After commenting on Aristotle's text and making clear that 'the specialist of divine science' (*divinus*) receives from 'the specialist of natural science' (*naturalis*) the demonstration of the existence of a prime mover, Averroes claims that Avicenna's opinion, according to which it is the specialist of divine science who demonstrates the existence of the first principle, is wrong. Averroes retorts that the method that Avicenna pretends to have discovered is 'weak and not demonstrative' and he remarks that he devoted a special treatise to this issue.⁵⁷ He mentions al-Ġazālī, on the one hand, as following Avicenna's method, but on the other hand, as questioning Avicenna's position. On several issues, concludes Averroes, al-Ġazālī is right in his criticisms against other thinkers (*plures enim quas induxit contra alios verae sunt*).

(16) On the generation of natural species

In *Phys.* VIII 6, in order to assess the necessary existence of one single and eternal unmoved mover, Aristotle makes clear that non-eternal unmoved movers alone, i.e. the forms of natural species, cannot explain the necessary continuity of the cycles of generation and corruption. For they are infinite, and they do not all exist at the same time (VIII 6, 258b12–32).

After commenting on this passage line by line, Averroes restates that in order to have generation of natural species, the coming to be and passing away of those unmoved non-eternal principles must be continuous and their number infinite. This assumption offers to him the occasion to place a long digression devoted to the so-called spontaneous generation. In the body of this digression, Averroes refutes Avicenna's opinion according to which a human being can be generated from earth, even if it is more appropriate for him to be generated in the female's uterus.⁵⁸

(17–19) On the nature of celestial bodies as moved things

In the first lines of *Phys.* VIII 10 (266a10–23), Aristotle seeks to demonstrate that no finite thing can cause motion for an infinite time. Each finite mover moves a moved thing in a finite portion of time.

After the word-by-word commentary on these lines, Averroes inserts a long digression concerning the case of celestial bodies. He observes (*notandum est*) that one may wonder that Aristotle's argument does not exclusively concern

57 On this passage see Adouhane, al-Miklāfī, pp. 155–98.

58 On this criticism, see Bertolacci, Averroes against Avicenna; cf. Cerami, *Génération et substance*, pp. 530–34.

sublunar bodies, but also celestial bodies. He warns that one could infer from this that 'their motive powers are forms in matter' and that their action cannot be accomplished but 'in conjunction with parts of their matter'. Against this conclusion, Averroes argues that celestial bodies are 'simple matters' and that 'their forms are not in matter'. He informs us that this is the error of 'modern philosophers who satisfy themselves with the books in which Avicenna exposes his philosophy'. He warns that what Avicenna 'gets in his books from Aristotle' is Aristotle's demonstration only *prima facie*. If one considers his demonstrations more carefully, one realizes that Avicenna's arguments do not agree with what Aristotle established. Averroes concludes that, for this reason, Avicenna's books do not guide toward the truth, but take away from it.⁵⁹

It is interesting to note that in the same digression, some lines later, Averroes blames Galen and al-Fārābī for the same reason. Averroes does not mention the name of those 'modern philosophers' who prefer Avicenna's books to Aristotle's, but it is quite certain that the allusion is to Ibn Bāḡḡa.⁶⁰

(18) After establishing that no infinite movement can be caused by a finite mover, Aristotle seeks to demonstrate that an infinite power cannot belong to a finite magnitude. He argues that if this were not the case, a finite power would cause motion in a time equal to that occupied by an infinite power. He concludes that 'no finite thing can have an infinite power' (*Phys.* VIII 10, 266a23–b6).

After explaining in a word-by-word commentary Aristotle's text, Averroes makes clear that the argument displayed in these lines can be reconstructed in several ways.⁶¹ He suggests two ways: as a second figure categorical syllogism; or as a hypothetical composed syllogism, followed by a refutation of the protasis. In either of these two ways, the argument leads us to the conclusion that no finite thing can have an infinite power.

Once he has finished the literal explanation of Aristotle's text, Averroes enters into a digression concerning the problematic case of celestial bodies.⁶² As in the previous passage, he states that one could raise the question whether

59 Averroes, *LC Phys.* VIII, c. 78, fol. 425K–M: '... quod pluribus accidit modernis philosophantibus, qui solis libris Avicennae contenti sunt in sua philosophia. Et maxime quae vir ille transtulit ab Aristotele in libris suis, huiusmodi videntur esse demonstrationes Aristotelis in prima facie, non sunt autem in veritate. Unde libri huius viri potius faciunt a sapientia recedere quam ipsam largiantur'.

60 In the *LC on Met.* Z9 too, Averroes alludes to 'modern philosophers' who side with Avicenna on the issue of substantial generation. A comparison with some parallel passages in the *MC* on the *De gen. an.* shows that Ibn Bāḡḡa is the target of this criticism (for precise references, see Cerami, *Génération et substance*, pp. 512–17).

61 Averroes, *LC Phys.* VIII, c. 79, fol. 426G: 'Hoc autem demonstratio multipliciter potest fieri et formari'.

62 After two folios of the Giunta edition, the digression ends with the words *revertamur ergo ad verba Aristotelis* (see *ibid.* VIII, c. 79, fol. 427G).

Aristotle's statement that every body has a finite power does or does not concern the celestial bodies.⁶³ If one assumes that the celestial bodies are covered by Aristotle's statement, one could infer that celestial bodies, inasmuch as their power is finite, are corruptible.

Averroes informs us that in order to solve this doubt Alexander of Aphrodisias 'in some of his treatises' claims that the celestial body 'gets its eternity from its mover, which is not in matter'.⁶⁴ The assumption that celestial bodies are 'made eternal' by their incorporeal mover can be found in the Arabic adaptation of Alexander's *De providentia*, where it is said that 'the eternity of the first body proceeds from the first cause, while the eternity of the changing bodies proceeds from the first body whose substance is stable'.⁶⁵ Averroes concludes that Alexander's assumption inevitably implies that the celestial body is something corruptible that will never be corrupted. He traces this thesis to Plato and explains that Philoponus uses it to demonstrate that the universe is corruptible as well as generated.

Afterwards, Averroes admits that what Aristotle claims in *De caelo* II 12 could be considered as an argument in support of the opinion that celestial bodies have a finite power. In this passage, as we shall see, Aristotle states that no celestial sphere can carry more bodies than it actually does.

After reconstructing the Greek history of this question, Averroes continues by linking it to its Arabic reception. He blames Avicenna for having misunderstood the words of Aristotle and having followed the interpretation of Alexander. He claims that Avicenna assumes from Alexander's statement and from *De caelo* II 12 that there must be two kinds of necessary beings: necessary on account of themselves, i.e. celestial movers; necessary on account of something else and possible on account of themselves, i.e. celestial bodies.⁶⁶ He concludes that Aristotle's statement does not imply the existence of this kind of necessary being, since when he affirms in *De caelo* II 12 that celestial spheres have a finite power he just means that they have a determined speed. Averroes admits that he spent a long time in trying to figure out a solution to this difficult question and that this solution will appear plainly when it is considered in its original context (cf. *LC De caelo* II, c. 71).

63 Ibid. VIII, c. 78, fol. 426G–H.

64 Ibid. VIII, c. 79, fol. 426K.

65 See Ruland, *Die arabischen Fassungen*, p. 91, lines 13–15. No statement of this sort can be found in the Arabic translation of the *De providentia* (cf. Fazzo and Wiesner, Alexander of Aphrodisias, p. 134, n. 38; Hasnawi, Alexandre d'Aphrodise, p. 88, n. 48) or in his commentary to *Phys.* VIII 10 (see M. Rashed, Alexandre d'Aphrodise).

66 Averroes, *LC Phys.* VIII, c. 79, fol. 426L–M. On Averroes' reading of Avicenna's distinction, see Davidson, *The principle*, pp. 70–80, and id., *Proofs for Eternity*, pp. 321–31; cf. Belo, *Chance and Determinism*, p. 182ff.

(19) Some lines before the end of the book (*Phys.* VIII 10, 267a21–b6), Aristotle claims that only an unmoved mover is able to cause motion always and in a uniform way. He makes clear that this kind of mover does not experience change at all and that what is moved must not experience change in relation to the mover either, if its motion is to remain constant (*Phys.* VIII 10, 267a21–b6).

After commenting these lines word-by-word, Averroes concludes that the whole passage, and notably its final lines, show that in Aristotle's opinion celestial bodies are not composed of matter and form and that they are necessary 'on account of themselves' (*ex se*). Inasmuch as they are not capable of undergoing change, they are not composed and, as such, they are not necessary 'on account of something else' (*ex alio*), but of themselves. Averroes concludes that this passage proves that what Avicenna claims is not in accordance with Aristotle's doctrine.⁶⁷

3.2 Criticisms in the *Epitome* of the *Physics*

Table 2: Criticisms of Avicenna in Averroes' *Epit.* on the *Physics*

PASSAGE IN ARISTOTLE	PASSAGE IN AVERROES	DOCTRINE BY AVICENNA	CRITICISMS BY AVERROES	PASSAGE IN AVICENNA
(1*) <i>Phys.</i> II 1, 192b20–32.	<i>Epit. Phys.</i> , p. 21, line 8–p. 22, line 7.	Cf. (5) On the definition of nature.	Avicenna is right only if he meant that the metaphysician has to argue against those who deny the existence of nature, and generally speaking those who deny the existence of things that are self-evident. The metaphysician establishes the causes of <the existence> of nature.	Cf. table 1 (5).
(2*) <i>Phys.</i> II 2, 194a18–27.	<i>Epit. Phys.</i> , p. 26, lines 11–18.	Cf. (6) On the epistemological status of natural philosophy.	The metaphysician cannot prove the existence of the first matter and first mover. He examines them insofar as they are beings and establishes the kind of existence they enjoy.	Cf. table 1 (6).

⁶⁷ Averroes, *LC Phys.* VIII, c. 83, fol. 432C–D.

PASSAGE IN ARISTOTLE	PASSAGE IN AVERROES	DOCTRINE BY AVICENNA	CRITICISMS BY AVERROES	PASSAGE IN AVICENNA
(3*) <i>Phys.</i> IV 4, 211a13–14.	<i>Epit. Phys.</i> , p. 56, lines 11–16.	Cf. (10) On the place of the heavens and the category of their movement.	Avicenna says that circular motion is not in place (<i>makān</i>), but in position (<i>wad'</i>). But this is not understandable. Averroes says that if Avicenna means by his statement that the celestial sphere moves from a position to another, without changing its place, he is right. But if he means that the sphere moves just in the position, he is not right.	Cf. table 1 (10).
(4*) <i>Phys.</i> VIII 1, 250b11–23.	<i>Epit. Phys.</i> , p. 134, line 7–p. 135, line 2.	Cf. (14) On the role of <i>Phys.</i> VIII 1 in the demonstration of the eternity of motion.	Avicenna, as al-Fārābī and Ibn Bāġġa, believes that in <i>Phys.</i> VIII 1, Aristotle introduces the definition of motion in order to show that the chain of movements is eternal.	Cf. table 1 (14).

There are just four explicit criticisms in the *Epit.* of the *Physics*. Each one of them corresponds to one of the criticisms occurring in the *LC*, but they are all less thoroughly argued and relatively less harsh than those occurring in the *LC*. The first one corresponds to criticism (5), the second to criticism (6), the third to criticism (10), the last one to criticism (14).

Just as criticism (5) in the *LC*, criticism (1*) is put in correspondence to *Phys.* II 1, 192b20–32, but it is less justified. It is integrated in a digression that follows a synthetic presentation of these lines. After making clear that ‘nature’ is always an inner principle, Averroes spells out that natural sciences must also establish the existence of ‘separable movers’; he admits that some doubts arise concerning ‘intellectual soul’, since one may wonder whether in its case there is an external mover as in artificial beings.⁶⁸ He adds that the existence of real self-movers could also question the definition of nature as an inner principle. He concludes that all these doubts cannot challenge the self-evidence of the existence of nature.

68 *Id.*, *Epit. Phys.*, p. 21, lines 1–7.

At this point, Averroes summarizes the results of the research and points out his criticism against Avicenna. He stresses that Avicenna has misunderstood the Peripatetic philosophers, in claiming that the 'definition' (*ḥadd*) and the 'essence' (*māhiyya*) of nature is not evident and that the metaphysician must establish it. As in criticism (5), Averroes first admits the possibility that Avicenna is right if he meant to say that metaphysics has to rebut people who deny the existence of nature. But he finally points out that it is more plausible, as Avicenna's own words show, that he meant to argue that nature is not a self-evident principle and that metaphysics has to demonstrate its existence (*wuḡūd*). He argues that this is not possible, since the only demonstration that could establish the existence of nature is from 'posterior things' (*min al-umūr al-muta'ahḥira*) that are parts of natural science.⁶⁹

Criticism (2*) corresponds to criticism (6), but it must be noticed that it is not inserted in correspondence to *Phys.* II 2 (194a18–27), but at the end of the part of the *Epit.* devoted to chapter II 3 and chapter II 7–9⁷⁰. In the *Epit.* of book II, Averroes does not follow the order of Aristotle's text. He discusses first the chapter devoted to the causality (i.e. II 1–3; II 7–9) and afterwards the chapter devoted to chance (II 4–6). The criticism against Avicenna occurs in a digression coming after the section devoted to natural causes and before the section devoted to chance. After discussing Aristotle's doctrine of the four causes, Averroes concludes in a quite Avicennian vein that the first matter and the ultimate mover are part of 'the assumption made by the specialist of the natural science about beings'. We can thus observe that in later works Averroes strays, on this issue, from a more Avicennian position towards a more radical anti-Avicennian position.

However, immediately after this, Averroes attacks Avicenna. The issue of the criticism is almost the same of criticism (6), but the tone is less peremptory. As in criticism (1*), Averroes makes clear that Avicenna is right, if he thought that metaphysics has to 'examine matter insofar as it is a being and define the sort of being it is'. The peculiar position of this criticism and its contrast with the preceding 'philo-Avicennian' statement suggest that the criticism was inserted later.

Criticism (3*) corresponds to criticism (10) of the *LC*. Again, Averroes criticizes Avicenna's doctrine concerning the movement of the outermost sphere. As criticisms (1*) and (2*), Averroes' criticism is less supported and less violent. He admits that Avicenna is right if he means by 'movement in position' that the celestial sphere moves from a position to another. Criticism (4*) corresponds to criticism (14). As recent scholarship has shown, this criticism is part of the reworking realized during the redaction of the *LC*.⁷¹

69 Ibid., p. 21, line 8–p. 22, line 7.

70 Ibid., p. 26, line 4–p. 27, line 2.

71 See Glasner, *Averroes' Physics*.

In the partial Latin Renaissance translation of the *MC* on the *Physics* by Jacob Mantino, there are no criticisms corresponding to those of the *LC* and the *Epit.* As we shall see, the case the *MC* on *De generatione et corruptione* and *De caelo* is similar, since there is just one criticism in the Latin translation of the *MC* on the *De generatione et corruptione*, while in the *MC* on the *De caelo* the only criticisms appear in a digression added at the end of book I. The reasons for the almost complete absence of criticisms in the Middle Commentaries are not clear. One can assume that this is a consequence of the ‘literary genre’ of the paraphrases. Still, the case of the *MC* on the *Physics* is surprising, since the *Epit.* contains a substantial number of criticisms, while the *Epit.* of the other treatises do not. It could be tempting to put forward the hypothesis that, as in the case of criticism of *Phys.* VIII, the other criticisms occurring in the *Epit.* of the *Physics* are later insertions.

3.3 Conclusions

Some preliminary conclusions can be drawn from the study of the criticisms present in the treatises on the *Physics*. From a doctrinal point of view, of the 23 criticisms present in them, nine deal with the epistemological nature of natural philosophy (2–7; 15; 1*–2*); six concern the foundations of hylomorphism (1, 9 on prime matter; 16–19 on the ontological constitution of celestial bodies); four pertain to the place and movement of the last celestial sphere (10–11, 13, 3*); two concern the interpretation of *Phys.* VIII 1 (14, 4*); one concerns more generally the relation between natural movement and the moved body (12) and one deals with chance (8). From a methodological point of view, we can single out nine general features proper to Averroes’ attitude: (I) all explicit mentions of Avicenna are polemical; (II) the great majority of the criticisms are connected with difficult or ambiguous statements in Aristotle’s text (1, 2–3, 4, 6–8, 10, 14–15, 18); (III) a large number of them are put in a quite separate and more or less long digression after the exegesis of Aristotle’s text (1, 2–3, 5–6, 10, 11, 14, 16–18, 1*, 2*, 4*); (IV) in seven places, Aristotle’s statement is presented as the object of a preceding debate among the Peripatetics (8–11, 14, 17–18); (V) Averroes informs the reader five times that the debate was still active among his contemporaries (at 9 he mentions his ‘associates’, at 10, 14 and 4* Ibn Bāḡḡa, at 17 ‘modern philosophers’); (VI) on five occasions Averroes traces back the origin of Avicenna’s mistake to someone else’s position (in 5 to Plato; in 6 to the *mutakallimūn*; in 11 and 18 to Alexander, in 14 to al-Fārābī); (VII) on one occasion Avicenna’s position is also attributed to al-Ġazālī (15); (VIII) in five criticisms Averroes admits the possibility that Avicenna’s statement was not mistaken (5, 13, 1*, 2*, 3*), even if in its most natural interpretation it is absolutely wrong. (IX) Finally, the criticisms in the *LC* with respect to those in the *Epit.* are incomparably more numerous and more vehement than those in the *Epit.*

4 Averroes' Commentaries on the *De caelo*

As in the case of the *Physics*, all three commentaries by Averroes on Aristotle's *De caelo* are extant. The *Epit.* is preserved in the original Arabic and in the Hebrew translation.⁷² The *MC* is preserved in the three languages.⁷³ As to the *LC*, it is only partially preserved in the original Arabic⁷⁴ and entirely preserved in the medieval Arabic-Latin translation by Michael Scotus.⁷⁵

4.1 Criticisms in the *Long Commentary* on the *De caelo*

Table 3: Criticisms of Avicenna in Averroes' *LC* on the *De caelo*

PASSAGE IN ARISTOTLE	PASSAGE IN AVERROES	DOCTRINE BY AVICENNA	CRITICISMS BY AVERROES	PASSAGE IN AVICENNA
(1) <i>De caelo</i> I 2, 269a32–b2.	<i>LC De caelo</i> I, c. 14, lines 41–52.	Avicenna denies that circular motion, being accidental to elemental bodies, is the natural motion of some other body.	Aristotle's statement is true if we assume that 'accidental' means 'opposite to the essence'.	<i>Samā'</i> <i>wa-ālam</i> , pp. 13–15.
(2) <i>De caelo</i> II 6, 288b6–22.	<i>LC De caelo</i> II, c. 37, line 80 (cf. <i>Epit. Met.</i> tr. 4; <i>De sub. orb.</i> ch. 1).	Avicenna believes that celestial bodies have imagination (<i>fantasia</i>).	If celestial bodies have imagination, they should have senses for the sake of their health; therefore something accidental could happen to them.	<i>Ilāhiyyāt</i> IX, 2, pp. 386–7. <i>Naḥs</i> , IV, 2; <i>Naḡāt</i> , p. 580, line 14–p. 581, line 4.

72 See Averroes, *Risālat al-Samā' wa-l-ālam*.

73 The Arabic original has been edited by Ğ. 'Alawī (see Averroes, *Talḥiṣ al-Samā' wa-l-ālam*). The Hebrew translation is still unedited. The Hebrew-Latin Renaissance translation by Paolo Ricci has been published in the Giunta edition.

74 Parts of the commentary on book I and II (on I, 7–12, cc. 61–140 and on II, 1–7, cc. 1–42) are preserved in the Tunis manuscript and published by G. Endress in Averroes, *Commentary on Aristotle's Book on the Heaven*.

75 I will refer to Carmody's edition in Averroes, *Commentum magnum super libro De caelo*.

PASSAGE IN ARISTOTLE	PASSAGE IN AVERROES	DOCTRINE BY AVICENNA	CRITICISMS BY AVERROES	PASSAGE IN AVICENNA
(3) <i>De caelo</i> II 7, 289a19–21.	<i>LC De caelo</i> II, c. 42, line 222.	Avicenna states that celestial bodies produce not only heat but also cold in the sublunar world.	What Avicenna says is false and without any basis (<i>hoc est remotum et extra fundamentum</i>). It is true only by analogy (<i>per comparationem</i>).	<i>Nağāt</i> , p. 303.
(4) <i>De caelo</i> II 8, 290a25–9.	<i>LC De caelo</i> II, c. 49, line 61.	The stars are the same in genus, but different in species, according to the difference of the parts of their movement and the difference of their center.	If the stars were the same in genus, they would be a composite of a different matter and a different form. But if it were the case, they would be generated by a pre-existent body. But that is impossible.	<i>Ilāhiyyāt</i> IX, 4, p. 407, line 7 (cf. <i>Nağāt</i> , p. 657, line 7).
(5) <i>De caelo</i> II 12, 293a10–14.	<i>LC De caelo</i> II, c. 71, line 27.	Avicenna states that every body capable of acting and being affected has a finite power and that its operation is made eternal by an <in>finite power.	If Avicenna is right, it could happen that something which is potentially corruptible will never be corrupted. Avicenna follows Alexander's reading.	Cf. table 1 (18).
(6) <i>De caelo</i> III 2, 300a20–27.	<i>LC De caelo</i> III, c. 18, line 21.	Avicenna refuses to admit that we can infer necessarily that a movement that belongs by constraint to a simple body belongs to another by nature. Cf. (1)	Avicenna's denial is false.	Cf. (1).

PASSAGE IN ARISTOTLE	PASSAGE IN AVERROES	DOCTRINE BY AVICENNA	CRITICISMS BY AVERROES	PASSAGE IN AVICENNA
(7) <i>De caelo</i> III 8, 306b19–22.	<i>LC De caelo</i> III, c. 67, line 115.	Avicenna states that it is not the forms of the elements that are mixed in the compound body, but their qualities.	Avicenna has fallen into such errors because of his scanty experience in natural science and his high opinion of himself.	<i>Kawn wa-fasād</i> , pp. 126–39.

(1) On the nature of elemental circular motion

In *De caelo* I 2–4, Aristotle aims ultimately at showing that the body that constitutes the superlunar world is a fifth simple body which is different by its very nature from the four simple sublunar bodies. In *De caelo* I 2 (269a32–b2), he argues that the celestial body is the only body that moves by nature circularly. The argument is based on two premises: 1) each movement necessarily belongs ‘by nature’ (κατὰ φύσιν) to a body and ‘contrary to nature’ or ‘unnaturally’ (παρὰ φύσιν) to another; 2) circular movement is ‘unnatural’ to the four sublunar elements. Aristotle infers from these two premises that circular motion must belong by nature to a certain body other than those who move by nature in a rectilinear way.

The second premise, though, is problematic, since it seems in conflict with what Aristotle has previously stated. As a consequence, the entire argument seems compromised. In I 2, 269a9–18, in order to demonstrate that none of the four sublunar bodies can move in a circle, not even against its nature, Aristotle claims that circular motion cannot be ‘unnatural’ to any of the four sublunar bodies, since for each one of them it is the rectilinear movement in the opposite direction that is ‘contrary to their nature’, i.e. for fire and air the movement downward; for earth and water the movement upward. Therefore, since one single thing can only possess one single contrary, Aristotle should be forced to admit that none of the sublunar elements could have the circular motion as its ‘unnatural’ movement.

Modern scholars have stressed the difficulty and made an effort to show that Aristotle does not really contradict himself.⁷⁶ The tension between the two

76 By following Simplicius' solution (*In De caelo*, p. 51, line 28–p. 52, line 13), W.K.C. Guthrie suggests that παρὰ φύσιν here does not possess the force of ‘contrary to the natural’, but only of ‘not according to the nature of the sublunary elements’ (see Aristotle, *On the Heavens*, p. 17; cf. Gigon, *Aristoteles-Studien*, p. 128, and Düring, *Aristoteles*, p. 354).

arguments had already been noticed by ancient commentators⁷⁷ In his *Contra Aristotelem*, Philoponus attempted to show that it is not impossible that bodies of the same nature move with different movements and that one single body can have more than one natural movement.⁷⁸ In following this strategy, Philoponus tried to conclude that we have no need to postulate the existence of a fifth simple body as an incorruptible principle of the heavens, since fire—which moves by its very nature in a circle *and* in a straight line—can constitute them.⁷⁹

In the Arabic-Latin translation of these lines, Aristotle's argument is not exactly the same. Actually, the couple 'by nature/contrary to nature' is replaced by the couple 'natural (*naturalis/tabī'iyya*)/accidental' (*accidentalis/arāḍiyya*).⁸⁰ According to the Arabic *De caelo*, therefore, Aristotle does not state that the circular motion is 'unnatural' to the four sublunar elements, but that it is 'accidental' for them. In this sense, the argument concludes that circular motion, being accidental to sublunar simple bodies, is the natural motion of some other body, i.e. the celestial one.

In commenting these lines, Averroes first affirms that Aristotle's conclusion is obtained through an argument *a loco digniore*. The argument is the following: if it is not the case that a movement which is accidental for one body must be natural for another, all movements would be accidental and not natural; but that it is impossible, since what is natural precedes what is accidental.⁸¹ Immediately afterwards, Averroes informs us that Avicenna denies Aristotle's statement and refuses to admit it.⁸²

Averroes' criticism is quite obscure and it is difficult to understand what Avicenna denies and what Averroes objects to. First Averroes seems to clarify that, according to Avicenna, 'by accident' here is a synonym of 'contrary to nature'. He also attributes to Avicenna the opinion that, if we do not understand 'contrary to nature' as a synonym of 'by accident', it happens that one single thing possesses more than one contrary. According to Averroes' reconstruction, thus, Avicenna shares Philoponus' objection that if one admits that circular motion is unnatural to the sublunar simple bodies, one has to conclude that a

77 According to Simplicius (*In De caelo*, p. 50, lines 18ff.), Alexander has already discussed the difficulty.

78 For Philoponus' objections to this argument, see Simplicius, *In De caelo*, p. 56, line 27–p. 57, line 8 (Wildberg fr. 33); p. 58, lines 1–10 (Wildberg fr. 34), and p. 58, lines 14–22 (Wildberg fr. 35).

79 On Philoponus' rejection of Aristotle's theory of aether, see Wildberg, *John Philoponus' Criticism*.

80 Averroes, *LC De caelo* I, c. 14, p. 25, line 1–p. 26, line 8. The shift from 'unnatural' to 'accidental' is also attested in Averroes' *MC* on *De caelo* I 2.

81 *Id.*, *LC De caelo* I, c. 14, p. 27, lines 27–40.

82 *Ibid.* I, c. 14, p. 27, line 41: 'Et Avicenna renuit hanc propositionem et dixit quod noluit ipsam concedere'.

single thing has more than one contrary. Thus, it becomes clear that according to Averroes Avicenna does not deny that 'what is natural precedes what is accidental', but that he denies the necessary inference implying that what is accidental to one simple body must be natural to another one.

Then, Averroes explains that Avicenna 'patently' (*confesse*) concedes that the circular motion belongs by accident to sublunar bodies. For it is universally admitted that fire and air move in a circle by accident. However, Averroes concludes that in admitting this proposition, the difficulty raised by Philoponus is still valid.⁸³

Such a reconstruction of Averroes' criticism seems to be confirmed by a passage of the *De caelo* of the *Šifā'*, in which Avicenna takes into account Aristotle's argument of *De caelo* I 2 (269a32–b2). Here, Avicenna states that the inference according to which a motion, being unnatural to a body, is the natural motion of some other body is something that 'has not yet been demonstrated' and that is 'not necessary'.⁸⁴ He discusses in the same lines a possible objection of someone who could infer from Aristotle's statement that two elements should have the same nature if they have the same movement.⁸⁵ Afterwards, he points out that the converse of Aristotle's statement is false, since it is not true that the movement that belongs by nature to a body belongs to another by accident.

In replying to Avicenna's doubt, Averroes assumes that this argument by Aristotle must be considered as a dialectical proof (*demonstratio secundum confessionem adversarii*) and suggests that in this context 'by accident' does not mean 'opposite to essential', as Avicenna thinks, but something more general. Then he concludes that there is no difficulty in admitting that a movement is essential for one thing, but non-essential, i.e. 'accidental', to more than one, e.g. fire and air. For the same reason, he assures the reader that Aristotle's argument is a valid one, even if it is not an absolute demonstration, but an *a fortiori* argument. In Averroes' reconstruction, thus, one must admit that circular motion necessarily belongs to a body, i.e. the celestial one, since it belongs accidentally to another, i.e. fire or air. For, if something is accidental for one thing, it must *a fortiori* belong 'essentially' to another thing, since the existence of what is posterior necessarily implies the existence of what is prior.

(2) On the existence of imagination in celestial bodies

In *De caelo* II 6, 288b6–22, Aristotle states that the movement of celestial bodies cannot be irregular (ἀνώμαλος), that means faster or slower. For retarda-

83 Ibid. I, c. 14, p. 27, lines 41–52.

84 Cf. Avicenna, *Samā' wa-ʿālam* II, p. 13ff.

85 On the identification of this anonymous opponent, see Cerami, *The De Caelo et Mundo of Avicenna's Kitāb al-Šifā'*.

tion is always due to incapacity (ἀδυναμία), and incapacity is unnatural (παρὰ φύσιν). In order to confirm this statement, Aristotle points out that in animals incapacities are always unnatural. Age, decay, and the like, are all unnatural, due to the fact that the whole animal is made up of materials which differ with respect to their proper places and do not occupy their own places. But, as it has been demonstrated in *De caelo* I 2–3, primary bodies (ἐν τοῖς πρώτοις) in their proper place contain nothing unnatural, being simple and unmixed and having no contrary. Therefore, concludes Aristotle, there is no place in celestial bodies for incapacity, nor for retardation or acceleration of their movement (since acceleration involves retardation).

At the end of this passage, Averroes considers a possible doubt concerning the perfect regularity of celestial movement. One may assume that the retardation and acceleration of the movement of the celestial bodies are possible, but not due to their incapacity. They could be caused by their intellectual imagination and for the sake of the sublunar living beings. As in the case of an artisan (*artifex*), whose creation is sometimes slower sometimes faster intentionally, one may argue that the acceleration and the retardation of the movement of celestial beings are due to their intellectual activities and their concern (*sollicitudo*) for sublunar beings.⁸⁶

To this doubt Averroes answers that this would be possible if imagination in celestial bodies was sometimes in actuality and sometimes in potency. However, this is not the case, since celestial imagination is always in act. At this point, Averroes attacks Avicenna and makes clear that this is the reason of his mistake (*et in hoc erravit Avicenna*). In assuming that celestial bodies have *fantasia*, Avicenna was compelled to assume that they have sensory faculties and therefore to conclude that accidents (*occasiones*) can occur to them, since sensory faculties exist for the sake of health (*propter salutem*).

(3) On the nature of the heat coming from celestial spheres

At the end of *De caelo* II 7, Aristotle aims at explaining the nature of the warmth proceeding from the stars and notably from the sun. He states first that warmth and light, which proceed from them, are caused by the friction set up in the air by the motion of the spheres along which the stars move. He makes clear that as movement tends to create fire in wood, stone, and iron, the movement of the sphere of the revolving body produces heat in the air underneath, and particularly in the part which the sun is attached to (*De caelo* II 7, 289a19–21).

At the beginning of the commentary on these lines, Averroes points out that this question raises a considerable doubt (*non modicam dubitationem*), notably because one could infer that the stars are constituted of fire, assuming that each

⁸⁶ Averroes, *LC De caelo* II, c. 37, p. 339, lines 70–76.

source of light and heat is necessarily fiery. Averroes makes clear that even if one agrees with Aristotle that the heat proceeding from the heavens is produced by the mutual friction of the parts of the air, set up by the motion of the sun and the stars⁸⁷, the difficulty is not solved. As a matter of fact, the sun and the stars touch neither the air nor the fire that is beneath the last celestial sphere, i.e. the sphere of the moon.⁸⁸

Afterwards, Averroes mentions Themistius' report of Alexander's solution to this last difficulty. Themistius relates that Alexander considered the case of the torpedo fish as being analogous to the case of the celestial heat. More precisely, he tells us that according to Alexander the celestial bodies between the sun and the concavity of the moon are as the fishing net in which the torpedo has been caught: while the hand of the fisher is made numb by the torpedo in the net, the net itself is not affected by the action of the fish.⁸⁹ This example—retorts Themistius—does not fit well the case of the celestial bodies, which contrary to the net are affected in no way by the torpedo.

Averroes then gives his own solution of the difficulty. He makes clear that the production of the heat in the air must be considered as the effect of one single agent, i.e. the heavens (*totus orbis*), whose parts, i.e. the sun and the stars, differ in producing motion and heat in the air according to their density and rarity.⁹⁰ Averroes compares the heavens to an animal and clarifies that the first, as every living being, acts in virtue of its entire capacity (*tota potentia*), but that 'this capacity is divided according to the division of the body'. For this reason, there is no absurdity in the idea that one part of the heavens, i.e. the sun and the stars, might produce an effect on something else without producing the same effect on its own parts. The moon, one should conclude according to Averroes, and the celestial bodies between the sun and the sublunar world, are not like the net of the fisher, but like one part of the torpedo.⁹¹ Therefore, concludes Averroes, we must state that movement generates heat, even if it generates it by accident (*accidentaliter*).

In the last part of this commentary, Averroes strives to explain that light proceeding from the sun is not a fiery body, even if it produces heat in the sublunar bodies. He makes clear that the case of light is in a sense similar to the case of movement. The production of the heat is not due to the light *per se*, but

87 Ibid. II, c. 42, p. 349, lines 33–5: 'causa calefactionis aeris a sole et stellis est confricatio partium aeris adinvicem propter motum solis et stellarum'.

88 Ibid. II, c. 42, p. 349, lines 36–7.

89 Ibid. II, c. 42, p. 349, line 38–p. 350, line 47.

90 Ibid. II, c. 42, p. 350, lines 54–7. On the idea that the celestial bodies have a greater concentration of power in some parts than in others, see Cerami, *Génération et substance*, pp. 468–73.

91 On the example of torpedo in Greek tradition, see Cordonier, *De la transmission*, pp. 35–69.

to the angles of its rays.⁹² This fact—Averroes points out—does not rule out the possibility that celestial bodies, as far as they are natural bodies, share with sublunar bodies the property of being bright or dark. The fact that celestial bodies and sublunar bodies share this property allows us to state that the nature of the moon is analogous to that of the earth with respect to darkness.⁹³

For this same reason, ancient people believed that some celestial bodies, as moon and Saturn, produce cold in the sublunar world, just as others produce heat. But this is not true, since the celestial bodies do not produce cold, but a heat similar to each element. At this point, Averroes attacks Avicenna, blaming him for having stated that celestial bodies produce cold and heat. This is incongruous and unwarranted (*hoc est remotum et extra fundamentum*), unless one speaks by analogy (*secundum comparationem*).⁹⁴

The idea that celestial bodies produce cold in the sublunary world could be gathered from a passage of the physical section of Avicenna's *Nağāt* devoted to the demonstration that a coldness (*burūda*) and a warmth (*harāra*) different from the corresponding sublunary elementary qualities emanate from heavenly bodies or, more precisely, from the 'powers of the spheres' (*al-quwā l-falakīyya*).⁹⁵ Here, Avicenna affirms explicitly that 'celestial cold' as 'celestial warmth' is cold only by homonymy and takes as evidence the cooling effect of opium. As far as I know, this is the only explicit passage in which Avicenna talks about 'celestial cold'. This criticism, therefore, is a particular important one, since it provides evidence that Averroes was acquainted with the *Nağāt*.⁹⁶

(4) On the plurality of the stars and the nature of celestial body

After having shown that the stars, inasmuch as they are spherical, can have only two movements, either rolling or spinning, and having then demonstrated that they cannot spin, Aristotle makes clear in *De caelo* II 8, 290a25–9 that they do not roll. For rolling, as he makes clear, involves rotation. The moon is a case in point. We can gather from the fact that its 'face' is always seen, the fact that it does not rotate. Immediately afterwards, Aristotle extends this consideration to the other stars and concludes that none of them has a movement of its own.

92 For a more detailed explanation of this doctrine, see Freudenthal, *The Medieval Astrologization*, pp. 111–37. Cf. also below p. 222.

93 Averroes, *LC De caelo* II, c. 42, p. 355, lines 198–215.

94 *Ibid.* II, c. 42, p. 356, lines 216–24.

95 Avicenna, *Nağāt*, pp. 303–4.

96 A mention of the *Nağāt*, preceded by a reference to the *Šifā'*, can also be found in Averroes' *al-Qawl fī l-muqaddima al-wuğūdiyya aw al-muṭlaqa*, p. 33, lines 1–2 (ed. Dunlop); fol. 80B–C (Giunta 1562 edition). Cf. the English translation by Rescher, pp. 103–4: 'That is what he says in the *Kitāb al-shifā'*. As to [what he says] in the *Kitāb al-nağāt* ...' I owe this reference to Amos Bertolacci.

At the very beginning of the commentary on these lines, Averroes tells us that the question of the proper movement of the planets was very much debated. He points out that one of the several difficulties linked to this issue was the question pertaining to the different phases of the moon. After mentioning the different possible explanations of this phenomenon, among his predecessors and contemporaries, Averroes concludes that according to the only viable hypothesis the attribution to the moon of any kind of a movement of its own must be denied.⁹⁷

Then, Averroes goes on to explain the general conclusion of Aristotle's argument. He points out that the case of the moon is not a mere example. For, if this were the case, Aristotle's argument would not be a real demonstration. On the contrary, what is true for the moon is true for all other stars, since all stars must be considered as members of the same species and not of different species in one single genus. At this point, Averroes mentions and criticizes Avicenna's doctrine. Avicenna assumes that each celestial body belongs to a different species, according to its rotation and its center, but that they all belong to the same genus. But this assumption compelled him to infer that they are constituted of a matter and a form with the result that they are generated and corruptible. As a consequence, one must admit that they were generated from a body prior to them, which is absurd.⁹⁸

(5) On the power causing the celestial movement

In *De caelo* II 12, Aristotle tries to solve two possible difficulties that may be raised concerning the number of the stars attached to the different spheres. First (291b28–31), one may wonder why we find the greatest number of movements in the intermediate bodies, and not, rather, 'in each successive body a variety of movement proportionate to its distance from the primary motion'. Second (292a10–14), one may ask why is it that the first sphere, i.e. the one containing all the others, carries the largest number of fixed stars, while in the case of the others, none of them has more than one star?

Averroes' critique against Avicenna is inserted after the solution of the second *aporia*. It must be noticed, though, that the Arabic translation of the corresponding passage is completely different from the Greek original. In the Greek text, Aristotle ends the last possible solution of the second difficulty by stating that 'the force of any limited body is only adequate to moving a limited body'. In the Arabic translation, this sentence is part of a larger argument, which supports the idea that the spheres other than the first one cannot

97 Averroes, *LC De caelo* II, c. 49, p. 367, line 21–p. 368, line 49.

98 Ibid. II, c. 49, p. 369, lines 59–68.

carry more than one star.⁹⁹ According to the Arabic text, Aristotle's argument would be built on two premises: i) that the last sphere moves the other spheres (*revolvit*) and ii) that each finite body has a finite capacity. If one admits these premises and concedes the hypothesis that each internal sphere carries several stars, one must conclude that the first sphere is in pain (*in aliquo labore*).

In commenting this argument, Averroes raises an additional difficulty. He points out that one may ask how is it possible that the movement of the entire cosmos is eternal if this movement—as Aristotle's text suggests—is the effect of the movement of the first sphere on the others, and as such the effect of a chain of bodies moving each other (*ad invicem*). It is in this context that Averroes attacks Avicenna. Against Avicenna and Alexander, Averroes states that it is wrong to assume as an answer to this difficulty that while the capacity of a finite body is finite, its operation is made eternal by an infinite capacity. If this were the case, one would be forced to admit the existence of a possibility that will never be realized, since the celestial body has a capacity for corruption that is never realized.¹⁰⁰ As we will shortly see, the same criticism is addressed to Avicenna in the *MC*.

Immediately afterwards, Averroes informs us that Philoponus was the first who raised this objection against the Peripatetics. Philoponus retorts against Aristotle that if the first celestial sphere has a finite capacity, but moves eternally in virtue of another infinite capacity, one must assume that this body has at the same time a finite capacity and an infinite one. In fact, while it is corruptible according to the finite capacity, it would be incorruptible according to the infinite one.¹⁰¹

In this case too, Avicenna's view is not considered by Averroes as an objection to Aristotle's argument, but as a reading of Aristotle's doctrine that cannot answer the objections of his adversaries and that, what is worst, exposes Aristotle's doctrine to the attacks of its critics. Moreover, it is noteworthy that after having identified Philoponus as the source of the objection, Averroes offers his own solution of the difficulty. Thus, in this case too, Avicenna's criticism is integrated in a sort of digression in which Averroes first presents the debate that took place before him and then gives his own reading, in order to solve this debate. The same order, as we shall see, structures the criticisms against Avicenna in the *MC*.

(6) On the movement of simple sublunar bodies

At the beginning of III 2 (300a20–29), Aristotle states that the existence of a natural movement for each simple body must be inferred from the existence of

⁹⁹ Ibid. II, c. 71, lines 1–6. Cf. id., *Samā' wa-'ālam*, p. 276, lines 5–7.

¹⁰⁰ Averroes, *LC De caelo* II, c. 71, p. 408, lines 24–9.

¹⁰¹ Ibid. II, c. 71, p. 408, lines 29–34.

a movement 'by constraint' (βία). He makes clear that 'by constraint' means 'unnatural' (παρὰ φύσιν) and claims that bodies can only move either by constraint or 'by nature' (κατὰ φύσιν). He considers the movement of bodies to be something manifest (κινούμενα φαίνεται) and infers that if a body moves 'by constraint', that is 'against nature', it also has to move 'by nature', since the privation of nature implies the existence of nature. The argument therefore is threatened by the same objections as those of *De caelo* I 2 previously mentioned.

In commenting on these lines, Averroes briefly attacks Avicenna, blaming him for having denied the necessity of the implication 'contrary to nature (for one element), ergo by nature (for another one)'. As in criticism (1), therefore, the topic at stake is the possibility of demonstrating that each simple body has only one natural movement. As in criticism (1), furthermore, we must assume that Averroes' target is Avicenna's idea that we cannot necessarily infer that one single natural movement belongs to a simple body from the fact that it belongs by accident or by constraint to another simple body (and that the target is not, strictly speaking, the denial of the contention that what is by nature is prior to what is by constraint). Avicenna's refusal—Averroes concludes—is absurd (*abnegatio Avicenne in ista nulla est*).¹⁰²

It must also be noticed that here too the Arabic translation diverges from the Greek text. While the παρὰ φύσιν in lines 23–5 is correctly translated as 'against nature' (*extra naturam*), the last occurrence of the expression in line 26 is translated by the expression *accidentales*. Moreover, in lines 22–3 the Arabic translator renders the expression 'proper movement' (οἰκείαν κίνησιν) by translating it as *essentialiter*. These lines prompt Averroes to make a precision that goes in the same direction as his comments on the argument of *De caelo* I 2 (269a32–b2). Accordingly, Averroes suggests that this argument is addressed to an opponent of Aristotle's assertion of the one-to-one implication of natural movement and the nature of simple bodies:¹⁰³ in this dialectical context, Aristotle takes 'contrary to nature' to be synonymous with 'accidental', Averroes explains.¹⁰⁴

(7) On the ontological status of the forms of the elements in the mixed body

In *De caelo* III 8 (306b19–22), Aristotle aims at refuting the Platonic doctrine stating that each element has a proper shape. He states that this theory is unsound (ἄλογον) and contradicted by 'nature' (ἡ φύσις). Against it, he argues that just as in other cases the substrate must be formless (ἄειδές) and unshaped

102 Ibid. III, c. 18, p. 519, lines 17–21.

103 Ibid. III, c. 18, p. 519, line 27–p. 520, line 31.

104 Ibid. III, c. 18, p. 520, lines 34–42.

(ἄμορφον) and that elements should be conceived as matter for composite things. He concludes that for this reason all elements can put off their qualitative distinctions and pass into one another.

At the end of Averroes' commentary on these lines, we find two digressions devoted to the nature of the substantial forms of the elements. The Latin text states first that it is necessary to ask why one denies—lit. why 'you do not admit' (*non ponitis*)—that the four elements have a proper shape, while admitting that they have a specific substantial form, whereas Aristotle affirms that as matter they should be unshaped *and* formless. The answer, like the question, is given in the second person plural—i.e. 'you have already said' (*iam dixistis*)—and it states that the four elements can have a proper substantial form, since they are the substrate of certain forms, but not of all forms indifferently.¹⁰⁵

Then, Averroes points out that we must also ask why the substantial forms of the elements do not remain in actuality when they mix together in a more complex body, while admitting—again in the plural (i.e. *cum iam posuistis*)—that there is no matter proper to certain forms, except in virtue of their forms.¹⁰⁶ The answer to this question is much more articulated and is given in the first plural person (*dicamus*). If the forms of the elements, Averroes claims, remain in actuality once the new form has come to be, the new being should not be different according to its substance, but only according to accidental properties. In order to explain the process of mixing, Averroes makes clear that the substantial forms of the four elements have a peculiar ontological status, since they are diminished (*diminute*), in comparison to the perfect substantial forms of the more complex bodies. In fact, their being is 'halfway' between substantial forms and accidents. For this reason it is not impossible that their forms undergo a process of mixture and remain in the mixture, just as black and white, once mixed, remain in the mixed color, provided that they remain in a diminished form.¹⁰⁷

At the end of his own explanation, Averroes criticizes Avicenna's doctrine of mixture. Since Avicenna does not admit that the substantial forms can have graduation—Averroes admonishes—he believes that it is not the forms of the elements that are mixed, but their qualities. This, however, according to Averroes, entails as an absurd consequence that the forms of the elements remain in actuality in the new being, so that this new composite possesses not one but many substantial forms. After this first criticism, Averroes pursues his digression in which he strives to account for the unity of the composite mixed body. Once again, he makes clear that it is impossible for the forms of the elements to

¹⁰⁵ Ibid. III, c. 67, p. 634, lines 83–96.

¹⁰⁶ Ibid. III, c. 67, p. 634, lines 96–9.

¹⁰⁷ For a detailed analysis of this passage, see Cordonier, *Le mélange chez Averroès*, pp. 361–76.

remain in actuality and concludes that Avicenna fell into error due to his lack of experience and the high opinion he had of his intelligence .¹⁰⁸

An Arabic version of the same criticism has been recently discovered by M. Aouad and T. Morel in the margins of a sixteenth-century Turkish manuscript (MS İstanbul, Süleymaniye Kütüphanesi, Damad İbrahim Paşa 779).¹⁰⁹ The two scholars identified the gloss as an excerpt of the *LC* on this same passage. The gloss contains the same violent attack on Avicenna and the same solution as the Latin version, but in a more synthetic way.

4.2 Criticisms in the *Middle Commentary* on the *De caelo*

Table 4: Criticisms of Avicenna in Averroes' *MC* on the *De caelo*

DOCTRINE BY ARISTOTLE	PASSAGE IN AVERROES	DOCTRINE BY AVICENNA	CRITICISMS BY AVERROES	PASSAGE IN AVICENNA
(1*) In a digression at the end of <i>De caelo</i> I, referring to <i>De caelo</i> I 12 and <i>De caelo</i> II 12, 293a4–10.	<i>MC De caelo</i> , p. 178, lines 5–12 (cf. <i>De sub. orb.</i> , pp. 105–10).	Celestial spheres have a finite capacity in the sense that they have a potency for corruption. They are possible by themselves and necessary through another.	Avicenna follows Alexander of Aphrodisias.	Cf. table 1 (18 and 19).

108 Averroes, *LC De caelo* III, c. 67, p. 635, lines 137–9: 'paucitas vero exercitationis istius viri in naturalibus et bona confidentia in proprio ingenio induxit ipsum ad istos errores'.

109 Morel and Aouad, Un fragment retrouvé, pp. 195–206.

DOCTRINE BY ARISTOTLE	PASSAGE IN AVERROES	DOCTRINE BY AVICENNA	CRITICISMS BY AVERROES	PASSAGE IN AVICENNA
(2*) Cf. (1*).	<i>MC De caelo</i> , p. 181, lines 17–22.	Celestial bodies are composite of matter and form.	If this were the case, the <i>aporia</i> would apply and we would have to admit that something which is potentially corruptible will never be corrupted. Avicenna, just as Philoponus, misunderstood the demonstration in the first book of the <i>Physics</i> .	Cf. table 1 (17).
(3*) Cf. (1*).	<i>MC De caelo</i> , p. 183, lines 11–16.	Celestial bodies are composite of matter and form.	It is not surprising that Avicenna erred, but that Alexander did. Actually, there is no conflict between the commentators, since Themistius and al-Fārābī admitted that the celestial body does not possess a subject.	Cf. (2*).

There are only three explicit criticisms addressed to Avicenna in the *MC* on the *De caelo*. All of them concern the question of the ontological nature of the celestial bodies, i.e. the heavenly spheres, and the ontological nature of their moving force. All criticisms are incorporated in a quite autonomous *quaestio* (*mas'ala*)¹¹⁰, which does not seem to constitute an original part of the *MC*.

¹¹⁰ On this *quaestio*, see Endress, Averroes' *De caelo*.

The *quaestio* opens with the statement that there is a challenging *aporia* (šakk kabīr) rising from two statements in Aristotle's doctrine: i) the 'already proved' statement that there cannot be something eternal which is potentially corruptible (*mumkin yafsudu*) and which possesses a corresponding capacity (*quwwa*) for corruption;¹¹¹ ii) the also already proved statement that the capacity of a body (either moving in a rectilinear way or in a circle) is finite, since their size (*qadr*) is finite.¹¹² From these two statements, one could infer that since the celestial body has a finite capacity, inasmuch as its size (*qadr*) is finite, it is also potentially corruptible in itself and incorruptible in virtue of an infinite capacity which is not in matter and which is its mover.¹¹³

(1*) Averroes remarks that this is what Alexander of Aphrodisias made clear in some of his treatises (*fī ba'ḍ maqālātihī*)¹¹⁴: the celestial bodies have in virtue of themselves a finite capacity that an infinite capacity can eternally drag out. Averroes also asserts that Avicenna followed Alexander on this issue by drawing his distinction between an 'existent necessary in virtue of itself' and an 'existent which is possible in virtue of itself, but necessary in virtue of another'. He warns that one could believe (*yuzannu*) that this is in accord with what Aristotle states in the second book of the *De caelo* and he quotes the Greco-Arabic translation of *De caelo* II 12 (293a4–8), which claims that all finite body has a finite capacity.¹¹⁵ From this, Averroes claims, one could infer that the spheres, as eternal bodily beings, possess a capacity for corruption, since their capacity is finite. Aristotle denies this. Immediately afterwards, Averroes notes that John Philoponus was already aware of this *aporia* and that he gathered from this that the universe is generated.

After presenting the *status quaestionis*, Averroes puts forward his own solution, which consists in first distinguishing two senses of 'finite' that can be applied to a moving body—a) according to the strength and to the velocity of its movement and b) according to the duration of its movement—, and then in admitting that celestial spheres, like all bodies, are finite in the first sense, but not in the second. Accordingly, we are not forced to admit that the celestial bodies possess a capacity for corruption, since their movements are continuous and infinite according to the second sense, i.e. their duration. Hence, we can admit with *De caelo* I 9 that celestial bodies have a finite capacity and with *De*

111 Averroes states that this statement has already been proved 'here', which means in the *De caelo*. The more direct reference is to *De caelo* I 12.

112 Averroes clarifies that this statement is demonstrated in 'this book' of Aristotle (*hādihī l-maqāla*), which can include *De caelo* I 9, but also, as we shall see, II 12.

113 Averroes, *MC De caelo*, p. 177, line 1–p. 178, line 4.

114 See above n. 65.

115 On the differences between the Greek text and the Arabic translation, see above pp. 199–200.

caelo II 12 that celestial spheres, other than the outermost one, cannot carry more than one star, for their strength and their velocity are finite.

(2*) Afterwards, in order to account for the infinite duration of the celestial movement, Averroes declares that a moving force not bound up with the finite moved body is needed. This separate force cannot be a substantial form for the celestial body, whose subsistence (*qiwām*) relies on its inhering in matter. For this kind of form is finite in the two senses. Thus it must be argued that celestial bodies are simple bodies and not composite of a matter informed by a substantial form. Instead, they consist of a self-subsistent matter and a separate form (*ṣūra muḫāriqa*), which acts as an unmoved mover.¹¹⁶ On this point too—Averroes insists—Avicenna errs, since he claims that celestial bodies are composite of matter and form. If this were the case, Averroes retorts, the mentioned *aporia* would apply and we would have to believe that an eternal thing has a possibility for being destroyed without actually being destroyed. But this, again, is false, as already demonstrated in *De caelo* I 12.¹¹⁷

After recalling that the necessity of an immaterial moving force has already been demonstrated in *Phys.* VIII, Averroes brings to light the causes of Avicenna's mistake. He claims that all the people who believe that celestial bodies are composed of matter and form have been misled by two texts in Aristotle's *corpus*: *Phys.* I and *De caelo* I 3. First of all, they wrongly judged that the demonstration of *Phys.* I is common (*'āmm*) to all bodies, whereas it only concerns bodies subject to generation and corruption. In fact, only generation and corruption imply the existence of matter.¹¹⁸ Moreover, they mistakenly believe that the claim demonstrated in *De caelo* I 3 that the celestial body is neither heavy nor light necessarily implies that there is *in* the celestial body a form subsisting in a matter.¹¹⁹ Averroes makes clear that these two misleading readings of Aristotle's text led Avicenna and others to believe that celestial bodies are composed of matter and form. In accepting this assumption, Avicenna was also necessarily forced to admit that celestial bodies are eternal only by accident. But this—Averroes concludes—is impossible, for it is impossible that something accidental belongs to what is eternal. As a consequence of all this, it must be argued that the celestial body does not possess a substrate capable of receiving contraries.¹²⁰

(3*) Immediately afterwards, Averroes attacks again Avicenna explicitly. He claims quite maliciously that what is surprising is not that Avicenna missed the sense of Aristotle's doctrine, but rather that Alexander missed it. For, in his

116 Cf. Averroes, *De sub. orb.*, pp. 130–37.

117 Id., *MC De caelo*, p. 181, lines 17–22.

118 Ibid., p. 182, lines 13–20.

119 Ibid., p. 182, line 20–p. 183, line 1.

120 Ibid., p. 183, lines 1–11.

commentary on *Met. Λ*, Alexander maintains that the celestial body is simple, not composed of matter and form. Then, Averroes notes (lit. 'you should know') that there is no disagreement (*ḥilāf*) on this point between the commentators, since Themistius states clearly, in his commentary on the *De caelo*, that the celestial body has no substrate, and that al-Fārābī shares this same opinion.¹²¹

Averroes concludes the *quaestio* by answering a further possible objection to his reading of Aristotle's doctrine. One can cast doubt upon the necessity of appealing to a 'mover from the outside' in order to explain the eternal movement of the celestial bodies, arguing that these latter are in fact simple and eternal. In the original Arabic, unlike the Hebrew-Latin translation,¹²² the answer to this objection is quite articulated and follows the main lines of what Averroes says in his commentary on *Met. Λ*. Averroes replies that celestial bodies have a capacity according to place, but not to substance. This capacity requires the necessary existence of a mover from the outside. He then concludes using Avicenna's own terminology that it is only in this sense that one can admit that 'the celestial body is possible in virtue of itself and necessary in virtue of another'.

It is also important to our purpose to notice that this *quaestio* is very close to chapter six of Averroes' *De substantia orbis*. There, Averroes formulates the same criticism against Avicenna that we find in the *MC*, but also informs us that Ibn Bāḡḡa follows Avicenna on this issue.

4.3 Criticisms in the *Epitome* of the *De caelo*

Table 5: Criticisms of Avicenna in Averroes' *Epit.* on the *De caelo*

DOCTRINE BY ARISTOTLE	PASSAGE IN AVERROES	DOCTRINE BY AVICENNA	CRITICISMS BY AVERROES	PASSAGE IN AVICENNA
(1**) <i>De caelo</i> I 2, 269a32–b2.	<i>Epit. De caelo</i> , p. 29, lines 9–10.	Avicenna denies the premise stating that what is accidental to one simple body must be natural to another one.	Aristotle's premise in this argument is self-evident, but Avicenna denies it.	Cf. table 3 (1).

¹²¹ Ibid., p. 183, lines 11–16.

¹²² In the Latin version, Averroes simply referred the issue back to *Phys.* VIII (295b1–6).

DOCTRINE BY ARISTOTLE	PASSAGE IN AVERROES	DOCTRINE BY AVICENNA	CRITICISMS BY AVERROES	PASSAGE IN AVICENNA
(2**) <i>De caelo</i> II 8, 289b1–290a35 (cf. <i>De caelo</i> II 12, 292a10–14).	<i>Epit. De caelo</i> , p. 69, lines 7–12.	Avicenna denies that the premises demonstrating that each star is at rest in one single sphere pertain to natural philosophy, while he admits that this is more akin to natural being.	Avicenna's reasoning is almost incomprehensible. Ibn Bāḡḡa supports him in what he states.	***

There are just two explicit criticisms in the *Epit.* of the *De caelo*. The two are related to topics already analyzed in the *LC*: (1) and (5). The second criticism, though, involves an issue that is not at stake in the *LC*.

The first criticism concerns Avicenna's denial of the inference that what is accidental to one simple body must be natural to another one. The criticism, directly addressed to Avicenna, appears in the same context as in the *LC*, i.e. in correspondence to Aristotle's argument aiming at demonstrating that circular movement belongs by nature to a fifth body, i.e. the celestial one. The criticism is very sketchy. Averroes states simply that Avicenna, despite the self-evident character of the statement, denies the premise stating that what is accidental to one simple body must be natural to another one.¹²³

It is more difficult to say which passage of Aristotle's text the second criticism is attached to. The critique is inserted at the end of the part of the *Epit.* devoted to the movements of the stars, which corresponds to what Aristotle discusses in *De caelo* II 8 (289b1–290a35).¹²⁴ In this section of the *Epit.*, Averroes aims at demonstrating that the stars cannot move according to a proper movement, but rather move with the movement of the sphere in which each one of them is located. Following Aristotle, Averroes admits that there are only four possibilities: i) that the spheres and the stars are both at rest, while the earth moves; ii) that the spheres and the stars are both in movement; iii) that the stars are in movement, while the spheres are at rest; iv) that the spheres are in movement, while each star is at rest, carried along with its own sphere.

¹²³ Averroes, *Epit. De caelo*, p. 69, lines 7–12.

¹²⁴ As we have already seen, the *Epit.* devoted to the study of heavens, as the other *Epit.* of natural philosophy, is not strictly speaking a commentary on Aristotle's text. The whole section of the *Epit.* devoted to the stars includes a first discussion on the 'substance' of the stars—corresponding to *De caelo* II 7—, a second one on their movements and a third one on their figures—corresponding to *De caelo* II 8 (290a35–b11) and II 11.

Averroes excludes the three first possibilities one after the other. He concludes that each star is located in one sphere and that it moves with the sphere as a part moves with the whole.

After having verified that it is not the case that the spheres and the stars are at rest, while the earth is moving, Averroes states that the spheres containing just one planet must be conceived as parts of the outermost sphere, which contains all the so-called fixed stars. By appealing to the same principles used in the preceding arguments, Averroes goes on to prove that all the fixed stars must be located in only one sphere.¹²⁵

At this point, just before turning to the study of the 'shape' of the stars, Averroes attacks Avicenna, whose position, Averroes argues, is quite unintelligible. Avicenna denies that natural philosophy can demonstrate by its own premises that the fixed stars are all located in just one sphere, stating that this is what is 'most appropriate' (*al-aḏhabu?*)¹²⁶ in natural matters (*fī l-amr al-tabī'ī*).

Averroes concludes his criticism by informing us that Ibn Bāḡḡa supports Avicenna on that point in 'certain explanations relating to the same subject', and by stating that the latter's rank in science is the same as the former's.

4.4 Conclusions

The study of the criticisms in the treatises on the *De caelo* confirms most of the characteristics highlighted in the case of those in the treatises on the *Physics*. From a methodological and stylistic point of view: I) all explicit references to Avicenna are polemical; II) Averroes' criticisms of Avicenna are always inserted on the occasion of a problematic or ambiguous statement in Aristotle's text; III) they are integrated in a more or less autonomous and structured digression (2, 3, 4, 7, 1*–3*); IV) Aristotle's statement is presented as the object of a preceding debate (1, 3, 5, 6, 1*–3*, 2**); V) this debate was still active among Averroes' contemporaries (4; 3* and 2** refer to Ibn Bāḡḡa); VI) the origin of Avicenna's mistake is traced back to someone else's reading (5, 1* and 3* mention Alexander, but Averroes states in 3* that he is surprised by Alexander's mistake); IX) the criticisms in the *LC* are by far the most numerous and the most severe.

From a doctrinal point of view, while in the *Epit.* and in the *MC* the only topics of the criticisms are the epistemological status of natural philosophy (2**), the ontological nature of the heavens and the relationship between the moved body and its motion (1*–3*, 1**), in the *LC* Averroes also mentions these points (1, 4–6), but adds criticisms concerning the attribution of *fantasia*

125 Averroes, *Epit. De caelo*, p. 68, line 19–p. 69, line 7.

126 Averroes complains that he cannot understand the meaning (*mā ma'nan*) of the term *al-aḏhabu*. This, however, means that he is quoting Avicenna literally.

to the heavens (2); the kind of effect they produce on earth (3); and the possibility that simple sublunar bodies mix together (7).

Before moving on to *De generatione et corruptione*, it must be emphasized that the *mas'ala* added to the commentary on *De caelo* I is a particularly interesting text, insofar as it is paradigmatic of Averroes' critical attitude toward Avicenna. It displays all the features that we have brought into light until now and adds to these two more features: X) Averroes tends to isolate Avicenna from other ancient readers of Aristotle or to justify these latter when they seem to maintain the same opinion as Avicenna (in 2* Themistius and al-Fārābī, unlike Avicenna, are identified as good readers of Aristotle; in 3* Averroes quotes a passage from Alexander giving the good reading); XI) Avicenna's doctrine does not solve the *aporia* arising from Aristotle's text; on the contrary, it gives arguments supporting the opponents of Aristotle's view (in 2* the opponent is Philoponus).

5 Averroes' Commentaries on the *De generatione et corruptione*

Averroes only wrote an *Epit.* and a *MC* on Aristotle's *De generatione et corruptione*. Despite his intention to write commentaries 'according to the letter' on all treatises by Aristotle, he almost certainly never composed a *LC* on this one. Both, the *Epit.* and the *MC*, are extant in the original Arabic.¹²⁷ The *Epit.* was translated into Hebrew by Moše ibn Tibbon¹²⁸ (1250) and from Hebrew into Latin, first by Abraham of Balmes, then by Vitalis Nissus (during the sixteenth century).¹²⁹ The *MC* was translated from Arabic into Latin during the thirteenth century¹³⁰ and into Hebrew during the fourteenth century.¹³¹

There is no criticism of Avicenna in the Arabic version of the *Epit.* The only criticism we find is in the Latin translation of the *MC*.

127 See Averroes, *Ġawāmi' fi l-falsafa* for the *Epit.*, and id., *Mittlerer Kommentar zu Aristoteles' De generatione et corruptione* for the *MC*.

128 See id., *Commentarium medium et Epitome in Aristotelis De generatione et corruptione libros*.

129 See id., *Paraphrasis super librum De generatione et corruptione Aristotelis*.

130 See id., *Commentarium medium in Aristotelis De generatione et corruptione libros*.

131 See id., *Commentarium medium et Epitome in Aristotelis De generatione et corruptione libros*.

5.1 Criticism in the *Middle Commentary* on the *De generatione et corruptione*

Table 6: Criticism of Avicenna in Averroes' *MC* on the *De generatione et corruptione*

PASSAGE IN ARISTOTLE	PASSAGE IN AVERROES	DOCTRINE BY AVICENNA	CRITICISM BY AVERROES	PASSAGE IN AVICENNA
(1) <i>De gen. et corr.</i> I 10, 328b22.	<i>MC De gen. et corr.</i> , p. 93, line 13–p. 94, line 17.	The mixing bodies are in potency in the mixed body. The power of the elements, i.e. the essence, is preserved in the mixed body, while their accidents are 'broken'.	According to Avicenna, elements must be in actuality in the mixed body. Aristotle, on the contrary, states that they are preserved only in potency in the mixed body.	<i>Kawn wa-fasād</i> 6, pp. 127–32.

(1) After studying contact and action/passion, Aristotle devotes chapter I 10 of *De gen. et corr.* to the third process necessary to explain generation and corruption: mixing. As we have already seen in table 3 (7), this doctrine entails the difficult issue of understanding how elements are preserved in the mixed body. Aristotle affirms in 327b29–31 that the elements 'neither persist actually ... nor are they destroyed ..., for their potentiality is preserved.' This piece of doctrine has been much debated among ancient commentators.¹³² In the transmitted Arabic version of the *MC* to this chapter, Averroes comments on Aristotle's text without entering into the debate.¹³³ In the Latin translation, however, we find a final section presenting and criticizing Avicenna's position on this point. This criticism is a particular important one, not only for understanding Averroes' attitude towards Avicenna's doctrine, but also for assessing Averroes' direct knowledge of Avicenna's corpus.

Averroes resumes closely the final part of chapter six of the *De generatione et corruptione* of the *Šifā'*,¹³⁴ in which Avicenna explains that what the 'first master', i.e. Aristotle, calls 'the potentiality' of the elements designates in this context nothing but their essence. Avicenna clarifies that properties like hotness, lightness, softness, etc., which he calls accidents, are merely the essence's effects. Men have no name for such essences, that is why they use

132 For an overview, see Stone, Avicenna's Theory of Primary Mixture, and al-Nawbaḥtī, *Commentary on Aristotle De generatione et corruptione*, pp. 228–36.

133 On Averroes' solution, see Cerami, *Génération et substance*, pp. 463–74.

134 Avicenna, *al-Kawn wa-l-fasād* 6, pp. 127–32.

the name of the properties instead.¹³⁵ He concludes that the essences of the elements persist as such in the mixed body and that, for this reason, they are in actuality in the mixed body, while the caused properties remain in it only with a ‘broken’ status (*maksūra*).¹³⁶ Averroes ends this passage by briefly stating that, contrary to Avicenna, Aristotle rightly maintains that elements are not in actuality in the mixed body, but only in potency. Averroes does not put forward the reasons of Avicenna’s mistake nor does he attack Avicenna as strongly as in the *LC* on the *De caelo*. Two points, however, must be emphasized in order to understand the reasons of Averroes’ criticism, in addition to what we stated in our assessment of criticism (7) of table 3. First of all, in this passage of the *Šifā*, Avicenna not only pretends to clarify Aristotle’s text, but criticizes the commentators for misunderstanding Aristotle’s position on the issue and for missing the ontological distinction between ‘essences’ and ‘accidental properties’.¹³⁷ Moreover, later in the *Šifā*, Avicenna makes clear that according to his theory of mixing, the new blending of the accidental properties (i.e. the complexion) is not the essence of the compound body, but what prepares it to receive the forms and the proper faculties emanating from the ‘giver of forms (*wāhib al-šuwār*)’.¹³⁸ Thus, it is not unreasonable to conclude that, in this case too, Averroes’ criticism is not only the result of an exegetical disagreement, but is also motivated by the implications of Avicenna’s ontological split between essential and accidental properties.¹³⁹

6 Averroes’ Commentaries on the *Meteorology*

As in the case of *De generatione et corruptione*, Averroes wrote only an *Epit.* and a *MC* of Aristotle’s *Metereology* and never composed a *LC*. The two texts are extant in the original Arabic.¹⁴⁰ The *MC* has been translated into Hebrew from the Arabic by Qalonymos ben Qalonymos.¹⁴¹ A partial Latin translation of books I–III is transmitted, as well as a translation of book IV.¹⁴² The *Epit.* can be

135 Cf. *ibid.* 6, pp. 127, lines 11–17.

136 On Avicenna’s doctrine of mixing and on the notion of ‘broken’ qualities, see Averroes, *Mittlerer Kommentar zu Aristoteles* ‘De generatione et corruptione’, pp. 162–87; Stone, Avicenna’s Theory of Primary Mixture, and al-Nawbahūtī, *Commentary on Aristotle De generatione et corruptione*, pp. 228–36.

137 Cf. Avicenna, *al-Kawn wa-l-fasād* 6, p. 127, line 18–p. 128, line 4.

138 See *id.*, *Af’āl wa-infi’ālāt*, p. 256, lines 9–11.

139 On this point, see above pp. 165–6.

140 See Averroes, *Risālat al-Ātār al-’ulwiyya*, and *id.*, *Talhīš al-Ātār al-’ulwiyya*.

141 Levey, *The Middle Commentary*.

142 The two are edited in the Giunta edition. The sections translated from books I–III are inserted in the Giunta edition within the translation of the *Epit.* The translated sections of the *MC* are not always inserted according to the order of the Arabic original.

found in Ibn Tibbon's *Otot ha-šamayim*.¹⁴³ It was also translated from Hebrew into Latin by Elia del Medigo.¹⁴⁴

In the *Epit.* as well as in the *MC*, Averroes refers to Ibn al-Biṭrīq's translation of Aristotle's text, which is less a translation, than a paraphrase.¹⁴⁵ As in the case of the *De caelo*, thus, it is necessary to consider first the text that Averroes had at his disposal, in order to understand his reading, as well as his criticism against Avicenna.

6.1 Criticisms in the *Middle Commentary* on the *Meteorology*

Table 6: Criticisms of Avicenna in Averroes' *MC* on the *Meteorology*

PASSAGE IN ARISTOTLE	PASSAGE IN AVERROES	DOCTRINE BY AVICENNA	CRITICISMS BY AVERROES	PASSAGE IN AVICENNA
(1) <i>Meteor.</i> I 3.	<i>MC Meteor.</i> § 21, p. 31, lines 1–3.	Earth, water and air, such as they exist in their proper places are not pure elements, but are composed of a mixture, whereas fire, such as it exists in its proper place, is simple and pure.	If this were true, fire would destroy the other bodies. Moreover if one element remains pure, generation of composite bodies would not take place.	<i>Af'āl wa-infi'ālāt</i> , p. 202, line 5–p. 203, line 21. Cf. <i>Nağāt</i> , p. 152, line 12–p. 154, line 5.
(2) <i>Meteor.</i> III 4, 375a1–29.	<i>MC Meteor.</i> § 200, p. 159, lines 2–11.	The green color band of the rainbow arises from a mixture of sunlight with an intermediate quantity of blackness.	Green arises by a mixture of the dark in the cloud and the white in the spray. This explanation agrees with Aristotle. Avicenna's explanation is wrong.	<i>Ma'ādin wa-ātār</i> , p. 53, line 6–p. 56, line 2.

143 Ibn Tibbon, *Otot ha-Shamayim* (ed. Fontaine).

144 Averroes, *Aristotelis Meteorologicorum*.

145 On this translation, see Aristotle, *The Arabic Version*. Note that the text Averroes reports in his commentary does not correspond exactly to the transmitted translation.

(1) On the structure of the atmosphere and the nature of the four elements in their proper places

The first three books of Aristotle's *Meteorology* are devoted to the phenomena that occur between the earth and the lowest celestial sphere, i.e. the sphere of the moon. The main aim of Aristotle, as he announces, is to understand and account for 'the affections of the whole world surrounding the earth'—what we would call atmosphere. In chapter I 3 (339a36–b3), he states that two questions must be answered before turning to the treatment of each individual phenomenon (from chapter I 4 onwards): i) which exactly is the relation of air and fire to the position of the first element; ii) why the stars in the upper region impart heat to the earth and its neighbourhood.¹⁴⁶ Answering these two questions will allow us to understand the nature of what occupies the region between the supra- and sublunar worlds.

Aristotle reviews the results of the preceding treatises *De caelo* and *De generatione et corruptione* again. Concerning the first question, he first claims that the four elements are distributed in the sublunar world according to a given order: the earth in the centre, then the water, afterwards the air and finally, he says, what we commonly call 'fire'. He then makes clear that what we call fire and air are not pure elements. For the real fire, i.e. flame, is an excess of heat, a kind of ebullition (ζέσις), while the air surrounding the earth is moist and warm, because it contains both vapour and a dry exhalation from the earth. The nature and the importance of these kinds of gas, to use a modern terminology, become clear in chapter I 4, where Aristotle explains that all meteorological phenomena are the result of these two exhalations that are dissolved by the sun: i) a vaporous, moist, exhalation from the water, more or less cold; ii) a windy, smoky, hot, dry exhalation from the earth.

Aristotle clearly maintains that the two exhalations are not pure elements, but result from the interaction of these elements under the effect of the celestial motion. It is not clear, however, whether he means that the atmosphere consists entirely of these exhalations or if there are actually some regions of the sublunar world in which the elements remain in their pure state. Concerning the upper layer of the atmosphere, adjacent to the sphere of the moon, Aristotle asserts that it is not occupied by real fire, but by the inflammable hot, dry exhalation (ὕπεκκαυμα),¹⁴⁷ which is potentially like fire. By asserting this, he solves to some extent the first question. Still, it is not easy to assess the nature of what Aristotle calls here 'real fire'.

The theory of the double exhalation is also part of the solution of the second problem. Aristotle states that warmth and heat on earth are the effect of the

¹⁴⁶ Aristotle, *Meteor.* I 4, 340a19–24.

¹⁴⁷ Ibid. I 4, 341b6–23.

circular motion of heaven, notably the sun's motion, and of the fire surrounding the air, which is often scattered by the motion of the heavens and driven downwards in spite of itself.¹⁴⁸ In this context, however, it is still difficult to understand whether Aristotle considers the two facts to be two aspects of one single phenomenon, or if he contemplates the possibility that the celestial body, as such, heats.

Greek and Arabic readers of Aristotle understood differently this arrangement of the atmosphere and the theory of the two exhalations.¹⁴⁹ As far as the Arabic world is concerned, two important elements were provided by Ibn al-Bitṛīq's translation: 1) at least with respect to I 3–4, the text speaks of three and not of just two exhalations, i.e. a dry-hot one, a moist-hot one and a moist-cold one; 2) with respect to I 3, the Arabic text states that there are regions where elements can be found in their pure state. Fire, notably, is in its pure state in the outermost part of the atmosphere, whereas the dry exhalation is mostly underneath it.

Due to the paraphrastic nature of Ibn al-Bitṛīq's translation, it is not easy to determine the exact corresponding passage of Aristotle's text in Averroes' commentary. The first criticism against Avicenna, though, is clearly part of a digression inserted at the end of the paraphrase of I 3. The digression deals with the two aforementioned problems. Averroes examines them as the subject of a previous debate prompted by the commentators (*al-mufasssīrūn*). He claims that Alexander addresses the first issue by claiming that the fire in the concavity of the moon is not burning and that it is called 'fire' only by homonymy.¹⁵⁰ Averroes' criticism of Avicenna is inserted in the discussion of this same issue.¹⁵¹

Averroes first reports Alexander's solution, according to which the hot and dry body, which follows the sphere of the moon, neither is fire in actuality nor burns, for it is fire in potency. In support of his reading, Alexander quotes Aristotle's claim in the *De generatione et corruptione* that fire is boiling of dry heat.¹⁵² Thus according to Alexander fire is an excess of the fiery element, since the hot and dry qualities are present in it in an extreme degree, stronger than in the elemental fire. After presenting Alexander's reading, Averroes provides his own answer and criticizes Alexander. He claims that it is absurd to admit that elements do not possess their proper qualities in the highest degree, while sensible compounds do. In fact, burning luminous fire is a composite and, as such,

148 Ibid. I 3, 341a19–31.

149 For a comprehensive presentation of this debate, see Lettinck, *Aristotle's Meteorology*, pp. 32–65.

150 Averroes, *MC Meteor.*, p. 27, lines 9–10.

151 Concerning the second issue, Averroes states that the 'commentators' usually provide a second cause of the heating coming from the stars that is mentioned neither in this book nor in the *De caelo*, namely light. On this issue, see criticism (3) in table 3.

152 Aristotle, *De gen. et corr.* II 2, 330b25–9.

it cannot possess the elemental qualities in their highest degree, since mixture (*al-iḥtilāl*) always requires the ‘fracture’ (*kasr*) of the elemental potency. Therefore Alexander is wrong, unless he means to say that this composite fire is not in its own place.

After facing Alexander’s reading, Averroes makes clear that another question follows from the same issue: one must ask if fire, when it is in its proper place, remains in its pure state or not. Regarding this point—Averroes adds—one could believe (*yuzannu*) that fire, contrary to other elements, remains in its pure state when it is in its proper place. This—Averroes explains—is what Avicenna believes, but erroneously. In fact, if fire were the only element that remains in its pure state when it is in its place, the other composite bodies would be destroyed, since what is in its pure state, as Averroes has already stated, is stronger than what is composite. Moreover, if fire was not mixed, no generation can take place. It must therefore be inferred that the uppermost fire does not remain in its pure state, but changes into a composite substance, i.e. luminous burning fire.¹⁵³

Avicenna discusses the question of the order of the elements in the first chapter of part IV of the *Natural Philosophy* of the *Šifā’* (called *On Affecting and Being Affected*). He assures the reader that in the lowest region of the sublunar world there are no pure elements, since the heat proceeding from the upper region completely transforms water, earth and air into the two exhalations. He also states that heat in the upper atmosphere is ‘the purest element’, insofar as the exhalations do not rise up to its place; if they do, Avicenna makes clear, the fire will transform them quickly. From this assertion, Averroes could have inferred that for Avicenna fire in the upper region is pure fire. Still, Avicenna also makes clear that fire is not the only element that remains in its pure state, since the deep interior of the earth is also ‘the purest earth’.¹⁵⁴

(2) On the colors of the rainbow

Aristotle devotes to the phenomenon of the rainbow two chapters of Book III (*Meteor.* III 4–5). In the first one he provides an account of the rainbow’s physical nature and of its coming to be, in the second one he gives the geometrical explanation of its shape. According to the explanation provided in III 4, the rainbow is ‘a reflection of sight to the sun’ or, more precisely, ‘a reflection of light from water’ in the cloud (i.e. ‘from small particles of water’), which constitutes a sort of mirror on which the sunlight is reflected.¹⁵⁵ As such, rainbow differs from halo, which is also a reflection, for in the case of the rainbow the

153 Averroes, *MC Meteor.*, p. 31, lines 1–21.

154 Avicenna, *Af’āl wa-infi’ālāt*, p. 202, line 5–p. 203, line 21.

155 Aristotle, *Meteor.* III 4, 373a35–b32.

surface on which light is reflected is water, while in the case of the halo it is air.¹⁵⁶

Among other topics, Aristotle discusses in the same chapter the question concerning the formation and order of the different colors of the rainbow. Aristotle maintains that the rainbow necessarily has three colors: red, green and purple. He makes clear that the outer band of the rainbow is red; for it is the largest band and as such reflects most sight to the sun. The middle band and the third go on the same principle. He also points out that sometimes one sees yellow between red and green, but this is due to the fact that when the rainbow is fading away and the red is dissolving, the white cloud is brought into contact with the green and becomes yellow. However, Aristotle's explanation remains unclear on several points, notably concerning the way the green color comes to be between the red and the purple bands.

On this issue too, as on the nature of the uppermost fire, the Arabic version of the *Meteorology* plays an important role.¹⁵⁷ According to Ibn al-Biṭrīq's text, the rainbow arises because the sunrays are reflected on a rising vapor. This vapor is produced around the cloud when the remnant humidity enclosed in it changes into a spray (*rašš*) of small particles. These particles act as a mirror and transfer the colors to our sight.¹⁵⁸ According to the more or less watery nature of the particles, the colors are more or less dark. These colors are wine-red (*ḥamrī*), white, which is actually yellow (*ṣufra*), green and purple (*urḡuwānī*).

In his *MC*, Averroes endorses Aristotle's doctrine as reported in his Arabic translation¹⁵⁹, which he reads with Alexander's explanation.¹⁶⁰ He states that there are often only three colors in the rainbow (wine-red or light red (*ašqar*), green and purple), but that sometimes we can also see a white-yellow band, between green and wine-red, which disappears quickly. As to the green and yellow colors, he claims that they are the product of the mixing (*iḥtilāl*) of the dark in the cloud with a white color that is formed 'in the spray (*rašš*) in virtue of the sunrays'.¹⁶¹

Then Averroes quotes again his version of Ibn al-Biṭrīq's text, which states one more time that, in most cases, the visible colors are three: the wine-red band, which is the larger and brightest one since it receives in a more direct way the sun-light; the purple band, which is the smallest and less bright one since it receives less sunlight; and the green one in-between.¹⁶² From this explanation,

156 Ibid. III 4, 373b32–5.

157 For more details, see Lettinck, *Aristotle's Meteorology*, pp. 263–6.

158 This explanation is already in Alexander of Aphrodisias' commentary, see id., *In Meteor.*, p. 142, line 28–p. 143, line 3.

159 On the differences between Ibn al-Biṭrīq's transmitted text and the one quoted by Averroes, see Lettinck, *Aristotle's Meteorology*, pp. 262–3.

160 On Alexander's reading, see ibid., pp. 295–6.

161 Averroes, *MC Meteor.*, p. 154, line 4–p. 156, line 9.

162 This part of the Arabic text corresponds to *Meteor.* III 4, 375a1–29.

one can infer that the middle color, i.e. green, is brighter than the last one, i.e. purple. For, in being closer to the sun, it would be the product of the mixing of a greater amount of light with the dark of the cloud. But this explanation, Averroes points out, does not account for the phenomenon correctly.¹⁶³

At this point, Averroes mentions Avicenna. He first reports that the latter ‘distanced himself from the commentators’ (*‘adala ‘an al-mufassirīn*), notably on the formation of the green band, and then quotes his text.¹⁶⁴ Avicenna states that ‘the green is not the mixture (*muḥālaṭa*) of the light with the blackness of the cloud, since the only thing that comes to be from this mixture is the red color’. According to this explanation, then, green differs from the other two colors, i.e. wine-red and purple, only ‘according to the more and less’, as these latter do. Green, in other words, as wine-red and purple, would be an intermediary gradation of one single scale, i.e. a scale going from white to black.

Having presented Avicenna’s reading of Aristotle, Averroes condemns it as wrong and counters that the green color is not *merely* an intermediary gradation. He makes clear that the green color, as the yellow one, does not result from the mixture of light with dark in the cloud, but that it is the product of the mixture of the white color reflected in the spray *and* the more or less dark color of the cloud. This, Averroes concludes, is what accounts for the phenomenon and what is in accord with Aristotle’s opinion.

After criticizing Avicenna, however, Averroes admits that the issue of the colors of the rainbow remains difficult to solve. Actually, concerning the green color, he makes clear that, even if Avicenna is definitely wrong in assuming that according to Aristotle it is an intermediary gradation of one single scale, we can formulate different hypotheses about the nature of its constitution and the nature of its blending.¹⁶⁵

Averroes’ criticism is hard to understand without referring to Avicenna’s text. The latter treats the phenomenon of the rainbow in part V of the *Natural Philosophy* of the *Šifā’*, *On Minerals and Upper Impressions*.¹⁶⁶ Avicenna first enumerates the different incorrect theories on the subject and puts among them the one defended by Aristotle. According to Avicenna, Aristotle claimed that the rainbow, as the other optical phenomena as halo etc., are ultimately due to

163 Averroes, *MC Meteor.*, p. 158, line 15–p. 159, line 2.

164 *Ibid.*, p. 159, lines 2–11.

165 *Ibid.*, p. 160, lines 1–7 (Reading *muḥālaṭa* instead of *muḥālifa* at line 3. Averroes explains that one can suppose a) either that the color itself is the blending of the two extremes, b) or that its reflecting surface, i.e. the watery body, is the mixture of the reflecting surfaces of the other two colors; or c) that these two hypotheses must be combined; or d), furthermore, that the dark shadow of the cloud is mixed to the white in the spray.

166 On Avicenna’s doctrine, see Horten and Wiedemann, *Avicennas Lehre*; Boyer, *The Rainbow*, pp. 77–9, and Lettinck, *Aristotle’s Meteorology*, pp. 281–3; see also Mandosio’s article in the present volume.

rays emitted by our vision towards a smooth surface, which are then reflected to another object.¹⁶⁷ In the case of rainbow this body would be the cloud. Accordingly, the rainbow would be a consequence of the reflection of light in the cloud itself when it is about to rain. But this, Avicenna states, is incorrect, since the presence of a cloud is not a necessary condition for the formation of the rainbow. The cloud is nothing but the background of the sunlight ray reflected from the moist air to our vision.¹⁶⁸

Having given Aristotle's explanation, Avicenna concludes that what the Peripatetics have said about the rainbow is unsatisfactory and adds that, even concerning the order and the formation of its colors, what they have suggested is 'stupid and untrue', notably concerning the green band, which should be the product of a mixture of the purple and the red. Against this hypothesis, Avicenna raises several objections. He first argues that there is no neat separation between the two external colors, but that the colors gradually change from red to purple. Then, he denies that the mixture of red and purple can even produce green, since green is not related to these colors. Avicenna thus concludes that what the Peripatetics have said is unclear and that the issue asks for further examination.¹⁶⁹ Even if he expresses his perplexities on this matter, he finally suggests that the two external colors are the product of the mixture of the darkness with the light, whereas green is formed by mixture of yellow and black.

It is important to remark that in the same part of the *MC*, Averroes mentions Ibn al-Haytam's mathematical explanation of the rainbow and claims, against Ibn Bāḡḡa, that it is unnecessary, if not inappropriate, to provide this kind of explanation in natural philosophy.¹⁷⁰ The criticism of Ibn Bāḡḡa's position on this point is another evidence of Averroes' general tendency to discuss issues on which Avicenna is not the only target of the rebuke.

Before pursuing our study by taking into account the *Epit.* of the *Meteorology*, some remarks are in order concerning the *MC*. It must be noted that, unlike the first criticism concerning Avicenna's doctrine of the nature of the uppermost fire, the criticism concerning the latter's doctrine of the rainbow contains an almost literal quotation. Moreover, Averroes' answer implies a precise knowledge of Avicenna's doctrine. Even if we can still contest the legitimacy of Averroes' interpretation, it can be concluded that this part of the *Šifā'* was known in Andalusia in Averroes' time. As we will shortly see, this hypothesis is confirmed by the criticism concerning the inhabitable regions of the earth.

167 Avicenna, *Ma'ādīn wa-ātār*, p. 40, line 5–p. 43, line 5.

168 Ibid., p. 49, line 19–p. 53, line 6.

169 Ibid., p. 53, lines 6–8 and p. 54, line 4–p. 56, line 2.

170 Averroes, *MC Meteor.*, p. 143, line 18–p. 144, line 10; cf. p. 160, line 15–p. 163, line 9. On this criticism, see Sabra, *The Physical and Mathematical*, pp. 439–78.

6.2 Criticisms in the *Epitome* of the *Meteorology*Table 7: Criticisms of Avicenna in Averroes' *Epit.* of the *Meteorology*

PLACE AND DOCTRINE OF ARISTOTLE	PASSAGE IN AVERROES	DOCTRINE BY AVICENNA	CRITICISMS BY AVERROES	PASSAGE IN AVICENNA
(1*) <i>Meteor.</i> II 5, 362b6–10.	<i>Epit. Meteor.</i> , p. 58, line 6; p. 59, line 7; (cf. <i>MC Meteor.</i> §129, p. 111, line 1–p. 112, line 9).	The area under the equator is inhabitable and it has the most moderate climatic zone.	Avicenna claims that the Peripatetics' theory is contradicted by empirical observation and by argument.	<i>Ma'ādīn wa-āṭār</i> , p. 26, lines 14–27; p. 28, line 13–p. 30, line 15.
(2*) <i>Meteor.</i> II 9.	<i>Epit. Meteor.</i> , p. 66, lines 14–24.	In some places in Ḥurāsān and Turkey where a thunderbolt had come down, bodies were found that resembled iron and copper. This was due to the earthy parts of thunderbolt.	This phenomenon has not been observed in Andalusia, nor did the Peripatetics mention it.	<i>Ma'ādīn wa-āṭār</i> , p. 5, lines 15–20.
(3*) <i>Meteor.</i> III 4.	<i>Epit. Meteor.</i> , p. 77, lines 7–13; p. 78, lines 2–9.	In the reflection of the sunlight, the cloud is not the mirror for the rainbow. It has the same function as the colored body that is behind the glass of a mirror. The mirror is the watery air.	If Avicenna were right, the cloud would act sometimes like an iron mirror, sometimes like a glass mirror.	Cf. Table 7, (2).

PLACE AND DOCTRINE OF ARISTOTLE	PASSAGE IN AVERROES	DOCTRINE BY AVICENNA	CRITICISMS BY AVERROES	PASSAGE IN AVICENNA
(4*) <i>Meteor.</i> III 4.	<i>Epit. Meteor.</i> , p. 84, line 21; p. 85, line 21.	The Peripatetics' explanation of the formation and order of the colors is unsatisfactory. Green is the product of the mixture of yellow and black.	Avicenna does not understand Aristotle's explanation and does not discriminate Aristotle's doctrine from the commentators' interpretation.	Cf. Table 7, (2); <i>Ma'ādin wa-ātār</i> , p. 55, lines 8–9.

(1*) On the inhabitable regions of the earth

Aristotle discusses the question of the division of the earth into inhabitable and uninhabitable regions in chapter II 5, as a sort of digression in his account of wind.¹⁷¹ He divides the earth by means of the two tropics and the two polar circles. He states that one has to imagine the form of the earth as a sort of reversed drum in which only two regions are inhabitable, the first one in the northern part of the world, between the parallel of the Cancer and the polar circle, the second one in the corresponding region of the southern part. He makes clear that the other regions are too cold or too hot for life to take place. The limits of the inhabitable part, though, remain undetermined and Aristotle says nothing about the living conditions the region located in the southern hemisphere.

In this case too, the text of Ibn al-Bīṭrīq's translation that Averroes quotes in his *MC* provides elements essential to an understanding of his criticism against Avicenna, since it gives a partially different representation of the earth. This text states that the earth is divided into two parts, one being inhabitable and the other uninhabitable. The uninhabitable part, in turn, is divided into two parts: an extremely hot region in the southern part, due to the proximity of the sun, and an extremely cold region in the northern part, due to the remoteness from the sun.¹⁷² Thus according to this text, the southern part of the earth under the equator seems to be completely uninhabitable, due to the heat.

In the Greek commentary tradition, and more generally in the Greek tradition after Aristotle, the question of the inhabitable parts of the earth was vividly

171 Aristotle, *Meteor.* II 5, 362a32ff.

172 Averroes, *MC Meteor.*, p. 111, lines 1–9, and Aristotle, *The Arabic Version.*, p. 71, lines 6–12.

debated.¹⁷³ Among the commentators at Averroes' disposal, Alexander divided the earth into five sections, three uninhabitable and two inhabitable, the first one in the north part and the other in the southern part. Alexander too, however, claims that the region around the equator is uninhabitable due to heat.¹⁷⁴

In the part of the *Epit.* devoted to this issue, Averroes states that Aristotle and all the Peripatetics believe (*yaz 'amūna*) that the regions near the equator and under it are not inhabitable because of the extreme heat, while the northern region beyond the Arctic pole is uninhabitable because of the extreme cold.¹⁷⁵ Then Averroes relates that Ptolemy and the mathematicians who follow him believe that life is possible below the region that is usually called 'the burning path' (*al-ṭarīqa al-muḥtariqa*), i.e. the equator.¹⁷⁶ At this point, he reports Avicenna's position and criticizes him.¹⁷⁷ He claims that Avicenna follows Ptolemy and the mathematicians on this opinion, and goes even further, since he also adds that the area under the equator is the most temperate climatic zone (*adall al-aqālīm*). In defending this idea, concludes Averroes, Avicenna believes that the Peripatetics' statements are contrary to observation (*hiss*) and to reasoning (*qiyās*).¹⁷⁸

Having presented Avicenna's opposition to Aristotle's view, Averroes provides his own explanation, based—as he states—on the premises at his disposal. He first makes clear that the cause of the heat in each region is the position of the sun in relation to the surface of that region. Heat increases when the sun is at the zenith and the aperture of the radial angle of the reflected sunrays is near 90°. The reason for this is that the reflection of the sunrays is most strong when the angle is at 90°. Immediately afterwards, however, Averroes assures that if the aperture of the angles generated by the sunrays and their reflection were the only cause of the intensity of heat, we could assume that there were countries under the equator that are inhabitable. In defense of this hypothesis, he relates that he himself visited inhabited countries where the sun was at the zenith. Immediately afterwards, however, Averroes points out that this account is not satisfactory and that this empirical observation (i.e. this induction/*istiqrā'*) does not produce certitude (*al-yaqīn*).¹⁷⁹ The reason for the fallibility of the induction, as well as the core of Averroes' reply, is provided in the following lines of the *Epit.*

173 Lettinck, *Aristotle's Meteorology*, pp. 194–208. See also Mandosio's article in the present volume.

174 Alexander of Aphrodisias, *In Meteor.*, pp. 102–4.

175 Averroes, *Epit. Meteor.*, p. 57, line 21–p. 58, line 3.

176 *Ibid.*, p. 58, lines 3–6.

177 On this debate, see also Mandosio's article in the present volume, who portrays Averroes' stance against Avicenna differently.

178 Averroes, *Epit. Meteor.*, p. 58, lines 6–8.

179 *Ibid.*, p. 58, lines 11–22.

There are actually two questions at stake in Averroes' reply. The first concerns the habitability of the regions around the equator and their climate. The second concerns the actual amount of emerged lands in the southern hemisphere. Averroes' criticism against Avicenna concerns directly the first topic, but also indirectly the second. Averroes first provides arguments against Avicenna's position that equatorial zones are the most temperate habitable regions. Afterwards, he argues against the more general idea that there can actually be emerged lands in the southern hemisphere. Averroes' standpoint is particularly difficult to grasp, since his approach consists in a series of concessions to his opponent, which are subsequently refuted by new arguments.¹⁸⁰

In order to refute Avicenna's thesis, Averroes elaborates a threefold strategy, first he concedes that one could suppose by a sort of *a priori* argument that lands beyond the equator are inhabitable; then he makes clear that the climate of those lands, even if they are inhabited, is not temperate; finally he gives the real cause in virtue of which the regions under the equator are uninhabitable.

Averroes first explains that if one admits that the reflection of the sunrays is the only cause of the heat, it could be *a priori* possible that the regions under the equator are inhabitable. He makes clear, however, that even if this possibility is accepted, one cannot infer that the climate of those regions is moderate, as Avicenna thought. Actually, their climate is not moderate but corresponds to the climate of the regions in which the sun is at the zenith. For this reason, even if these regions were inhabited, the conditions of life for their inhabitants would be unnatural. Then, Averroes makes clear that there is also another cause of this phenomenon, which he defines as 'material' and 'from the patient'. The mistake of 'those who think' that the regions beneath the equator are inhabitable is precisely that they do not take into account this cause.¹⁸¹

He makes clear that in the different countries the greatest warmth occurs after summer solstice. In the temperate or almost temperate countries this heat remains three months, as in Andalusia and in other countries of the same latitude. But this timespan differs in each country, so that in the countries where the sun is at the zenith more than one time, the air receives more heat and this heat remains longer in it.¹⁸² This can be ascertained by empirical observation.¹⁸³ Consequently, in countries where the sun is at the zenith for more than six months a year, heat is all the time at its maximal level. Because of this, and

180 In what follows I will concentrate on Averroes' arguments against the idea that the equatorial zone is the most temperate region, since it is on this issue that Averroes attacks explicitly Avicenna. I will present a more detailed presentation of Averroes' position in a study to come.

181 Averroes, *Epit. Meteor.*, p. 58, line 22–p. 59, line 12.

182 More literally, Averroes claims that it is 'the form of the heat' that is retained in air.

183 Averroes, *Epit. Meteor.*, p. 59, line 13–p. 60, line 4.

contrary to its nature, air retains heat throughout the year. This is the case of the regions at the equator. Animals and plants, whose preservation depends on the seasonal cycle, cannot live in those countries. For, Averroes claims, it is as if there were no season at all or as if there were a cycle of eight seasons. This is why conditions of life, as Averroes said before, are ‘unnatural’.¹⁸⁴

Afterwards, Averroes claims that one can also arrive at the conclusion that lands under the equator are not inhabitable by a ‘universal argument’. According to this argument, one must admit that since there is one extreme on earth, i.e. an extremely cold region, and a middle term, i.e. a temperate region, there must also be the other extreme, i.e. an extremely hot region. Otherwise, the middle term would be overwhelmed by the only existent extreme and the earth will be entirely frozen. Thus, there must be a torrid zone together with a frozen and a temperate one. And this argument—Averroes concludes—is also in line with what Aristotle states. What is contrary to this doctrine is the product of ‘pure imagination’ (*an tawahhum muṭlaq*).¹⁸⁵

In order then to account for the more elevated temperature of the southern hemisphere, Averroes provides a supplementary cause in addition to the two previously offered (i.e. the agent one and the material one). He makes clear that the heat is more intense in the southern hemisphere of the earth due to the higher number of fixed stars placed in the southern hemisphere of the last sphere. Because these stars are more numerous, the heat caused by their movement in the corresponding southern part of the earth is more intense than in the northern one.

This is what Averroes claims against Avicenna in the *Epit.* For several reasons, however, this criticism is not easy to evaluate. For one thing, when we look at the part of the *Šifā’* in which Avicenna considers the general question of the climate of the different emerged lands, we realize that part of his explanation goes in the same direction as the explanation provided by Averroes. Actually, Avicenna too admits that the aperture of the angles and the proximity of the sun are not the only cause of the heat on earth. For the period of time that the sun is at the zenith, which is longer in the southern countries, is also a cause of the more intense heat. Avicenna then is not among those who forgo the so-called ‘material cause’. For another thing, concerning the particular issue of the climate at the equatorial zone, Avicenna advances empirical observation provided by the travelers and people who had visited countries under the equator whose climate was temperate, notably the island of Ceylon.

Even if, as I said, the aim of this article is not to settle the question of the legitimacy of Averroes’ criticisms against Avicenna, his polemical stance here cannot be properly understood without considering the part of the *MC* in which

184 *Ibid.*, p. 60, lines 11–19.

185 *Ibid.*, p. 60, line 19–p. 61, line 5.

Averroes considers the same issue. Even if Averroes does not mention Avicenna there by name, he examines and criticizes the doctrine according to which the region near the equator is the most temperate one. As we shall see, the analysis of the *MC* will provide essential clues for understanding Averroes' criticism against Avicenna.

At the beginning of the part of the *MC* devoted to the inhabitability of the earth, Averroes quotes the relevant passage of Ibn al-Biṭrīq's translation. In commenting on these lines, he relates that while the commentators (*al-mufasssīrūn*) usually divide the earth into five sections and admit that there is an inhabitable region in the southern hemisphere, Aristotle says nothing in his text concerning the different climatic zones of the southern hemisphere.¹⁸⁶ Aristotle's silence, Averroes assures us, means that he does not admit the same arrangement for the southern hemisphere as for the northern. However, Averroes informs us that the question of the inhabitability of the region around the equator was far from settled, not only because the commentators seem to diverge from the Master's doctrine, but also because 'many people' of his time contradict him on this point. For this reason, Averroes assures us, Aristotle's doctrine needs to be ascertained by means of empirical observation and thorough arguments.¹⁸⁷

Averroes provides arguments for or against the suitability for life of the different regions. Concerning the region around the equator, he adds new arguments against its inhabitability and refers the reader to his *Epit.* for others. Among the arguments supported by empirical observation, as in the *Epit.*, Averroes reports the case of people that live near the equator, which he names here 'the Ethiopians'. He states that their conditions of life are unnatural, that their complexion is farthest remote from the human complexion¹⁸⁸ and that it is not even possible to consider their survival in those countries as life, unless by accident. Actually, due to the extreme heat, they are compelled to live in caverns as animals. *A fortiori*, then, it is not possible to live in regions where the sun remains at the zenith twice a year. Without mentioning Avicenna, Averroes states here that pretending that regions under the equator are the most temperate ones is completely unintelligible (*ḡayr ma'qūl*).

Having completed the presentation of the arguments against the inhabitability of the equatorial zone, Averroes informs us that he was not the only one who defended Aristotle's position on this issue. Among those people, he mentions

186 *Ibid.*, p. 111, line 1–p. 112, line 4.

187 *Ibid.*, p. 112, lines 5–8.

188 Averroes' remarks do not only concern Ethiopians, since in the same passage, Averroes states that the complexion of the inhabitants of the regions near the North Pole is not human either.

Abū ‘Abd al-Raḥmān ibn Ṭāhir, which he defines as ‘our associate’ (*ṣāḥibunā*).¹⁸⁹ Averroes relates that Ibn Ṭāhir provided several (physical) arguments against the inhabitability of the Torrid Zone, but that many contemporaries criticized him. Among his critics, Averroes mentions in particular Abū Bakr ibn Ṭufayl, whom he blames for using, on this matter, dialectical arguments and for having contradicted Aristotle’s position.¹⁹⁰

It is not easy to determine which works of Ibn Ṭāhir and Ibn Ṭufayl Averroes alludes to. This passage of the *MC*, however, is decisive, because it offers a key to better evaluate Averroes’ criticism against Avicenna. We have no direct knowledge of a treatise by Ibn Ṭufayl on the issue of the inhabitability of the Torrid Zone. But it is well known that in his philosophical novel *Ḥayy ibn Yaqzān* the ideal climate of the island in which the protagonist was born is an essential element of his spontaneous generation. More precisely, Ibn Ṭufayl relates at the beginning of the novel that ‘our forefathers’ (*salafunā*) tell of a certain island lying off the coast of India, at some degrees under the equator, where human beings come into being without father or mother due to its perfect temperate climate.¹⁹¹ The implicit reference to Avicenna’s testimony on the climate of Ceylon is unquestionable. Furthermore, in what follows, Ibn Ṭufayl states explicitly that he adopts Avicenna’s explanation of the production of heat on earth and reconstructs part of the latter’s arguments quite faithfully, even if in a more simplistic way.¹⁹²

It is not farfetched then to assume that Averroes alludes in the *MC* on the *Ḥayy ibn Yaqzān* and that Ibn Ṭufayl is here the ‘proximate’ target of his criticisms. Actually, Ibn Ṭufayl’s appropriation of Avicenna’s doctrine fits even better the accusations that we find in the *Epit.* and in the *MC*. First of all, at least in his philosophical novel, Ibn Ṭufayl does not take into account the so-called ‘material cause’ of the production of heat on earth. He only adopts Avicenna’s explanation based on the reflection of light and the position of the sun and assumes that for this reason spontaneous generation of man is possible. Furthermore, concerning the accusation of incongruity, Ibn Ṭufayl is also a more direct target than Avicenna, since he does not declare to rely on testimony of travelers, as Avicenna does, but on what the ‘forefathers’ relate. In this sense, we can better understand why Averroes states that the existence of a perfect temperate region at the equator is the product of ‘pure imagination’.

189 Abū ‘Abd al-Raḥmān ibn Ṭāhir (d. 1178), who must be distinguished from the homonymous first governor of Murcia, seems to be identifiable with the author of a treatise on Ibn Tūmār (cf. al-Marrākuṣī, *al-Dayl*, pp. 338–9), see Puig Montada, Abū ‘Abd al-Raḥmān ibn Ṭāhir.

190 Averroes, *MC Meteor.*, p. 116, line 18–p. 118, line 2.

191 Ibn Ṭufayl, *Ḥayy ibn Yaqzān*, p. 20, lines 6–9.

192 *Ibid.*, p. 20, line 9–p. 21, line 12.

In conclusion, three important remarks are in order concerning this criticism. First, it provides new evidence in favour of the idea that Averroes' condemnations do not target Avicenna exclusively, but more largely an 'Andalusian Avicennism'. Ibn Ṭufayl, as Amos Bertolacci suggested recently,¹⁹³ and Ibn Bāğğā, as we have already seen in the criticisms in the *Physics* and in the *De caelo*, and as I have pointed out elsewhere,¹⁹⁴ are part of this Avicennian trend in Andalusia and constitute a more 'proximate' target of Averroes' attacks. In this context, however, it must be emphasised that Averroes does not consider Ibn Ṭufayl as his opponent, since in the same passage he calls him 'our associate'. Actually, what Averroes accuses Ibn Ṭufayl of is not turning against Aristotle, but reading his works through the lenses of Avicenna's *Šifā'*.¹⁹⁵ Second, the link between the hypothesis of the inhabitability of the equatorial region and the doctrine of the human spontaneous generation explains the importance that Averroes places on the issue of the climate of the equatorial region. Third, this criticism confirms what is revealed by the other polemical passages in Averroes' *Epit.* and *MC* on the *Meteorology*, i.e. this part of the *Šifā'* was well known in Andalusia around the mid-twelfth century AD.

(2*) On the effects of thunderbolts

Aristotle devotes to the study of thunder, lightning and thunderbolt the whole chapter II 9 and part of III 1. He makes clear that all these phenomena have the same substance as wind, i.e. dry exhalation. He explains that thunder is the noise produced when the hot dry exhalation present in a cloud is ejected and strikes the surrounding clouds, while lightning and thunderbolt are the ejected exhalation that mostly catches fire and goes downward.

Ibn al-Biṭrīq's text provides a revised, but not distorted version of Aristotle's explanation. It states that thunder (*ra'ad*), lightning (*barq*) and thunderbolt (*šā'iqā*) occur when moist and dry exhalations rise up together in the atmosphere and form a cloud in which a dry exhalation is enclosed. Thunder is the noise produced by the dry exhalation's striking of the moist parts of the cloud and its breaking outwards from it. Lightning and thunderbolt are the ejected dry exhalation that inflame.

Averroes examines all these phenomena in the second treatise of the *Epit.*, in the section devoted to earthquakes and thunderbolts. He states that thunders,

193 See Bertolacci, *Averroes against Avicenna*.

194 See Cerami, *Génération et substance*, p. 512–17.

195 In the introduction of *Ḥayy ibn Yağzān*, Ibn Ṭufayl himself relates that this is exactly what he recommends for understanding Aristotle's text, since Avicenna 'in his *Šifā'* undertook to interpret Aristotle's books, proceeding according to Aristotle's doctrine and following the method of his philosophy', p. 14, lines 9–11. Cf. Gutas, *Ibn Ṭufayl*, p. 226.

lightnings and thunderbolts belong to one single genus and that they are distinguished by their specific differentiae. He explains that a thunder occurs when smoky exhalation is ejected because of the condensation of the cloud, while lightning is the catching fire of the smoky exhalation caused by the violent motion of its breaking out. Averroes points out that a thunderbolt occurs when the inflamed smoky exhalation descends to the earth; he clarifies that the effects of its struck vary in accordance with the difference of its nature and the difference of the structure of the hit body: if the thunderbolt is extremely fine and airy and the struck body is of rare structure, it does not destroy it; if it is more dense and earthy, it burns the body. Accordingly, it may happen that a body, like bronze, melts when struck, while other bodies, like wood or animals, are not burned.¹⁹⁶

In the same lines, Averroes reports that the Peripatetics relate that a thunderbolt struck a temple and that a smoke arose from it. At this point, Averroes mentions Avicenna, reporting his observation according to which in Ḥurāsān and Turkey bodies struck by a thunderbolt resembled iron and copper. Avicenna, Averroes adds, supposed that this phenomenon was due to the earthy parts of the thunderbolt and related that he tried to melt them into arrowheads, but that they evaporated into smoke. Without completely rebutting Avicenna's testimony, Averroes concludes that neither the Peripatetics nor anyone in Andalusia have observed this kind of phenomenon.¹⁹⁷

This passage of the *Epit.* is another clear piece of evidence of Averroes' good knowledge of this part of the *Šifā'*. Not only because we find in it the observation reported by Avicenna,¹⁹⁸ but also because Averroes' explanation of the phenomenon of the thunderbolt is quite similar to the one provided by Avicenna.¹⁹⁹

(3*) On the function of the cloud in the formation of the rainbow

Averroes devotes to the phenomenon of the rainbow almost all of the third treatise of the *Epit.* He first provides the same definition of the rainbow that we find in Ibn al-Biṭrīq's translation.²⁰⁰ He then states that he wishes to provide the causes of the formation of this phenomenon and reports the explanation given 'in mathematical science'.²⁰¹ According to this explanation, the 'efficient cause'

196 Averroes, *Epit. Meteor.*, p. 65, line 19–p. 66, line 13.

197 Ibid., p. 66, lines 14–23.

198 Avicenna, *Ma'ādīn wa-āṭār*, p. 5, lines 15–20.

199 Ibid., p. 67, line 4–p. 68, line 13.

200 Averroes, *Epit. Meteor.*, p. 75, line 20–p. 76, line 12.

201 On Ibn al-Hayṭam's explanation, see R. Rashed, *Le modèle de la sphère*, pp. 109–40; id., *Optique et mathématiques*, and id., *Géométrie et dioptrique*.

of the rainbow is the reflection (*in 'ikās*) of the sunray against the cloud to the observer.²⁰² The entire explanation is based on the idea that the cloud acts as a mirror in the reflection of the ray and that it must have a specific form and stand in a specific position with regard to the sun and the observer. Averroes also makes clear that the cloud must consist of small watery spherical particles in which color is reflected.

Having given this explanation, Averroes quotes Avicenna and informs us that the latter denies the idea that the cloud is the mirror for the rainbow. According to Avicenna, the cloud is nothing but the background behind the mirror toward which the reflected ray is projected. Instead, the body that performs the function of mirror is 'watery air' (*hawā' mā'iyya*). Averroes also reports Avicenna's observations in support of his hypothesis: Avicenna once saw a rainbow on the top of a mountain where there was no cloud and inferred from this that the wall of the mountain acted in this case the same function as the cloud. In assessing this hypothesis, Averroes claims that if Avicenna were right, the cloud would act sometimes as an iron mirror, sometimes as a glass mirror.²⁰³ In the same lines, Averroes reports another observation of Avicenna who related that he once saw in a bath a rainbow produced by a sunray entering from the window. Afterwards, Averroes adds evidence gathered by him and his associates (*aṣḥāb*) in support of the claim that a rainbow may occur in transparent air when the level of humidity is high. Among the observations quoted, Averroes relates that he once saw, in a warm region, a rainbow in a dust cloud raised by the marching army he was part of.

The attitude of Averroes in the whole passage is not completely unequivocal. In general, Averroes seems more willing to correct and complete Avicenna than to refute him. He seems to admit that Avicenna's hypothesis is not completely wrong, but that the explanation provided by the science of perspective is still to be preferred when we observe the phenomenon in the sky, since the cloud is actually a watery body. In any case, what it is important to remark here is that Averroes shows a precise knowledge of Avicenna's doctrine, not only because we find in Avicenna's text the observation of the mountain, as well as the one of the bath, but also because Averroes reports quite faithfully Avicenna's doctrine of the formation of the rainbow.²⁰⁴ The same situation is confirmed in the part of the *Epit.* devoted to the formation and order of its colors.

202 Averroes, *Epit. Meteor.*, p. 76, lines 13–15.

203 Ibid., p. 77, lines 7–13.

204 Avicenna, *Ma'ādīn wa-āṭār*, p. 50, line 8–p. 56, line 2.

(4*) On the formation and order of the colors of the rainbow

The passage of the *Epit.* concerning the nature and the order (*tartīb*) of the colors of the rainbow contains the same criticism as the *MC*, but supported with more detailed arguments.

As in the *MC*, Averroes' main point is that the two external colors, i.e. the light-red and the purple, must be considered as the two extremes of a single scale, while the intermediary colors, i.e. yellow and green, are the product of the mixture of a greater or lesser amount of white and black. Accordingly, Averroes states that the two extremes belong to the same species and differ according to the more or less, while what comes to be from their blending, as in all real mixture, is a new 'intermediary' color.²⁰⁵ After providing this explanation, Averroes assures that this is what he finds in the books of the commentators at his disposal. He then declares that Avicenna reproved ('*adala*) the commentators on this point and claimed that the Peripatetics (viz. 'our friends the Peripatetics') did not provide any real explanation of the order of the colors of the rainbow.²⁰⁶

In what follows, Averroes first gives the reason of Avicenna's criticism, and then replies to it. As in the *MC*, he makes clear that Avicenna puts forward his objection because he thought that according to Aristotle the intermediary colors, and notably the green one, differ from red-light and purple according to the more and less. As in the *MC*, Averroes blames him for having missed that this is true *only* for red-light and purple, but not for the green color. For this reason, Averroes concludes, Avicenna only criticized the Peripatetics without seriously discussing their explanation of the phenomenon.²⁰⁷

Afterwards, Averroes admits that it is not clear whether the commentators report Aristotle's doctrine correctly and claims that further research is necessary in order to assess their faithfulness, even if it is certain that Avicenna's criticism is directed not only against them, but 'even more' against Aristotle, the leader (*ra's*) of the Peripatetics. Averroes makes clear that there are two ways of understanding the expression 'intermediary': in a prior and proper sense, we call intermediary what comes to be from the blending of the two extremes and which is 'by essence' different from these latter; in an analogous and posterior sense, we also call intermediary what is different only in quantity and which

205 Averroes, *Epit. Meteor.*, p. 83, line 13–p. 84, line 8.

206 Ibid., p. 84, lines 21–2: 'Our friends the Peripatetics do not provide any explanation concerning the order of the colours'. Despite some minor differences, Averroes' quotation is almost literal, cf. Avicenna, *Ma ādin wa-āḡār*, p. 55, lines 8–9: 'In a general way, our friends the Peripatetics do not provide anything understandable concerning this issue of the colors and their difference'.

207 Averroes, *Epit. Meteor.*, p. 84, line 22–p. 85, line 1.

differs from the extremes according to the more or less. It is in the first sense, and not in the second, that Aristotle states that green is intermediary between red-light and purple.²⁰⁸

Adopting this interpretation, Averroes concludes that Avicenna's accusation against Aristotle is unjustified. However, he finally acknowledges that the interpretation of the commentators could actually be the wrong one, either because of the translation at their disposal or because they consciously chose a diverging interpretation. Still, in this case too, Avicenna is wrong, for he should have differentiated between Aristotle and the commentators and not use in his objection the word 'Peripatetics' *tout court*.

6.3 Conclusions

Before drawing the general conclusions of this study, some concluding remarks on the criticisms present in the *MC* and the *Epit.* of the *Meteorology* are in order. Even if we do not possess a *LC* on the *Meteorology*, the criticisms present in this part of Averroes' natural philosophy are an extremely important piece of evidence for the study of his attitude toward Avicenna and more generally for the reception of the latter's doctrine.

Concerning this last point, it must be emphasized first of all that Averroes' criticisms incontestably reveal a direct and precise knowledge of Avicenna's *Ma'ādin wa-ātār*; not only because this is the only part of the *Šifā'* in the treatises analyzed which Averroes quotes almost literally, but also because he reports many of Avicenna's observations and reproduces quite faithfully his account of the observed phenomena. Furthermore, these criticisms attest the existence of an ongoing debate in twelfth-century Andalusia on the issues pertaining to Aristotle's *Meteorology*. This is a significant element not only for the history of the reception of Aristotle's and Avicenna's thought, but more generally for the history of science.

A general assessment of this historical fact goes beyond the limits of this article, but the present survey of Averroes' criticisms give a hint of the reasons for the wide circulation of this part of the *Šifā'* and thereby of the importance that Averroes accorded to its discussion. From a more general point of view, the issues at stake are of a broader interest than other topics pertaining to philosophy in general and Peripatetic philosophy in particular, notably insofar as they concern other disciplines as mathematics, cosmology and geography. From Averroes' particular point of view, these issues have essential implications for his understanding of Aristotle's doctrine. The case of the rainbow concerns the boundaries of natural philosophy and insofar its status as a demonstrative

208 *Ibid.*, p. 85, lines 3–11.

science. As to the inhabitability of the lands, as we have shown, its implications exceed the limits of the meteorology and question, due to Ibn Ṭufayl's reading, the very basis of Aristotle's metaphysics.

Concerning Averroes' attitude against Avicenna, the criticisms present in the *Epit.* and the *MC* on the *Meteorology* also provide important elements for its understanding. They confirm most of the relevant features that we have singled out in the other treatises: the fact that criticisms are connected with problematic statements in Aristotle's text, which were debated by Averroes' predecessors (1, 2, 1*) and/or by his contemporaries (1*–3*); the effort of tracing back the origin of Avicenna's error to predecessors' reading (2, 1*), and of isolating him from Aristotle and more generally from the 'faithful' Peripatetic tradition (1, 2, 1*).

7 Final Considerations

It is difficult, perhaps even questionable, to try to provide a general assessment of Averroes' attitude towards Avicenna. Actually, we know that his stance on Avicenna's doctrine changes during his philosophical career and according to contexts. On metaphysical issues, in particular, it is notorious that in the first years of his philosophical production Averroes was positively influenced by Avicenna's theory of emanation. In this sense, the very relevance of a unifying account of their multifaceted relationship could be challenged. Moreover, Averroes' reconstructions of Avicenna's positions are sometimes so scanty and abridged that one can be tempted to deny that Averroes had direct access to Avicenna's texts or, alternatively, to accuse him of an ideological and intentional distortion of Avicenna's doctrine. In both cases, the very project of providing a general framework for evaluating Averroes' attitude toward Avicenna is jeopardized. The present study shows that this general assessment is viable and productive to understand Averroes' critical stance towards Avicenna.

The overview of all explicit criticisms in Averroes' writings attests that while it remains true that the appraisal of each criticism depends on its particular historical and doctrinal context, there are some essential features of Averroes' attitude that persist through the different periods. This survey reveals thus two kinds of features: those common to all different treatises and those specific to each one of them. Furthermore, even if the aim of the present contribution is not to evaluate the legitimacy of Averroes' accusations, the method pursued provides new evidence to better understand their ultimate reasons.

Six general features can be singled out in all treatises: (I) the explicit quotations of Avicenna are always polemical: there is no unquestionable and unreservedly positive mention of Avicenna's doctrines; (II) all the criticisms are essentially linked to difficult passages in Aristotle's texts; (III) these difficul-

ties result either from an actual obscurity of Aristotle's statements and/or (IV) from a preceding debate inside or outside the Peripatetic tradition; (V) a large number of passages reveal that these debates were still open in Andalusia at Averroes' time; in most cases Avicenna is identified as the initiator, inside the philosophical camp, of an allegedly erroneous reading of Aristotle's doctrines; (VI) to the extent possible, Averroes traces back the origin of Avicenna's presumed error to his predecessors, (VII) while trying to isolate him from other Peripatetics.

As for the results peculiar to the different treatises, we can point out five specific features: (VIII) the criticisms in the *LC* are by far the most numerous and the harshest ones, those in the *MC* are by far the least numerous. There are no criticisms in the *MC* on the *Physics* and only one in the Latin translation of the *MC* on the *De generatione et corruptione*, while the criticisms in the *MC* on the *De caelo* are all in a quite autonomous *quaestio* placed at the end of the commentary on book I. In the *MC* on the *Meteorology*, on the issue of the inhabitability of the Torrid Zone, Averroes does not criticize Avicenna, as he does in the corresponding part of the *Epit.*, but Ibn Ṭufayl; (IX) in the *LC*, mostly, the criticisms are inserted in more or less long and structured digressions, after the exegesis of Aristotle's text;²⁰⁹ (X) in the *LC* and *MC* more than in the *Epit.*, Avicenna's position is associated with al-Ġazālī and the *kalām* and (XI) he is accused of not solving the aporia stemming from Aristotle's statements, but on the contrary of giving arguments to Aristotle's opponents; (XII) in few cases, more often in the *Epit.*, Averroes admits the possibility that Avicenna's statement is not mistaken, even if he states that in its most natural interpretation his reading is wrong.

In conclusion, all these data put together reveal that Avicenna has always been a primary interlocutor to Averroes and that his criticisms concern all domains of natural philosophy: Avicenna is attacked on the most general issues concerning the epistemological nature of the science, as well as on more specific doctrines concerning the different kinds of natural bodies. The data also reveal that the fiercest attacks focus on doctrines that compromise according to Averroes the very foundations of Aristotelian philosophy, such as the essential link between matter and form, and between essence and essential accidents, the unity of the composite substance, the relationship between the natural movement and the moved body, the ontological status of celestial bodies.

209 Points VIII and IX are in a sense related: since digressions are the deputed place for criticisms, and since *MC* by their own nature tend to avoid digression, *MC* contain the smallest number of criticisms. Still, the two points must be kept separate, not only because we find exceptions to this picture (since Averroes actually inserts some digression in the *MC*), but also because there is no compelling reason to affirm that *LC* by their own nature tend to contain digressions.

The present survey also provides tentative answers to the question of Averroes' acquaintance with Avicenna's writings. Even if it is still difficult to establish the extent of his direct knowledge of the latter's works, in some cases we can identify precisely the passages in Avicenna's corpus Averroes is alluding to. The criticisms in the commentaries on *De generatione et corruptione* and *Meteorology* attest that Averroes had access to the corresponding part of the *Šifā'*, since he either paraphrases it quite faithfully or quotes it almost literally. The criticism of Avicenna's theory of the 'celestial cold' suggests that Averroes was also acquainted with the *Nağāt*. It must be emphasized that other criticisms concerning doctrines exposed in the *Šifā'* can also be traced back to the *Nağāt*. In this sense, it is plausible to assume that this work by Avicenna, together with the *Šifā'*, was one of Averroes' main sources. If this is the case, some of the simplifications of the former doctrine can be more easily explained.²¹⁰

However, in order to properly interpret these data and understand Averroes' attitude towards Avicenna, it is still necessary to undertake a survey also of all the implicit references to Avicenna's doctrines. In the case of some of the above-mentioned issues, I have pointed out that Averroes does not reject all of Avicenna's opinions and that he adopts part of Avicenna's account of the phenomena under examination. A more comprehensive comparative study of Avicenna's and Averroes' works is still paramount to confirm this picture. What seems certain, however, is that the choice and the assessment of Avicenna's doctrines at stake are never accidental nor the products of an ideological bias, but are explainable within the framework of an ongoing debate on Aristotle's philosophy in twelfth-century Andalusia.

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210 In this context, it is important to recall that the *Nağāt* also contains one of the very few explicit mentions of the *wāhib al-šuwār* (see Avicenna, *Nağāt*, p. 666). Here, Avicenna identifies the *dator formarum* with the intellect of the tenth sphere. This passage therefore can be one of the sources of Averroes' affirmation that the *dator formarum* is the agent intellect. On the 'non-Avicennian' character of this identification, see Janssens, *The Notions*, pp. 551–62, who however does not take this passage into account.

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Avicennian Sources in Abraham Ibn Daud's Natural Philosophy?

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1 Introduction*

The question mark after the title of this paper requires some explanation. As will be explained in more detail below the question of the use of Avicenna's writings in Abraham ibn Daud's philosophical book *Ha-Emunah ha-ramah* (*The Exalted Faith*; henceforth: *ER*), is a complicated matter. Put briefly, the problem is this: *ER*, written in Arabic around 1160 in Toledo, clearly testifies to a thorough familiarity with Avicennian doctrines, but it is not so easy to ascertain through which channels exactly Ibn Daud became acquainted with them. Avicennian doctrines in his book concern the following: the soul, the Necessary Existent, cosmology and the theory of emanation, and the problem of the origin of evil. More generally, Avicenna's thought is present throughout the book to such an extent that Ibn Daud (ca. 1110–80) is commonly considered to be the first representative in Jewish thought of the Aristotelianism as taught by the Muslim *falāsifa*. Yet Avicenna is never mentioned by name in *ER*, nor is any of his writings.

Several scholars including myself have treated the question of Ibn Daud's sources, but as yet no general consensus on the matter has been achieved. In her 1998 book A. Eran pointed to parallels with Avicenna's *Kitāb al-Nağāt* (*The Book of Salvation*) and al-Ġazālī's digest of Avicennian teachings in his *Maqāsid al-falāsifa* (*The Intentions of the Philosophers*).¹ In my own study of *ER* I noted several similarities with Avicenna's doctrines notably in Avicenna's *Kitāb al-Šifā'* (*Book of the Cure*) and in *Maqāsid*, alongside occasional parallels with *Kitāb al-Nağāt*.² This paper seeks to shed more light on the issue by contextualizing and problematizing the question of Ibn Daud's use of sources, and by comparing some relevant sections in the *ER*'s chapters on natural philosophy with the aforementioned Arabic texts. Among all Avicennian texts these

* Special thanks are due to Andreas Lammer for his critical reading of an earlier version of this article and his valuable comments.

1 Eran, *From Simple Faith*.

2 Fontaine, *In Defence of Judaism*.

summae are the most likely candidates because of their comprehensiveness and style.³ His *summa Kitāb al-Isārāt wa-l-tanbīhāt* (*Book of Pointers and Reminders*) is less detailed than these three works.⁴ Moreover, it was far more popular in the East than in the West.⁵

First, however, a few introductory words should be devoted to Ibn Daud's *ER*.⁶ The full title of the work is: *The Book Exalted Faith that Brings Agreement between Philosophy and Religion*. The term 'philosophy' refers to the thought of the *falāsifa*, in particular al-Fārābī and Avicenna, and Ibn Daud seeks to establish the promised 'agreement' by adducing Biblical verses that in his view allude to or prove the truth of the philosophical doctrines treated by him. More specifically, the aim of his expositions is to philosophically prove the freedom of the will, since Biblical verses contradict each other on this point. As noted above, Ibn Daud wrote his book in Arabic (*al-'Aqīda al-rafi'ah*), but unfortunately the original is lost. In the last decades of the fourteenth century, that is, some 200 years after his death, the book was translated into Hebrew twice, the first time under the title *Ha-Emunah ha-ramah*, and the second under the title *Ha-Emunah ha-nissa'ah*. In what follows, references will be to *ER*, which has become the 'standard' translation.⁷

Abraham ibn Daud does not mention by name any Muslim sources, with the exception of al-Fārābī's commentary on the *Topics*.⁸ Moreover, there is one reference to 'a Muslim sage' who turns out to be al-Ġazālī, but these two passages are not concerned with natural philosophy, the subject of the present volume.⁹ The Jewish author usually refers to 'the true philosophers' (*ha-filo-*

3 It should be noted, though, that these three texts display numerous differences among themselves in terms of length, arrangement of the subject-matter, explanations, examples, and other details.

4 For example, this work does not treat motion very extensively.

5 For its *fortuna* in the East, see McGinnis, *Pointers, Guides, Founts and Gifts*, and Wisnovsky, *Avicenna's Islamic Reception*.

6 For more detailed information on Abraham ibn Daud and his thought, see my entry on him in *The Stanford Encyclopedia of Philosophy*, and the monographs Eran, *From Simple Faith*, and Fontaine, *In Defence of Judaism*.

7 References to *ER* are to ed. Weil 1851 with references to ed. Samuelson/Weiss 1986 (= S) in parentheses. For the passages to be discussed below I have also consulted the second translation, which has been preserved in a unique manuscript dated 1391 (MS Mantua, Bibliotheca Comunale, 81). It is available in the annotated edition of *Ha-Emunah ha-nissa'ah* by Eran, *Meqorotav ha-filosofiyim shel Avraham ibn Daud be-sifro al-'Aqīdah al-rafi'ah*. As has been shown by Eran, this translation was based on *ER*, and is less precise than *ER*.

8 Ibn Daud, *ER* II.4.3, p. 65, line 22 (S 155b2–3).

9 *Ibid.* II intro, p. 45, line 27 (S 123a163). Ibn Daud presents a parable that is taken from al-Ġazālī's *Mizān al-'amal*.

*sofîm ha-'amittiyyim*¹⁰) without further specification, although he sometimes contrasts their views to those of 'the physicians'.

2 The Jewish Context

To begin with, it is important to note that the aforementioned uncertainty about Ibn Daud's acquaintance with Avicennian texts is not specific to Ibn Daud: it forms part of a wider context, that is, the reception of Avicenna among medieval Jews in general. During the past fifteen years or so important new research has been carried out on this topic, among others by M. Zonta, W.Z. Harvey, and S. Harvey,¹¹ and most recently by G. Freudenthal and M. Zonta.¹² In their comprehensive article 'Avicenna among Medieval Jews', Freudenthal and Zonta treat a phenomenon that they characterize as 'Avicennian knowledge without Avicenna'.¹³ By this they mean the paradoxical situation that although several Avicennian philosophical doctrines were widely known and adopted by Jewish philosophers, Avicenna hardly existed among them as 'an author associated with a definite corpus of writings'.¹⁴ The absence of an Avicennian corpus among Jews stands in stark contrast to the Jewish reception of Averroes' corpus, in particular of Averroes' various commentaries on Aristotle's writings, which were translated into Hebrew and studied intensely. This raises the question of whether Jewish authors were in fact acquainted with Avicennian philosophical writings or whether they were aware of his ideas without having actually studied texts by Avicenna.

In recent years, it has also become a matter of debate whether the most important medieval Jewish philosopher, Moses Maimonides, author of the *Guide of the Perplexed* written in Arabic in the 1190s in Fustat (nowadays Cairo), knew any writings by Avicenna. In an article published in 2005 M. Zonta suggested that al-Ġazālī's *Maqāṣid* was 'the real, direct source of many, if not all of Maimonides' "Avicennian" doctrines,' and that Maimonides

10 The Arabic equivalent of the Hebrew expression is perhaps *al-faylasūf bi-l-ḥaqīqa*, as found in al-Fārābī in his *Tahṣīl al-Sa'āda*, section 59. In his abridged Hebrew translation, Šemtov ibn Falaquera (13th century) adds to al-Fārābī's identification of the prince as the philosopher-legislator (section 57): 'and he is the true philosopher' (*we-hu' ha-filosof ha-amitti*), an addition that he may have taken from section 59, a section that he does not translate. In a later passage (section 62), he translates *al-faylasūf bi-l-ḥaqīqa* as *ha-filosof 'al ha-emet*. I would like to thank S. Harvey for pointing out these passages to me.

11 Zonta, *Avicenna in Medieval Jewish Philosophy*; W.Z. Harvey, *Maimonides' Avicennism*; S. Harvey, *Avicenna's Influence on Jewish Thought*.

12 Freudenthal and Zonta, *Avicenna among Medieval Jews*. For a review of this article, see S. Harvey, *Some Notes on 'Avicenna among Medieval Jews'*.

13 Freudenthal and Zonta, *Avicenna among Medieval Jews*, p. 227.

14 *Ibid.*, p. 217.

may not have known the *Kitāb al-Šifāʾ* or the *Kitāb al-Nağāt* at all.¹⁵ In his 2005 book on Maimonides H.A. Davidson also points to al-Ġazālī as an important source for Maimonides' knowledge of Avicennian ideas and casts doubt on Maimonides' direct familiarity with Avicenna's writings.¹⁶ Since Maimonides is not the subject of this paper, I will leave this issue aside.¹⁷ Yet it should be borne in mind that even if it can be proven that the Great Eagle had no direct knowledge of Avicenna, this need not necessarily be valid for Ibn Daud who, it may be recalled, wrote his *Exalted Faith* in Toledo some decades before Maimonides, and may have had other sources at his disposal. In any event, in light of the recent research, the question of whether the *Maqāṣid* may have been Ibn Daud's *exclusive* source should be treated in any examination of the sources of *ER*.¹⁸

3 The Availability of Avicennian Texts in Andalusia

We do not know exactly when Avicenna's writings became available to Jews in Andalusia. As was established already in 1876 by S. Landauer, Judah Halevi incorporated sections of Avicenna's treatise on the soul (*Risāla fī-l-nafs*) in his *Kuzari*, a work that he completed ca 1140, but on which by his own declaration he had been working for twenty years.¹⁹ Furthermore, Abraham ibn Ezra's philosophical poem *Hay ben Meqīṣ* makes use of Avicenna's *Ḥayy ibn Yaqzān*, which means that this book was known in Andalusia before 1140, presumably from the early 1130s.²⁰ As far as we know, by this time Ibn Daud lived in Andalusia where he received his intellectual formation, which included the study of philosophy, but it cannot be ascertained that he studied texts by Avicenna here. The Andalusian Ibn Bāḡḡa (d. 1138) does not seem to have been familiar with them.²¹ Ibn Ṭufayl refers to Avicenna's *Šifāʾ* as well as to his *Kitāb al-Išārāt wa-l-tanbīhāt* in his introduction to *Ḥayy ibn Yaqzān*, but since the latter work is now believed to have been composed between 1177 and 1182, this is not relevant for our inquiry, for Ibn Daud produced his book ca 1160.²² Moreover,

15 Zonta, Maimonides' Knowledge of Avicenna, pp. 212–13 and 222.

16 Davidson, *Moses Maimonides*, p. 104, n. 146; pp. 115 and 121. On Maimonides' attitude toward Avicenna, see also W.Z. Harvey, Maimonides' Avicennianism; on Maimonides' indebtedness to al-Ġazālī, see Eran, Al-Ghazali and Maimonides on the World to Come.

17 On this issue, see Freudenthal and Zonta, Avicenna among Medieval Jews, pp. 221–8, and S. Harvey, Some Notes on 'Avicenna among Medieval Jews', pp. 253–6.

18 See also Freudenthal and Zonta, Avicenna among Medieval Jews, pp. 236–7.

19 Landauer, *Die Psychologie des Ibn Sīnā*.

20 S. Harvey, Avicenna's Influence on Jewish Thought, p. 331.

21 Gutas, *The Heritage of Avicenna*, p. 90. See also Lettinck, *Aristotle's Physics*, p. 259.

22 For a refutation of Cruz Hernández's claim that Ibn Ṭufayl was the first Andalusian thinker to use Avicenna, see S. Harvey, Avicenna's Influence on Jewish Thought, pp. 327–30.

in view of this date it is unlikely that he drew his knowledge about Avicenna's teachings from Averroes' criticism of them in the latter's commentaries, since the commentaries began to appear only from 1159 onwards.

Significantly, no Judaeo-Arabic manuscripts of Avicenna's key texts, *Šifā'* and *Nağāt* are extant.²³ More information about the availability of Avicennian writings in the Iberian peninsula can be gleaned from the Arabic-into-Latin translations of them. The following parts of the *Šifā'* became available in Latin in the third quarter of the twelfth century in Toledo: (i) The introduction of Avicenna's secretary al-Ġūzġānī and the Prologue of Avicenna (1152–66); *Madḥal* (1150–1200); *Physica* I-III.1 (c. 1150–75); *De anima* (1152–66); *Metaphysica* (c. 1150–75).²⁴

These translations were produced in Toledo, where Ibn Daud lived at that time, and, as we will see below (section 6), it is highly probable that he was involved in the project. Unlike the *Šifā'*, the *Nağāt* was never translated into Latin, nor was any other philosophical work by Avicenna, and we do not know whether this compendium was circulating in Toledo or in the Iberian peninsula in Ibn Daud's day. By contrast, al-Ġazālī's *Maqāšid* was rendered into Latin in Toledo around the same time as the *Šifā'* and became very popular.²⁵

As for Arabic-into-Hebrew translations of philosophical writings by Avicenna, it should be observed that not much of them was translated into Hebrew: for the *Šifā'* we can point to only a few short passages.²⁶ Ṭodros Ṭodrosi translated substantial parts from the *Nağāt* (physics and metaphysics) under the title *Hašalat ha-nefeš*, but this was only around 1340 in Southern France and the text does not seem to have had a wide diffusion.²⁷ The *Maqāšid*, in contrast, was translated into Hebrew several times in the late thirteenth and the first decades of the fourteenth century and commented upon.²⁸ The work enjoyed great popularity among Jewish scholars, but all this was long after Ibn Daud's time.

Needless to say, Ibn Daud, who knew Arabic, did not need any Hebrew or Latin translations. These data are relevant, however, for the question which Arabic texts were available in Ibn Daud's day in Toledo. What emerges from them is that Ibn Daud may have had access to (parts of) the *Šifā'* and the *Maqāšid* when he was writing *ER*, although their mere presence in Toledo does not offer conclusive evidence for it. Conversely, the lack of data about the availability of the *Nağāt* in Toledo does not preclude the possibility that he was, after all,

23 Freudenthal and Zonta, *Avicenna among Medieval Jews*, pp. 234–5.

24 For these data, see Bertolacci, *The Reception of Avicenna*, Table 12.1, pp. 246–7.

25 *Ibid.*, pp. 264–6.

26 Freudenthal and Zonta, *Avicenna among Medieval Jews*, pp. 239–40.

27 See now the edition by Elgrably-Berzin, *Avicenna in Medieval Hebrew Translation*.

28 S. Harvey, *Why Did Fourteenth-Century Jews Turn to Alghazali's Account of Natural Science?*

acquainted with this text. Therefore, I will now proceed to compare some sections of Ibn Daud's natural philosophy with passages in the Avicennian texts in order to examine whether or not Ibn Daud's phrasing of certain views and arguments testifies to a direct use of Avicennian texts.

A methodological note is in order here: in the absence of the Arabic original of *ER* this comparison must be based on its Hebrew translation. However, since medieval Hebrew translations of Arabic philosophical texts tend to be quite close to their source-texts in cases where we do have the original, we may be confident that as a rule not much is lost in this translation either. Although we cannot exclude the possibility that occasionally a term may be mistranslated, Arabic terminology and syntax are clearly visible in the Hebrew of *ER*. This implies that if we find similarities or parallels in phrasing between *ER* and the Arabic texts under consideration, we may be confident that these formulations were present also in the lost *al-'Aqīda al-rafi'a*. Therefore, when in what follows I write 'Ibn Daud says/writes' or words of similar import, my understanding is that the Hebrew translation renders the Arabic faithfully.

4 Comparison of Some Selected Passages

Here another difficulty immediately presents itself, namely the relative paucity of relevant material in Ibn Daud's treatise. The sections containing discussions in the field of natural philosophy proper are rather limited. *ER* consists of an introduction and three parts of unequal length. The bulk of the book (parts I and II) is devoted to 'theoretical philosophy' and covers what may be called natural philosophy and metaphysics. Ibn Daud himself describes part I as 'introduction into natural philosophy and metaphysics', being 'the minimum of what someone needs who wishes to know the Jewish religion when he has left the level of the multitude behind him'.²⁹ Part II is called 'On the principles of religion'; a sizeable part of it concerns metaphysical issues.³⁰

29 Ibn Daud, *ER* introd., p. 1, lines 7–8 (S 1b18–20).

30 Ibid. introd., p. 1, lines 9–10 (S 1b20–2b1).

Introduction (pp. 1–4)

Part One:

I.1 substance and accident; the categories (pp. 4–8)³¹

I.2 matter and form; the elements (pp. 9–13)

I.3 motion (pp. 13–15)

I.4 infinity (pp. 15–17)

I.5 motion continued (pp. 17–20)

I.6–7 soul (pp. 20–41)

I.8 heavenly bodies/spheres (pp. 41–3)

Part Two:

Introduction (pp. 44–6)

II.1–3 God (the Necessary Existent), his unity and attributes (pp. 47–57)

II.4 God's actions (existence of the intellects and emanation) (pp. 57–69)

II.5. Prophecy (pp. 75–81)

II.6.1 Secondary principles; causality (pp. 81–93)

II.6.2 On the origin of evil; free will; providence (pp. 93–8)

III. Practical philosophy (pp. 98–104)

As can be seen in this outline, the section on the soul is the most elaborate of the chapters on natural philosophy, and takes up about 20% of the entire book. Since the reception of Avicenna's views on the soul and logic, however, does not belong to the subject matter of the present volume, only chapters I.2–5, twelve pages in all, are relevant for our discussion here. It will come as no surprise, therefore, that Ibn Daud's discussions of topics such as motion and infinity are far less elaborate than those in Avicenna's writings. The explanation for Ibn Daud's conciseness is that he wrote his book for students who had just started to study philosophy and were confused by the problem of the relation between philosophy and religion.³² In other words, Ibn Daud wrote for readers who needed to be introduced to the basic tenets of contemporary philosophy,

31 The placement of a section on logic in pt. 1 is remarkable. *ER* I.1 treats the distinction between substance and accident as well as the categories. It has a polemical purpose; Ibn Daud refutes Solomon ibn Gabirol's view in his *Meqor hayyim (Fons vitae)*, according to which the selfsame thing can be both an accident and a substance. A clear distinction between substance and accident is of crucial importance for later chapters of the *ER*, for example in that on matter and form and that on the soul, whereas his discussion of the categories is relevant for his exposition on motion. Ibn Daud does not specify why he includes this section under natural philosophy, although he must have been well aware of the fact that Avicenna assigned logic a place of its own in his writings. Ibn Daud limits himself to saying that he will discuss the philosophical topics only after having elucidated what 'substance' and 'accident' truly are (*ER*, p. 3, lines 38–9; S 7b1–2).

32 Ibn Daud, *ER* introd., p. 4. (S 8b4–6).

not for an audience of advanced students who would have been interested in the subtleties of (Avicennian) philosophy.

Furthermore, it is important to note that the views put forth in the first part are limited to those that Ibn Daud needs for his treatment of ‘principles of religion’ in the second part of his book, for example, for his proofs for God’s existence and unity. These two circumstances imply that the discussions in chapters I.2–5 are brief, basic and selective, which complicates the issue of the sources used in *ER*. Moreover, it is noteworthy that religious principles are not limited to part II; as we shall see, the religious dimension is present also in chapters I.2–5.

4.1 Ibn Daud’s Discussion of Infinity

The chapter on infinity (*ER* 1.4, pp. 15–17) aims to show that infinite body or a series of numbered or ordered things cannot exist in actuality. Nor is it possible for an infinite power to exist in a finite body. Ibn Daud’s point of departure is the argument according to which an infinite *line* in actuality cannot exist.

His version of the argument is as follows:

Suppose that two lines AB and CD are infinite in the directions of B and D, and that we detract from line CD a finite segment CE and lengthen the line ED until E is where C used to be, and then we would examine whether ED is equal to AB or shorter than AB. If ED is equal to AB, and CD was *ex hypothesi* equal to AB, then CD is equal to [ED] and ED is equal to [CD], for when two things are equal to one thing, they are equal. Thus CD will be equal to ED, [which implies] that the smaller is like the greater, and this is a contradiction which is absurd. Therefore ED is not equal to AB, but must be shorter than AB. But if ED is infinite, then it is smaller than the infinite line AB, and one infinite cannot be shorter than another infinite. Therefore ED must be finite. If we then add the finite segment CE to it, the aggregate (or: composite [*mequbaş*]) ED–CE must be finite, for something infinite cannot be composed of finite things.³³

Ibn Daud concludes: ‘since line CD is equal to line AB, therefore both AB and CD are finite lines of a known magnitude, that is, it is possible to know their magnitude. Therefore, it is impossible that an infinite line exists.’³⁴

The proof, sometimes called ‘the method of application,’³⁵ serves Ibn Daud as a prototype for the refutation of the existence of the infinite in all kinds of quantities: he infers from it that no infinite surface or body can exist in actu-

33 Ibid, p. 15, line 30–p. 16, line 7 (S 41b5–42b4).

34 Ibid., p. 16, lines 7–9 (S 42b4–6). Quoted after Rudavsky, *Time Matters*, p. 83.

35 See Davidson, *Proofs for Eternity*, p. 126. It is called this way because one magnitude is applied to another.

ality. Proofs for the impossibility of the existence of an infinite magnitude in actuality were adduced in one form or another by many Muslim and Jewish philosophers.³⁶ The key elements of it are (i) that in positing something infinite and detracting a part of it, one infinite would be greater than another, which is impossible, and (ii) that the infinite cannot be composed of finite parts. Ibn Daud was not the first Jewish thinker in Spain to use it, for it was already known to the eleventh-century scholar Bahya ibn Paquda.³⁷ It is difficult, however, to point to a precise source for the proof that an infinite line cannot exist in actuality, for it is found in different forms in Avicenna's *Šifā'*, his *Nağāt*, and in al-Ġazālī's *Maqāšid*.³⁸

According to H.A. Wolfson, both Ibn Daud and al-Šahrastānī derived the proof from the *Nağāt*.³⁹ It is true that Ibn Daud's wording is closer to that employed in the *Nağāt* than that of *Šifā'* or *Maqāšid*.⁴⁰ Unlike Ibn Daud, however, the *Nağāt* does not base the proof on a (postulated) infinite line, but on a 'continuous quantity' (*kamm muttašil*) and 'a magnitude having position' (*miqdār dū waḍ'*) from which a finite part is removed. The *Šifā'* refers to: 'any infinite magnitude' but adds that it may be a line, a surface or a body. In fact, if we substitute Avicenna's 'magnitude' by Ibn Daud's 'line', the two proofs are very similar with regard to the line of reasoning, although the terminology is slightly different. The proof as articulated in the *Maqāšid* mentions a line, but the formulation of the proof differs from that of the *ER*. Moreover, all sources add that the magnitude can be supposed to be either infinite in all directions or infinite at one side, a detail that is absent in the *ER*.

Ibn Daud's inference that neither an infinite surface nor an infinite body can exist in actuality is followed by a proof to the effect that no infinite series of numbered ordered 'things' can exist in actuality since the notions of 'numbered' and 'infinite' contradict each other.⁴¹ In Avicenna's *Šifā'* and *Nağāt* the case of a series of numbered 'things' is treated together with that of an infinite magni-

36 For the development of this proof in medieval Islamic philosophy, where al-Kindī seems to have been the first to use it, see McGinnis, *Avicennan Infinity*, and Lettinck, *Aristotle's Physics*, p. 256. For the different uses of such proofs, see Davidson, *Proofs for Eternity*. Cf. also Wolfson, *Crescas' Critique of Aristotle*, index s.v. 'infinite', and Rudavsky, *Time Matters*, pp. 82–3.

37 Ibn Paquda, *Ḥovot ha-levavot (Duties of the Heart)* I.5, pp. 72–4.

38 The proofs are found in Avicenna, *Šifā': Physics* III.8.1, p. 325 (ed. McGinnis); id., *Nağāt: Physics*, vol. 1, pp. 153–4 (ed. 'Umayra), and al-Ġazālī, *Maqāšid*, p. 197 (ed. Dunyā). In the latter it belongs to the part on metaphysics, not physics.

39 Wolfson, *Crescas' Critique of Aristotle*, p. 347 provides the proof as formulated in the *Maqāšid* in Hebrew translation.

40 Ibn Daud's terms *kamah mitdabbeq (kamm muttašil*, 'continuous quantity'); *šaweh (muttasāwiya*, 'equal') and *mequbaš (mağmū'*, 'aggregate/composite'), are all found in the *Nağāt* but not all of them in the *Šifā'* or the *Maqāšid*.

41 Ibn Daud, *ER*, p. 16, lines 13–17 (S 42b13–18).

tude. The proof in al-Ġazālī's *Maqāṣid* refers to an infinite line, not to number, and is followed by a proof for the impossibility of an infinite series of *causes*. Ibn Daud does not say explicitly that he has a series of causes in mind when he refers to 'numbered things'. From a later passage, however, it may be inferred that this is indeed his intention.⁴² If this interpretation is correct, Ibn Daud's line of reasoning follows that of his Avicennian sources.

Ibn Daud adds three arguments in corroboration of his thesis: (i) ordered things have a beginning, middle and end, whereas infinite things are all in the middle;⁴³ (ii) an infinite thing cannot be in a place, for it cannot be surrounded by anything,⁴⁴ and (iii) an infinite body will neither be in rest, nor in motion.⁴⁵ These are stock arguments, deriving from Aristotle's *Physics*, and Ibn Daud may have become acquainted with them in various ways; but among the aforementioned Avicennian sources, the *Šifā'* is the only one where the three arguments can be found.⁴⁶

In comparing these passages in *ER* with the relevant Avicennian texts, however, it is important to consider also the structure and context of Ibn Daud's discussion of infinity. Significantly, in *ER* the discussion on infinity is not limited to the theoretical discussion in I.4, where it in fact interrupts the account of motion (*ER* I.3 and I.5), a topic to be discussed below. The section containing biblical proof texts that immediately follows I.4 continues the philosophical exposition, for more than half of it is devoted to the proof that a finite body cannot contain an infinite power, a proof that is reminiscent of that for the impossibility of an actual infinite line. Here Ibn Daud already hints at the implication: the world cannot be governed by a corporeal power. Furthermore, the account of infinity is continued at the end of I.5, where Ibn Daud evokes the thesis that no infinite ordered series can exist.⁴⁷ He now concludes from it that the series of causes must necessarily end at a first mover (cf. next section).⁴⁸ Whereas in *ER* I.4 one could gain the impression that Ibn Daud was referring to numbers, here he clearly has in mind a series of causes, or more exactly movers.

Ibn Daud's discussion of this topic thus reveals unambiguously that the main goal of these chapters on natural philosophy is to lay the basis for meta-

42 See below on this page.

43 Ibn Daud, *ER*, p. 16, lines 17–24 (S 42b18–43b8). Cf. Aristotle, *Metaphysics*, 994a10–19.

44 Ibn Daud, *ER*, p. 16, lines 24–9 (S 43b8–13). Cf. Aristotle, *Physics*, 205b31–206a8.

45 Ibn Daud, *ER*, p. 16, lines 29–35 (S 43b13–44b3). Cf. Aristotle, *Physics*, 205a15–19.

46 The first argument is given in *Šifā'*: *Metaphysics* VIII.1 (where the context is a series of causes); for the second, cf. *Šifā'*: *Physics* III.8.3 and III.8.9, and for the third, cf. *Šifā'*: *Physics* III.8.8–9.

47 Ibn Daud, *ER*, p. 19, lines 11–18 (S 52b1–8).

48 *Ibid.*, p. 19, lines 18–29 (S 52b9–53b4). To be more precise, at this stage Ibn Daud leaves open the possibility that there is more than one such mover, noting that the number of unmoved movers will be treated in pt. II.

physical teachings to be explored in part II. It is especially in II.1 where he seeks to prove the existence of God as the First Cause and the Necessary Existent that he makes recourse to his doctrines concerning infinity, in particular to the thesis that there is no infinite regress of causes and that the Necessary Being is incorporeal. Put differently, Ibn Daud makes use of Avicennian teachings in a manner that suits his own purposes. He is not interested in theoretical discussions about infinity as such, which explains why he omits much material that he could have found in Avicenna, for example, a discussion of atomism or the question in what sense the potential infinite can exist.

4.2 Ibn Daud's Discussion of Motion in *ER* I.3 and I.5

The contents of Ibn Daud's account of motion in *ER* I.3 can be summarized as follows: the term 'motion' is used first and foremost for locomotion and change in position, but it is also used for every gradual continuous change in the categories of quantity and quality. This description excludes sudden change from being considered as motion, for example when vitriol liquid is poured out on gallnut-water, turning it black instantaneously.⁴⁹ The term 'natural motion' applies primarily to the motion of the elements.⁵⁰ The elements are moved by their forms on God's command, by the intermediacy of their accidents. Each of the elements moves to its own natural place; this constitutes the basis of the order of the universe.⁵¹ Nature is defined as: 'a certain principle and rest for a thing [in which it inheres] essentially, not accidentally'.⁵² There are four kinds of motion: uniform; manifold; voluntary, and non-voluntary. By the term 'natural motion' we mean primarily non-voluntary unchanging motion, i.e., the motion of the elements.⁵³

After the discussion of infinity in *ER* I.4 (see above, section 4.1), Ibn Daud returns to the topic of motion in *ER* I.5. Here he repeats in which senses the term 'motion' is used, this time making a distinction between its usage by the multitude and that by philosophers. He asserts that the term 'motion' is taken by the multitude to refer to locomotion or motion with regard to position, and that philosophers, moreover, apply the term to every gradual continuous change in the categories of quantity and quality. Next he discusses at some length why there cannot be motion without a mover and provides arguments against the

49 Ibn Daud, *ER*, p. 13, lines 19–33 (S 33b13–34b12).

50 Ibid., p. 13, lines 33–4 (S 34b13–14).

51 Ibid., p. 14, lines 11–16 (S 36b1–37b5).

52 Ibid., p. 14, lines 27 (S 37b7–8).

53 Ibid., p. 14, line 32–p. 15, line 11 (S 37b14–39b9).

view that things can be moved by themselves.⁵⁴ The section is ended by what is in fact the upshot of Ibn Daud's accounts of motion and infinity: all motions end in a First Unmoved Mover who is neither moved by another mover nor moves in a circle.⁵⁵

For several of Ibn Daud's statements on motion parallels can be found in the Avicennian texts under discussion, for example: (i) the use of the term 'motion' applies primarily to locomotion;⁵⁶ (ii) the term 'nature' is said first of all of the forms of the elements;⁵⁷ (iii) motion occurs in the categories place, quantity, quality and position,⁵⁸ and (iv) motion can be divided into four kinds, although this division is less pronounced in the *Nağāt*.⁵⁹ Moreover, the stock examples of change in the categories position (sitting-lying down), quantity (large and small) and quality (hot and cold; white and black) are the same in all three texts.

Whereas Ibn Daud's description of motion as 'every little-by-little change in a body that is continuous and gradual' (*kol šinnuy yihyeh le-gešem me 'aṭ me 'aṭ bi-devequt we-hadragah*)⁶⁰ is not found verbatim in the sources under consideration, the key-terms in it do have parallels, in particular in the *Šifā'*. The expression *me 'aṭ me 'aṭ* (little-by-little) renders *yasīran yasīran* that occurs several times in the *Šifā'* alongside *qalīlan qalīlan*.⁶¹ *Yasīran yasīran* is also found in the *Nağāt*, but not in the *Maqāšid*.⁶² The term *bi-devequt* (continuous) corresponds to *ittišāl* of the *Šifā'*,⁶³ but is neither found in the parallel passages in the *Nağāt* nor in the *Maqāšid*. *Hadragah* (gradual), finally, is a translation of derivations of the Arabic root *d-r-ğ*, as found in the *Šifā'* (*mutadarriğan yasīran yasīran*), and in the *Maqāšid* (*'alā l-tadrīğ*), but it does not occur in the *Nağāt*.⁶⁴

There is, however, one particular element in the *ER*'s exposition of motion that suggests familiarity with the *Maqāšid*. This concerns Ibn Daud's observation that the common use of the term 'motion' denotes motion of place and position, and that it is furthermore used by philosophers for every gradual

54 Ibid., p. 17, line 22–p. 19, line 11 (S 50b4–52b8).

55 Ibid., p. 17, lines 3–18; cf. above, n. 48.

56 Avicenna, *Šifā'*: *Physics* II.1.4 (end), p. 111; al-Ġazālī, *Maqāšid*, p. 304. This is mentioned in passing in Avicenna, *Nağāt: Physics* p. 136, line 1.

57 Ibn Daud, *ER*, p. 14, line 26; Avicenna, *Šifā'*: *Physics* I.6, p. 48; al-Ġazālī, *Maqāšid*, p. 310.

58 Avicenna, *Šifā'*: *Physics* II.3.20 (end), p. 151; id., *Nağāt: Physics*, p. 134, line 2, and al-Ġazālī, *Maqāšid*, pp. 305–6. According to Wolfson, *Crescas' Critique of Aristotle* (p. 502), Ibn Daud adopted al-Ġazālī's classification.

59 Avicenna, *Šifā'*: *Physics* I.5.3, p. 39; al-Ġazālī, *Maqāšid*, p. 310; cf. Avicenna *Nağāt: Physics*, p. 135, line 22–p. 136, line 2.

60 Ibn Daud, *ER*, p. 13, lines 25–6 (S 34b3–4). The translation in *EN* is very similar: *kol hištan-nut ... me 'aṭ me 'aṭ bi-temidut we-hadragah*.

61 See, for example, Avicenna, *Šifā'*: *Physics* II.1.2, p. 108; II.3.13 and II.3.14 (p. 145).

62 Id., *Nağāt: Physics*, pp. 133–4.

63 Id., *Šifā'*: *Physics* II.1.3, pp. 109 and 112.

64 Ibid., see n. 68; al-Ġazālī, *Maqāšid*, p. 304.

change in quantity and quality. Al-Ġazālī writes: 'It is well known [or: widely accepted, *mašhūr*] that "motion" is applied only to transition from one place to another (*intiqāl*), but by general agreement (*bi-štilāḥ al-qawm*) it denotes something more general, namely a process from one property to another that takes place gradually.'⁶⁵ Both authors thus distinguish between different uses of the term and refer to 'gradual change' in particular.⁶⁶

Turning now more specifically to the division into four kinds of motion, it should first be noted that this division is original with Avicenna.⁶⁷ Ibn Daud's division of motion into uniform and non-uniform (or: manifold) on the one hand, and voluntary or involuntary on the other, clearly follows that of Avicenna. Consider the scheme as drawn up in *ER*, p. 14 line 32–p. 15, line 2:

uniform voluntary motion: heavens
uniform and involuntary: elements
non-uniform and involuntary: plants
non-uniform and voluntary: animals

as well as Ibn Daud's addition that only the second kind is called 'natural motion'; the other three are motions of a soul, namely celestial, vegetative and animal-soul respectively.

This fourfold division, including the addition, bears great similarity to that found in the *Šifā'*.⁶⁸ It provides the same examples, and is also close in terminology. It is also quite close to al-Ġazālī's slightly less detailed presentation of it in the *Maqāšid*. As to the terminology: For 'uniform' *ER* has *me-ofen eḥad* (literally: in one way), which in all probability renders '*alā nahḡ wāḥid* of the *Šifā'*'.⁶⁹ The corresponding term in the *Maqāšid* is *muttaḥid*.⁷⁰ For 'non-uniform' both *mithalefot* and *mištannah* (these terms are synonyms and denote 'in different ways' in this context) are used, rendering Avicenna's *mutafannin* (*Šifā'*) and/or al-Ġazālī's *muḥtalifa* and *ilā ḡihāt muḥtalifa*.⁷¹ These terms are lacking in the *Naḡāt*.

65 Al-Ġazālī, *Maqāšid*, p. 304.

66 One may wonder whether Ibn Daud takes the Arabic *al-qawm* in the expression *bi-štilāḥ al-qawm* to refer to 'philosophers'. According to A.-M. Goichon, in her *Lexique de la langue philosophique d'Ibn Sīnā* (p. 323), *qawm* in Avicenna means 'le vulgaire opposé au sage, d'où le sens de non-philosophe, ceux qui ne sont pas instruits des choses de la philosophie.' However, some 14th-century Hebrew translators of the *Maqāšid*, Judah ben Solomon Natan and Isaac Albalag, translated *bi-štilāḥ al-qawm* as 'the agreement of the wise (*ha-ḥakhamim*)' or 'as agreed upon by the philosophers (*ha-filosofim*).' I am grateful to Steven Harvey for having supplied me with the relevant passages of these translations.

67 See A. Lammer, *Defining Nature*, esp. pp. 139–41.

68 Avicenna, *Šifā'*: *Physics* I.5.3, p. 39. Cf. Lammer, *Defining Nature*, 139–41.

69 Translated by McGinnis (p. 39) as 'according to a single course'.

70 Al-Ġazālī, *Maqāšid*, p. 310.

71 We do not know whether the use of two terms for 'non-uniform' goes back to Ibn Daud himself, or whether it is due to the translator. Unfortunately, the greater part of the division

It may moreover be added that Ibn Daud's definition of 'nature' is found almost verbatim in the *Šifā'*. The difference is that Ibn Daud says that it is 'a certain' principle of motion and rest, whereas Avicenna has 'the first principle'. On the other hand, the Aristotelian definition was well known to Muslim and Jewish philosophers, and Ibn Daud may have come across it in other sources as well.⁷²

Ibn Daud's discussion of motion, like that of infinity, is instrumental for his expositions in the second part of *ER*. The notions that there is no motion without mover and no infinite regress of motions are put to use in the second part of *ER*, where he is concerned with the demonstration of the existence of a First Unmoved Mover and with questions related to the actions of this entity. To be sure, here Ibn Daud follows Avicenna, who in book VIII of his *Metaphysics* also makes use of the impossibility of an infinite regress to prove God's existence, but Ibn Daud anticipates, already in his physics, the implications of the proof that the infinite cannot exist in actuality.

Ibn Daud's chapters on motion also display differences from the Arabic source-texts. For example, one of his arguments against self-motion is that when one walks from one place to another, mover and moved are not identical, for a hierarchical series of movers is involved, the bones being moved by the sinews and the sinews by the muscles etc., and the series does not end with the (human) will, for above it are other movers. Moreover, Ibn Daud presents another example by describing in detail the process in which wheat becomes flour through the operation of a millstone: here too the motion is performed by a series of movers, one above the other, a process set in motion by the will of the craftsman. However, Ibn Daud adds, above this will there are other wills.⁷³ The last two examples do not derive from Avicenna's discussion.⁷⁴

Moreover, there are notable omissions in *ER* of topics discussed at length by Avicenna. For example, Avicenna's extensive inquiry why there is no motion in

of motion into four kinds is missing in the only extant copy of the second translation. The missing section covers *ER*, p. 14, line 34–p. 15, line 6 (S 37b17–39b3). We have only the translation for 'uniform', namely *bilti šonot*, which means: not manifold.

72 Avicenna, *Šifā'*: *Physics* I.5.4, p. 40: 'the first principle of motion and rest in that to which it belongs essentially rather than accidentally' (transl. McGinnis). Avicenna subsequently analyzes the various elements of this description. On the discussion of Aristotle's definition by his Greek commentators and Avicenna, see Lammer, *Defining Nature*.

73 Ibn Daud, *ER*, p. 18, line 30–p. 19, line 11 (S 51b3–18). As to the 'other wills', Ibn Daud notes that this will be explained later. In all probability he has in mind his account of emanation in pt. II.

74 It should be noted, though, that the millstone emerges in Avicenna's discussion of atomism, cf. Avicenna, *Šifā'*: *Physics* III.3.15–16, pp. 279–80. See also *ibid.*, III.4.12, p. 295, and IV.8.2–3, pp. 451–3, where the context is the continuity of motion. Bahya ibn Paquda refers to the upper stone of the mill when discussing man's ignorance of the secrets of creation, *Ḥovot ha-levavot (Duties of the Heart)* III.8, p. 262.

the categories other than locomotion, position, quality and quantity, is lacking in *ER*.⁷⁵ This omission may be attributed to the fact, noted above, that Ibn Daud's explanations are often of a more introductory character, which has to do with the intended audience. Another and more striking omission is that the *ER* does not offer a systematic account of time and place, whereas these topics are discussed at considerable length in the Avicennian sources. This too may have to do with Ibn Daud's intended audience, but one may also think of another reason. One topic that is conspicuous by its absence throughout the *ER* is a systematic discussion of the origin of the world. Unlike Maimonides, who would discuss these matters in his *Guide*, Ibn Daud avoids to address the issue of emanation versus creation, which is why he may have considered a discussion about time (and infinity of time) to be too delicate in view of his reluctance to commit himself to a certain viewpoint.⁷⁶

Another difference from Avicenna's exposition concerns the following. When asserting that the elements are moved by their forms, by the intermediacy of their accidents, Ibn Daud emphasizes that this happens on God's command, and that the form (qua substance) emanates from God, whereas the accidents are not 'in God's primary intention', it is form that is the underlying substrate of the accident. The fact that the forms assign the elements their proper places, Ibn Daud contends, is intended by God, who wished the universe to be arranged thusly.⁷⁷ Besides continuing the polemic against Ibn Gabirol on the distinction between substance and accident,⁷⁸ this exposition shows once again that Ibn Daud uses Avicennian views for his own purposes, and also that the religious dimension is not limited to the second part of *ER* but is present from the outset in Ibn Daud's natural philosophy.

4.3 Ibn Daud's Notion of 'Corporeal Form'

It would take us too far to discuss in detail Ibn Daud's teachings about matter and form, which constitute the subject matter of *ER* I.2. I will therefore focus on one particular item, namely his account of 'corporeal form'. As we shall see, this exposition is not without difficulties. The treatment of corporeal form follows that of the transformation of the elements into one another, which in turn, is preceded by a brief explanation of the concepts of 'matter' and 'form'. After having described processes of transmutation of the elements he concludes

75 Avicenna, *Šifā'*: *Physics* II.2–3, and id., *Nağāt: Physics*, pp. 132–4. As in *ER*, it does not figure in the *Maqāsid*.

76 See Fontaine, *In Defence of Judaism*, pp. 89–91.

77 Ibn Daud, *ER*, p. 14, lines 10–11 and 15–20 (S 36b3 and 11–17).

78 See above, n. 31.

that in order for these processes to take place there must be an underlying substrate, which is prime matter, the existence of which cannot be perceived, but can be proven by the intellect. Rather surprisingly, Ibn Daud then goes on to state that God created (*bara*) this matter first and subsequently endowed this matter with ‘corporeal form.’ By corporeal form, Ibn Daud explains, he means ‘the form of absolute body (*šurat gešem be-šiluaḥ*), which is not air, nor water, nor fire, nor earth, but only *hitdabbequt*, by which I mean that thereby the substance (*ešem*) has a certain massiveness (*’ovi*) in which three dimensions (*hitpašṭuyot*) can be posited (*yuneḥu*) that intersect each other at right angles.’⁷⁹ To this he adds that *hitdabbequt* (a term that I shall leave untranslated for the moment) is the form of the body, for if it is removed, the essence of the body is removed too. Moreover, it is not possible to conceive of a body in which there is no *hitdabbequt* at all.⁸⁰ The rest of his account can be summarized as follows: after the corporeal form the forms of the elements emanated, and from the elements the composite things come into being. Absolute body (*gešem be-šiluaḥ*), which is like matter for the elements is not in truth matter, for it has a form, namely *hitdabbequt*.⁸¹ *Hitdabbequt* and *mitdabbeq* are also found in the heavenly bodies. The universe as a whole has corporeity (*gašmiyut*), which is first body, as well as form, which is first form, that is, the form of absolute body.⁸²

At this point Ibn Daud hastens to explain that in spite of his use of terms such as ‘next’ or ‘after’ what he has just described should not be viewed as a temporal succession. It is not the case that first matter, once created, remained devoid of form, and that absolute body came into being only afterwards etc. Instead, Ibn Daud emphasizes, what he describes is a mental process. In reality these ‘stages’ exist simultaneously, since God creates only concrete beings that possess forms and also accidents. In fact it is the intellect that abstracts prime matter from form.⁸³ Put differently, what Ibn Daud describes here is the ontological make-up of things, not a temporal process, for matter as such cannot exist devoid of form. Nonetheless, it remains difficult to see how this reservation can be reconciled with his earlier statement that God created matter first just like a builder prepares his material before beginning to build.⁸⁴ It is certainly at odds with other passages in the *ER*.⁸⁵

Finally, towards the end of the chapter on matter and form Ibn Daud distinguishes between corporeal and incorporeal substances. Here we read: ‘corpo-

79 Ibn Daud, *ER*, p. 10, lines 1–8 (S 23b16–24b6) (transl. Wolfson, *Crescas’ Critique of Aristotle*, p. 587, slightly modified).

80 Ibn Daud, *ER*, p. 10, lines 8–12 (S 24b6–11).

81 *Ibid.*, p. 10, lines 12–18 (S 24b11–18).

82 *Ibid.*, p. 10, lines 26–31 (S 25b10–17).

83 *Ibid.*, p. 10, line 31–p. 11, line 6 (S 25b17–26b11).

84 *Ibid.*, p. 10, lines 2–5 (S 23b17–24b2).

85 Cf. Fontaine, *In Defence of Judaism*, pp. 272–3.

real substance [and this is what we are studying here] is a substance (*'ešem*) that has a certain mass (*'ovi*) and rigidity in which three dimensions (*hitpašuyot*) can be posited (*yuneḥu*) that intersect each other at right angles. It is that of which we said that its form is *hitdabbequt*, and that its matter is that which is the substrate of *hitdabbequt*.⁸⁶

The concept of 'corporeal form' is a post-Aristotelian notion that was developed by Aristotle's Neoplatonic commentators of Late Antiquity and became subsequently widely discussed by medieval Muslim and Jewish philosophers, who held divergent views about its nature and ontological status.⁸⁷ For our inquiry the relevant question is whether it is possible to determine which source underlies Ibn Daud's statements on corporeal form.

Let us first summarize what can be learned about corporeal form from Ibn Daud's account: It is the form of body absolutely; it constitutes the essence of a body; it is also first form, and it is *hitdabbequt*. Moreover, between first matter and first form the same relation obtains as between matter and form in concrete natural bodies. This is clear from Ibn Daud's formulation of *hitdabbequt* that appears twice in this chapter in almost identical words, (the first time in his description of corporeal form that is endowed to prime matter, and the second in regard of corporeal form in concrete natural bodies): 'That by which the substance (*'ešem*) has a certain massiveness (*'ovi*) in which three dimensions (*hitpašuyot*) can be posited (*yuneḥu*) that intersect each other at right angles.' In the second description the word 'rigidity' (*maqšiyut*) is added.

But how does Ibn Daud understand *hitdabbequt*? The underlying Arabic term is probably *ittiṣāl*. According to Wolfson, in his seminal study on Hasdai Crescas, the term in *ER* means 'cohesiveness', and displays familiarity with al-Ġazālī's formulation in the *Maqāṣid*. In identifying corporeal form with cohesiveness, he argues, Ibn Daud adopts al-Ġazālī's interpretation of the concept.⁸⁸ Yet Wolfson leaves open the possibility that Ibn Daud nonetheless follows Avicenna's understanding of 'corporeal form', according to which *hitdabbequt* is not cohesiveness itself, but rather a predisposition to assume the dimensions.⁸⁹ Wolfson bases himself on Ibn Daud's use of the term *hitdabbequt*, which he takes to mean 'predisposition for cohesiveness' rather than 'cohesiveness' itself

86 Ibn Daud, *ER*, p. 11, lines 31–34 (S 28b10–14) (transl. Wolfson, *Crescas' Critique of Aristotle*, p. 588, slightly modified).

87 Wolfson, *Crescas' Critique of Aristotle*, pp. 100–01 and 579ff.; Hyman, Aristotle's 'Prime Matter'; Elior, Isaac Abravanel's Rejection of Corporeal Form. On Muslim authors, see Stone, Simplicius and Avicenna; Shihadeh, Avicenna's Corporeal Form, and now Lammer, *The Elements of Avicenna's Physics*, 3.1, esp. pp. 121–32.

88 Wolfson, *Crescas' Critique of Aristotle*, pp. 587–8; cf. al-Ġazālī, *Maqāṣid*, p. 144, lines 5–6 (p. 576).

89 Wolfson, *Crescas' Critique of Aristotle*, p. 588; cf. Avicenna, *Šifā': Metaphysics IX.5.10*, p. 338 (ed. Marmura; cf. II.2.9, p. 51); id., *Naḡāt: Metaphysics*, p. 51, lines 12ff.

(*devequt*). However, this terminological argument is inconclusive, since the second translation of Ibn Daud's treatise (*EN*) has *hiddabeq*, *dibbuq* and *hitdabbeq* indiscriminately in these passages. Moreover, a bit later on, Wolfson himself renders *hitdabbequt* in another *ER* passage by 'conjunction'.⁹⁰

Thus, Wolfson does not provide an unequivocal answer to the question on which source Ibn Daud drew. Indeed, it is not easy to determine which text underlies the *ER*'s formulation of *hitdabbequt*. In fact, neither Avicenna's nor al-Ġazālī's formulation provides an exact equivalent of it. In the *Maqāsid* we read that *body* is that in which three dimensions can be posited intersecting each other at right angles.⁹¹ The formulation in the *ER* seems to be a literal rendering of al-Ġazālī's statement (substituting corporeal form for body), but a bit further on al-Ġazālī writes that the existence of corporeal form is such that it can assume (*an yaqbala*) the dimensions, not the dimensions in actuality.⁹² Ibn Daud does not refer to actuality. More importantly, we do not really find an equivalent for the word *hitdabbequt*; the word *ittiṣāl* does not occur in the *Maqāsid* in this context. In the *Nağāt*, by contrast, it does occur. Avicenna affirms that the meaning of corporeal form is that it is body only because it is such that it is true that three dimensions can be posited (*yasihhu an yafrada*) in it, intersecting each other at right angles.⁹³ In what follows he investigates whether corporeal form is either continuity (*ittiṣāl*) itself or a nature that makes *ittiṣāl* incumbent on it so that it cannot exist without it.⁹⁴ The outcome of this investigation need not detain us here, what is relevant for our inquiry is that Avicenna associates corporeal form with continuity. On the other hand, the phrase 'it is true' is lacking in the *ER*, instead we have 'it is possible' (*efṣar*).

Corporeality is discussed several times in the *Šifā'*, and also here we find passages that are similar to what Ibn Daud has to say, for example at the beginning of the *Physics*: 'the natural body is a substance in which one can posit one dimension, and another crossing it perpendicularly, and a third dimension crossing both of them perpendicularly, where its having this description is the form by which it becomes a body.'⁹⁵ In the *Metaphysics* corporeality is defined as: 'the form of a continuum (*ittiṣāl*) that is receptive of the hypothesized three dimensions'.⁹⁶ These statements, too, come close to what we read in the *ER*, and here the concept of *ittiṣāl* is discussed, but they do not provide a literal parallel. Moreover, the terms 'mass' and 'rigidity' that appear in the Hebrew translations

90 Wolfson, *Crescas' Critique of Aristotle*, p. 598, translating *ER*, p. 10, line 26.

91 Ibn Daud, *ER*, p. 144, lines 5–6.

92 *Ibid.*, p. 144, lines 12–13.

93 Avicenna, *Nağāt: Metaphysics*, p. 50, lines 16–20.

94 *Ibid.*, p. 51, lines 12ff.

95 Avicenna, *Šifā': Physics* I.2.2, p. 13 (transl. McGinnis).

96 *Id.*, *Šifā': Metaphysics* II.2.9, p. 51 (transl. Marmura).

of *ER* are lacking in the Arabic texts. It thus appears that Ibn Daud's formulation of what corporeal form is is a combination of these sources, in particular the *Šifā'* and the *Maqāšid*.

Furthermore, what emerges from this comparison is that the term *hitdabbequt* should be translated as 'continuity', and not as 'cohesiveness', as Wolfson had it. A. Lammer, who has explored Avicenna's concept of 'corporeal form', emphasizes that the form of corporeality is nothing but continuity, which entails divisibility and extension.⁹⁷ It is in this sense that the term *hitdabbequt* in the *ER* should be understood, even though Ibn Daud does not discuss divisibility. J. Klatzkin's *Thesaurus Philosophicus* assigns three meanings to *hitdabbequt*: (i) 'cohesion', 'coherence' and 'connection'; (ii) 'continuity', 'being uninterrupted', and (iii) in the sense of *devequt*, adhering to God. Interestingly, he quotes our passage in the *ER* as a proof-text for the first meaning. In light of the above, it would be more fitting to place it in under the second meaning. In this regard, it may also be recalled that the term *bi-devequt* is used for 'continuous' in the account of motion (cf. above, section 4.2), and that the expression *kama mitdabbeq* can be taken to render *kamm muttašil*, continuous quantity (cf. above, section 4.1).

As was the case in sections 4.1 and 4.2 above, it should be noted, however, that also here Ibn Daud's account of corporeal form as a whole displays differences from the relevant expositions in the Arabic sources we have considered. For one thing, the continuation of Ibn Daud's polemics with Ibn Gabirol in this chapter is instrumental in lending the discussion of corporeal form in *ER* a character of its own. Moreover, his assertions that God has created matter and endowed it with corporeal form do not have an equivalent in these texts. These and other such statements clearly show that Ibn Daud's religious conviction plays a part in his teachings on natural philosophy. This is not to say that religious convictions are lacking in Avicenna. This aspect, however, is more prominent in Ibn Daud's physics, which has to do with his stated aim to harmonize philosophy with religious tradition.

5 Avicennian Sources in Passages not Belonging to Ibn Daud's Natural Philosophy

The picture that emerges from the passages discussed in the preceding paragraphs is that certain statements of Ibn Daud's expositions can be shown to have literal parallels in one or more of the sources mentioned. For the present purpose, therefore, it is useful to briefly consider other topics in *ha-Emunah ha-ramah* that do not belong to physics proper, because they further illustrate

⁹⁷ See Lammer, *The Elements of Avicenna's Physics*, ch. 3.1.

the complexity of the problem and enable us to place these parallels in a wider perspective.

(i) In a recent article I compared Ibn Daud's treatment of the problem of evil and providence to that of Avicenna, a topic that is found in several Avicennian writings.⁹⁸ To this end I compared the relevant sections in the *Šifā'* and the *Nağāt*, and found that they present almost verbatim the same text. D. Gutas has emphasized that the *Nağāt* should by no means be seen as an abridgment of the *Šifā'*.⁹⁹ Yet the exact relation between these two texts in their entirety has not yet been explored, and it may well be that it varies from one topic to another, much as Ibn Daud's use of sources may vary from one chapter to another. In any event, for the passages discussed above there is not such an overall correspondence between Avicenna's two *summae*, which can be explained by the fact that the *Physics* of the *Nağāt* is copied from the *Philosophy for 'Arūdī*, which predates the *Šifā'*.¹⁰⁰ It may be mentioned in passing that it is also a matter of debate whether or not al-Ġazālī based his *Maqāšid* on Avicenna's Persian *summa Dānešnāme*,¹⁰¹ although this issue does not bear directly on Ibn Daud's use of sources. What is important for our discussion, however, is that other writings of Avicenna, such as his *al-Išārāt wa-l-tanbīhāt* can be discarded as sources for Ibn Daud's account of evil, whereas there are some details which may have derived from al-Ġazālī's *Maqāšid*.

(ii) Speaking about al-Ġazālī, Ibn Daud's discussion of the Necessary Existent suggests that he may also have been familiar with al-Ġazālī's *Tahāfut al-falāsifa*. This discussion is one of the passages in which Avicenna's impact on Ibn Daud's thought is most prominent, as can be deduced not only from his presentation of proofs of God's existence, but also from his description of the Necessary Existent, such as 'That Whose essence is sufficient for His existence'; 'The Necessary existent has no cause'; 'That upon which depends the existence of all things, and does not acquire existence from anything else'. These are recurring phrases in Ibn Daud's account, and one can find them in several works by Avicenna.¹⁰² One may assume, however, that the consistent repetition of these formulations is inspired by al-Ġazālī's critique of the *falāsifa*. In his *Tahāfut* al-Ġazālī maintained that the term 'Necessary Existent' is vague and misleading unless it is used in the sense of 'that which does not need a cause for its existence'.

98 Fontaine, 'Happy Is He whose Children Are Boys'.

99 Gutas, *Avicenna and the Aristotelian Tradition*, pp. 113–14.

100 *Ibid.*, p. 112–13.

101 According to Janssens, Al-Ġazālī and His Use of Avicennian Texts, the *Maqāšid* is a reworking of the *Dānešnāme* with additions from *al-Išārāt wa-l-tanbīhāt* and the *Šifā'* itself.

102 Fontaine and S. Harvey, *Jewish Philosophy on the Eve of the Age of Averroism*.

(iii) In my 1990 study of Ibn Daud's thought, I showed that several passages throughout the *ER* also bear close similarity to al-Fārābī's *Siyāsāt al-madaniyya*, to Alexander's *Mabādi' al-kull* and to the treatise '*Uyūn al-masā'il*', which is now generally believed to belong to Avicenna's circle rather than written by al-Fārābī. It is unlikely that the latter work served as the exclusive source for the topics that I have examined here, for, although this text mentions the distinction of four kinds of motion, it does not contain a proof that there cannot be an infinite magnitude in actuality.

As to non-Avicennian sources, it is moreover conceivable that he was familiar with commentaries on Aristotle's *Physics*, such as that by Ibn Bāḡḡa.¹⁰³ In this regard we must also bear in mind that he may have had access to texts that are now lost, such as al-Fārābī's commentary on the *Physics* and his paraphrase of *Physics* VIII, the *Kitāb al-Mawḡūdāt al-mutaḡayyira* that is referred to by Maimonides (cf. *Guide of the Perplexed* I.74).¹⁰⁴ The assumption that Ibn Daud actually knew such commentaries is corroborated by a significant discovery made by K. Szilágyi, who identified a Judaeo-Arabic Genizah fragment as the end of a book of physics by Abraham ibn Daud.¹⁰⁵ The fragment once belonged to an anthology of physics containing also works by Avicenna and Averroes on Aristotle's *Physics*. Unfortunately, the fragment consists of only one page of Ibn Daud's work, the last one, carrying a damaged colophon, so that there is no way of knowing which sources he used for this composition and the extent to which it was more elaborate (as it seems to have been) than the sections on natural philosophy in the *ER*.¹⁰⁶ It is obvious, however, that he took an interest in physics.

In this regard, we should briefly mention another Toledan author, the arabophone Judah ben Solomon ha-Kohen, author of an encyclopedic work, *Midraš ha-ḥokmah* (*The Exposition of Science* or *The Pursuit of Wisdom*). This work, originally written in the early 1230s, refers to Abraham ibn Daud. In his survey of Book V of the *Physics*, Judah ha-Kohen writes that it is doubtful whether there can be motion in the category of quantity, since this category has no contrary, 'large' and 'small' being relative terms, and adds that Abraham ibn Daud solved this question.¹⁰⁷ Surprisingly, however, the proposed solution

103 A cursory reading of this commentary did not reveal any parallels with Ibn Daud's account that are absent from the Avicennian texts, but the matter requires further investigation.

104 On this work, see Rashed, Al-Fārābī's Lost Treatise *On Changing Beings*.

105 Szilágyi, A Fragment of a Book of Physics.

106 For a transcription of the Judaeo-Arabic fragment, see Szilágyi and Langermann, A Fragment of a Composition on Physics by Abraham ibn Daud. For an analysis of its contents, see Langermann, Fragments of Commentaries on Aristotle's *Physics*.

107 The observation on the mention of Ibn Daud in the *Midraš ha-ḥokmah* was first pointed out by Sirat, Juda b. Salomon ha-Cohen, p. 43. Regrettably, like Ibn Daud's book, the Arabic original of this encyclopedic work is no longer extant.

is not found in either of the two Hebrew translations of *The Exalted Faith*. This can be explained by assuming either that different versions of Ibn Daud's Judaeo-Arabic philosophical work were circulating, or, more probably, that Ibn Daud treated this difficulty in another work, perhaps the aforementioned books of *Physics*.

The *ER*'s sections discussed above illustrate the various problems involved in identifying Ibn Daud's sources in natural philosophy: the loss of the Arabic original; the question of availability of Avicennian sources; the relative paucity of material in the *ER*; the circumstance that we have to do with doctrines that are found in several Avicennian works; Ibn Daud's brief formulations, and the selective way in which Ibn Daud uses Avicenna's views. Yet we have also seen that certain parallels in phrasing and terminology strongly suggest familiarity on Ibn Daud's part with Avicennian texts, so that it may after all be possible to arrive at some conclusions. For this we must first turn to the question of the identity of 'Avendauth'.

6 Avendauth and Ibn Daud

It is now over sixty years ago since M.T. d'Alverny published her famous article 'Avendauth?' (with question mark!), in which she suggested that our philosopher Abraham ibn Daud is to be identified with the translator 'Avendauth Israelita', known from Latin sources, who collaborated with Dominicus Gundissalinus (fl. 1162–90) on Arabic-into-Latin translations of Avicennian texts, for these translations contain ideas that also occur in *ER*.¹⁰⁸ Various scholars found d'Alverny's suggestion most alluring, but it remained difficult to decisively prove it.

In recent years, however, innovative research on the Arabic-into-Latin translation movement in general and on the collaboration between Avendauth and Gundissalinus in particular has been carried out by A. Fidora, C. Burnett, D.N. Hasse and A. Bertolacci.¹⁰⁹ Their studies tend to corroborate the identification. Fidora describes common philosophical interests between Ibn Daud and Gundissalinus. Hasse, Burnett and Bertolacci point to the fact that around the middle of the twelfth century the translator Avendauth wrote a letter to an unnamed high-placed person, perhaps the bishop of Toledo, in which the translator sought to solicit the addressee's interest in his Latin translation of 'some chapters on general aims' from the beginning of the *Šifā*'. Further-

108 D'Alverny, Avendauth?

109 In this paragraph I draw on the following studies: Fidora, Religious Diversity; Burnett, *Arabic into Latin*; Hasse, *Avicenna's De Anima in the Latin West*; id., The Social Conditions of the Arabic (Hebrew-)Latin Translation Movement, and Bertolacci, A Community of Translators.

more, Burnett suggests that it was Avendauth who introduced to the archbishop al-Ġazālī's *Maqāṣid* and Ibn Gabirol's *Meqor ḥayyim* (*The Fountain of Life*) that Gundissalinus was to translate into Latin in co-production with John of Spain. Together with Gundissalinus, Avendauth translated the psychological part of *Šifā'*. Moreover, Burnett and Bertolacci have emphasized the significant role played by Avendauth in the Toledan translation-programme: whereas in earlier studies he used to be viewed as a mere helper of Gundissalinus, he now emerges as the motive force of the Avicenna translation programme in Toledo.

Drawing on these findings G. Freudenthal has further investigated the issue by examining a curious passage, found in the introduction to part II of the *ER*.¹¹⁰ Examining the hierarchy of sciences Ibn Daud argues in his introduction that man should devote himself to acquiring knowledge of God, which is the highest of all sciences.¹¹¹ The passage itself concerns an algebraic problem and discusses an experiment in which most is boiled and then overflows.¹¹² Ibn Daud expresses his annoyance at people who waste their time on such experiments, thereby 'dooming their souls'. As Freudenthal convincingly argues, these words are directed against Gundissalinus. This experiment itself stems from a very specialized kind of mathematical literature that was quite rare. A Latin book about such experiments is ascribed to Gundissalinus' circle. Ibn Daud seems to warn his colleague that it is a waste of time to engage in such experiments. This finding finally turns the identification of Avendauth the translator with Ibn Daud the philosopher into a near certainty, for it implies that Ibn Daud the philosopher was familiar with Gundissalinus' scholarly interests and with the literature the latter read, which Ibn Daud could have found in the Toledo cathedral.

The findings yielded by these new studies bear directly on the question raised at the beginning of this paper: through which channels did Abraham ibn Daud become acquainted with Avicenna's thought? We have seen that although there are obvious parallels between *ER* and the Avicennian texts under consideration, it was not always possible to single out one specific text that must have served Ibn Daud as his source to the exclusion of others. This obtains also for the *Maqāṣid*, even though at first sight this digest could be supposed to have been Ibn Daud's exclusive source in view of the conciseness of the latter's renderings of Avicennian views.

Of course more passages in the part on natural philosophy of *ER* can and should be compared, but it seems unlikely that the picture will change significantly, with the possible exception of the section on the soul. All in all then, taking into consideration the textual evidence in combination with the fact that

110 Freudenthal, Abraham Ibn Daud, Avendauth, Dominic Gundissalinus.

111 Ibn Daud, *ER*, pp. 44–6 (S 121b–125a).

112 *Ibid.*, p. 45, lines 20–25 (S 123a9–14).

Avicenna's *Šifā'* and al-Ġazālī's *Maqāṣid al-falāsifa* formed part of the Arabic-into-Latin translation-programme in Toledo in which Avendauth played a prominent part, and given that the identification of Avendauth with Abraham ibn Daud is now next to certain, it is plausible to assume that Ibn Daud derived his knowledge of Avicenna's thought primarily from these two texts. It is possible that he was familiar also with the *Nağāt*, but here the evidence is less strong. In any event, it is highly probable that in the case of Ibn Daud we can speak of 'Avicennian knowledge *with* Avicenna'.

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The Medieval Hebrew Reception of Avicenna's Account of the Formation and Perseverance of Dry Land: Between Bold Naturalism and Fideist Literalism

(Samuel & Moses ibn Tibbon, Jacob ben Šešet, Moses Melguiri, Geršon ben Solomon, Levi ben Geršom, Levi ben Abraham, Isaac & Ḥayyim Israeli, et al.)

Gad Freudenthal

Samuel ibn Tibbon, the illustrious translator of Maimonides' *Guide of the Perplexed* in 1204, was one of the most radical medieval Jewish thinkers. He is also one of the few true Avicennians in the history of medieval Jewish thought. This concomitance is not accidental.¹

Samuel ibn Tibbon's intellectual audacity comes to the fore in the very first pages of his major work: *Ma'amar Yiqqawu ha-mayim* (*A Treatise on 'Let the Water Gather'*), completed in 1231. Ibn Tibbon there reconstructs the evolution of his research during the last two decades of his life:

One of the erudite companions seeking knowledge asked of me: 'what do the philosophers say about the [fact] that the elemental water does not surround the entire earth and does not cover its entire surface, but leaves a part of it uncovered, in contact with the surface of the air, as can be witnessed by the senses? [For according to the philosophers] it is in the nature of all the elements to be spherical globes, whose nature it is that the light element encompasses the one that is heavier than it, and surround it on all sides. Their statements without any doubt imply that since the earth is the heaviest element, having an absolute weight, it should, by virtue of its nature, be a rigid globe situated at the lowest place, namely at the centre of the all. For [the centre] is the place that perfects its form. It is in the nature of water, owing to its heaviness as compared with what is above it and its lightness in comparison with the earth, that it encompasses [the earth] on all sides in a spherical shape. The same holds of the air in [relation] with the water, and of fire in relation with the air. All this [is so] by virtue of their inherent nature, as they [the philosophers] have proved in their forceful proofs [*mofet*] or demonstrations [*re'ayah*]. What then is the cause that the [element] earth is exposed and the dry land is visible? And how is it that the water does not cover it totally, as it should by virtue of its nature?'

This is the question that was put to me.²

1 Freudenthal and Zonta, *Avicenna amongst Medieval Jews*, esp. pp. 254–7.

2 Samuel ibn Tibbon, *Ma'amar Yiqqawu ha-mayim*, pp. 7–8.

The wonderment at the fact that the sea has bounds and does not flood the earth has very ancient roots in many civilizations. ‘Thou hast set a bound that they [the waters] may not pass over; that they turn not again to cover the earth’, the Psalmist exclaims (Ps. 104:9).³ As Ibn Tibbon’s interlocutor realized, natural science exacerbates the difficulty inasmuch as it implies that, given the natural necessities as posited by Aristotle, the entire surface of the earth should indeed be covered with water. Traditional Jewish thought subscribed to the ready explanation offered in Genesis. According to it, initially (‘in the beginning’) the surface of the earth was entirely covered with water; but at some past point dry land emerged through a deliberate act (in fact: a speech-act) by God. This traditional account made all further questions pointless. But Samuel ibn Tibbon’s interlocutor was unsatisfied. He belonged to a circle of philosophically minded students, gathered around Ibn Tibbon himself, who were deeply committed to the Maimonidean, largely naturalist agenda. It is thus within the frame of reference of natural philosophy that he expected an answer, which Samuel ibn Tibbon set out to find. Although the philosophical problem was centuries old and not new even to Aristotle, finding an answer was not easy, namely because Ibn Tibbon rejected the standard view put forward by ‘Aristotle and his followers, including the wise Ibn Rushd’.⁴ Consider why.

Aristotle, reacting against certain Presocratics who already foresaw global warming that will culminate in a drying up of the earth, held that both the sea and dry land, just as the entire world, are eternal.⁵ To account for evidence showing that some places that are now sea had been dry land in the past and that stretches of what is now dry land had in the past been flooded, he argued that at any point in time, the surface of the earth is partly covered by water and partly uncovered and that although the relative locations of dry land and of sea shift continually, the earth never was nor will be *entirely* submerged in water. Averroes accepted this idea, integrating it within a larger theoretical scheme. He held that ‘sea’ and ‘dry earth’ are each a ‘species’ (albeit one encompassing only a single individual, as is also the case e.g. of the sun). Since the species are eternal, it followed that sea and dry land were eternal too: according to Averroes, there never was nor will be a situation in which the surface of the globe is either entirely dry or entirely flooded.⁶

But Samuel ibn Tibbon knew better. He *knew* the Aristotelian account to be refuted by indubitable evidence, consisting of the information that at some

3 See also Job 28:10–11; Prov. 8:29; Jer. 5:22.

4 Samuel ibn Tibbon, *Ma’amar Yiqqawu ha-mayim*, p. 7, lines 8–9.

5 Aristotle, *Meteorologica* II.14, and Solmsen, *Aristotle’s System of the Physical World*, pp. 420–39.

6 For a fuller discussion and references see Freudenthal, (Al-)Chemical Foundations, and id., Samuel ibn Tibbon’s Avicennian Theory of an Eternal World.

point in time the earth *was* entirely submerged under water. The source for this factual information was the Book of Genesis, deriving from prophecy. Like all other medieval Jewish philosophers, Ibn Tibbon was committed to two different sources of knowledge: rationalistic, philosophical analysis on the one hand and the Revealed Scriptures on the other. Any account of the world had to do justice to both. In the present case, the Book of Genesis explicitly states that during the early phases of its existence, the surface of the earth was entirely under water: after ‘the heaven and the earth’ were created and before God created anything else, ‘the Spirit of God moved upon the face of the waters’ (Gen. 1:2); obviously there was only water, no dry land yet. Only on Day three ‘God said, Let the waters under the heaven be gathered together unto one place, and let the dry land appear: and it was so’ (Gen. 1:9)—clearly testifying that during Days one and two the water was not yet ‘gathered’. From these verses, which Moses received through revelation and which were transmitted by an uninterrupted reliable tradition,⁷ it was clear to Ibn Tibbon that at some point in time the earth *was* entirely covered by water: the biblical account thus clearly *disproved* Aristotle’s view. The question concerning the existence of dry land proved more difficult than it might have appeared at first blush.

Ibn Tibbon’s problem was thus the following: assuming an initial state in which water covered the globe entirely, find a naturalistic explanation for the *emergence* of dry land. Once the problem was so framed, Aristotle and Averroes had no help to offer. Inasmuch as Ibn Tibbon sought a solution to a scientific problem while taking into consideration data provided not only by nature but also by Scripture, his manoeuvring room was limited. No wonder he found it difficult to discover a solution in the scholarly literature. Ibn Tibbon whimsically writes that for twenty years he was ‘rowing hard in the deep waters of this investigation, seeking to attain the dry land of understanding’, without finding a satisfactory solution.⁸

Felicitously, Ibn Tibbon finally hit upon an answer. He discovered it in ‘the great book called *Kitāb al-Šifā*’ by ‘the wise Ibn Sīnā’.⁹ Avicenna, to be sure, was not guided by considerations deriving from the Book of Genesis. Nonetheless, his natural history of the earth fitted the bill exactly. Avicenna’s naturalistic theory described an eternally returning cycle: the earth is regularly flooded, but dry land recurrently emerges from beneath the water.¹⁰ In this scheme, the emergence of the earth from under the water is one phase in an infinite cycle in which dry land emerges from under the water, only to be again gradually submerged under it, and then re-emerge. According to Avicenna, the world

7 See e.g. Davidson, *Moses Maimonides*, pp. 124–5.

8 Samuel ibn Tibbon, *Ma’amar Yiqqawu ha-mayim*, p. 5, lines 20–21.

9 *Ibid.*, p. 7, lines 10 and 12.

10 For this and the following see Freudenthal, (Al-)Chemical Foundations.

perpetually oscillates between two end-points without ever attaining a stable state: at one end is the state described in Genesis, in which the entire globe of earth is submerged under water; at the other is the state in which a part of the globe's surface is dry land. According to Avicenna, this eternal cyclical process is brought about by natural necessities inherent in the natures of the elements and other constituents of the sublunar world. This theory obviously implies that all the flora and fauna are regularly destroyed, and then come to be again. Avicenna posited that this regeneration of the species is brought about by natural necessities, including the assistance of the agent intellect. On this account, man, too, as all other living substances, is generated 'spontaneously' and recurrently comes to be not of another man, a thesis whose radicalism one easily fathoms.¹¹ The entire process takes place in accord with God's Providence and Wisdom.¹²

This was exactly what Ibn Tibbon needed. From his vantage point, Avicenna's crucial contribution was to have shown that 'earth'—i.e., stretches of dry land—'is something that comes to be after it had not been, [an idea] not asserted by the rest of the school of the philosophers that follow Aristotle's view'.¹³ Put differently, according to Ibn Tibbon, Avicenna showed that 'earth cannot persist in its natural state',¹⁴ i.e., covered with water. For Ibn Tibbon this account explained why the earth did not remain in the perfect state in which, according to Genesis, it was at some point. Avicenna's theory thus provided his follower Ibn Tibbon with precisely the explanation he needed—a naturalistic account of the process through which a surface entirely covered with water *necessarily* becomes dry land. He now knew why humans are not aquatic animals.

Now whereas Avicenna had to worry about nature only, his Jewish disciple could not embrace this theory without demonstrating—to himself and to his coreligionists—that it was in conformity with Scripture. Ibn Tibbon accomplished this too, showing that Avicenna's account of eternal return had been described notably in two psalms in an allegoric form. He thereby showed that the theory was both scientifically sound and religiously legitimate. I have devoted to Ibn Tibbon's views two studies, and will not go here into further detail.¹⁵

From the perspective of the present paper the salient point is the following. As from 1231, a rather early date in the context of the Hebrew cultural system in Europe, Ibn Tibbon put within the reach of the Hebrew scholar a fairly complete account of Avicenna's theory, coupled with its religious legitimization. This was a very bold account of the 'Work of Creation': it offered a naturalistic

11 See Hasse, *Urzeugung*, pp. 14–16, and Bertolacci, Averroes against Avicenna.

12 Mandosio, Latin technique du XII^e au XVII^e siècle, p. 118.

13 Samuel ibn Tibbon, *Ma'amar Yiqqawu ha-mayim*, p. 8, lines 6–7.

14 *Ibid.*, p. 7, line 17.

15 See n. 5 above.

explanation of the ‘gathering of the water’, a process that traditional Jewish exegesis had attributed to God’s direct intervention in nature; and, moreover, it stated that after the regular total flooding, all living beings, including man, are generated naturally, without a sire of the same species. It goes without saying that this account supposed the eternity of the world, an anathema of Jewish traditional thought.

We will now ask how medieval Jewish thinkers related to this radical thesis. The attitude toward it can serve as a sort of litmus test assessing the ‘degree’ of naturalism or traditionalism of a given thinker. We thus look at the reception history of Ibn Tibbon’s Avicennian account. To make the narrative historically meaningful, I proceed in chronological order.

II

Within ten years of the publication of *Ma’amar Yiqqawu ha-mayim*, it became the object of a refutation. Its author, the Kabbalist Jacob ben Šešet of Gerona, wrote a work with the title *Mešiv devarim nekoḥim* (*Retorting with Rightful Statements*), dated ca. 1240, that presented his own theosophical ideas along with a resolute rejection of Ibn Tibbon’s views. Jacob ben Šešet did not fully understand the sophisticated argument of Samuel ibn Tibbon’s work—the theoretical scientific premises on which Avicenna drew were far beyond his ken. But he nonetheless dimly perceived the radical tendency of *Ma’amar Yiqqawu ha-mayim*, which highly alarmed him. He did not offer a detailed critique of Ibn Tibbon, and instead heaped upon him large quantities of strongly worded abuse. However, Ben Šešet lived in a period and an intellectual climate that were already to some extent under the influence of Maimonides and naturalism, and he felt that the old fideist stance, which contented itself with the idea that the water gathered by God’s command, was no longer sufficient. He thus felt it was necessary to offer *some* naturalist explanation of the processes described in Genesis. Ben Šešet’s alternative account was philosophically both naïve and absurd and is not mentioned by later authors. It is, however, revelatory of the historical situation in the world of Hebrew thought in the middle of the thirteenth century: Samuel ibn Tibbon’s work put the problem of the ‘gathering of the water’ on the table, where it was to remain. Any author who wished to comment on the Work of Creation had to take it into account. I have studied Jacob ben Šešet’s ideas elsewhere and will not go into them here.¹⁶

Let me mention here in passing two other nearly contemporary thinkers influenced by the burgeoning Kabbalah. The first is the celebrated Rabbi Moses ben Nachman or Nachmanides (1194–1270) of Gerona. Although he was phil-

16 Freudenthal, *The Kabbalist R. Jacob ben Šešet of Girona*.

osophically informed, he was not acquainted with Samuel ibn Tibbon's book and therefore does not take issue with its ideas. He nonetheless understood that according to the philosophical doctrine, by their natures, the earth should be underneath the water everywhere. The fact that it is not, he reasoned, proves that the elements followed divine Will (*hefeš 'Elohim*).¹⁷

The second kabbalistically-oriented thinker is more directly relevant here. This is Isaac ibn Laṭīf (ca. 1210–80), who was acquainted with Samuel ibn Tibbon's ideas and voiced strong disagreement, again without having understood them correctly.¹⁸ Ibn Laṭīf (mis-)understood Ibn Tibbon as having maintained that the heaven and the elements are eternal, but the 'gathering of the water', and hence dry land, as well as the coming-to-be of the composed substances such as the animals, are 'new', and are the proper object of the term 'creation'. Although Ibn Laṭīf perceived Ibn Tibbon as a radical, he did not realize that Ibn Tibbon had affirmed a much more radical thesis of an eternally recurring 'gathering of the waters', as Ben Šešet had well perceived.

III

We next come to Moses ibn Tibbon (fl. 1244–83), Samuel's son. The two share one aspect of their careers: both translated into Hebrew works of the Greco-Arabic philosophical tradition, indeed Moses was the main agent in introducing Averroes into the Hebrew cultural system. But *qua* philosophers, the two Tibbonids were far apart, indeed a counterexample to the idea the apple doesn't fall far from the tree. Whereas Samuel ibn Tibbon was a bold Avicennian, an original mind with a radical philosophical agenda, Moses was a mildly conservative and mediocre thinker. Specifically, whereas Samuel ibn Tibbon decidedly affirmed the eternity of the world, Moses opted for the view that the world was 'newly' created in a finite past.¹⁹

In addition to his numerous translations, Moses ibn Tibbon wrote a number of works of his own. One of them is *Answers to Queries on Physics*, preserved in a single manuscript. Hagar Kahana-Smilansky has recently published the first study of this text and is preparing a critical edition.²⁰ The gathering of the water is discussed in the context of the explanation of the notions of natural and

17 Nachmanides, Commentary on Gen. 1:9. R. Bahya (Behaye) ben Ašer (1255–1340) integrated this passage into his own commentary ad loc.

18 Ravitzky, *The Thought of Rabbi Zerahya b. Isaac b. She'alti'el Hen*, pp. 237–8, and Kneller-Rowe, Samuel ibn Tibbon's *Ma'amar Yiqqawu ha-mayim*, vol. I, p. 184.

19 E.g. Moses ibn Tibbon, *Sefer ha-Pe'ah*, in id., *The Writings of R. Moshe Ibn Tibbon*, p. 94, lines 6–7 and 13; see also my Review of 'The Writings of R. Moshe Ibn Tibbon'.

20 Kahana-Smilansky, Moses Ibn Tibbon's *Answers to Queries on Physics*. I am grateful to Hagar Kahana-Smilansky for putting at my disposal a transcription of the entire text.

forced motions. Moses explains to his student-correspondent why the intermediary elements air and water do not travel to the periphery or the centre of the universe, but only up or down, to the surfaces of the shells of the elements fire and of earth respectively. He writes:

Water and earth consistently stop one at the limit of the other. For [the following reason]: it is in the nature of earth, on account of its thickness and coarseness, to preserve [any] shape it takes on. This is so either [i] by God's will, [namely] by virtue of His saying 'Let the water gather into one place and the dry land appear' (Gen. 1: 9), or [ii] because some earth is transformed into water or another [element]—so that it is subtracted from the earth's spherical shape creating in it depth[s] and hole[s]—and [also] some water is transformed into another [element], becoming earth, which settles on [the surface of the] earth, generating on it protuberances and eminences. All this occurs promptly upon a change in the position[s] of the fixed stars²¹, which [act] specifically on the element earth, so that they transform into sea what was dry land, and transform into dry land what was sea.

Now it is not in the nature of the earth that when protuberances and eminences are generated on its [surface, its parts will spread] so that it [i.e. the globe of the earth] would again become spherical, as is the case with the other elements. This holds particularly of its uncovered parts and of the parts adjacent to the upper surface of the water [covering it]: for the earth mixes and blends with the other elements and is kneaded with them, and when it is concocted by the heat of the sun it hardens very much and becomes like one of the minerals.²² This [incidentally] is why in the depths of the earth the water is always drawn together. For whenever [quantities of the element earth] are subtracted from the [globe of the] earth's spherical surface, producing in it ditches and depths, and [concomitantly] elevations rise at the limit of water, necessarily the adjacent element [viz. water] enters into it, either because the void is impossible or owing to repulsion or owing to the water being heavy.²³

Moses ibn Tibbon clearly draws on his father's work, which both he and his correspondent also mention explicitly. As Kahana-Smilansky has shown, he also draws on parts of Avicenna's *Šifā'* (*Generation and Corruption; On the Heaven and the World*), as well as on Moses Melguiri's Hebrew redaction of Ps.-Avicennian *Liber de celo et mundo* (to which we will come back).²⁴ But what Moses makes of his father's account is disappointing: in his view, the observable fact that some earth is above water, contrary to what is implied

21 Following Samuel ibn Tibbon, *Ma'amar Yiqqawu ha-mayim*, p. 161, lines 2–3.

22 Like his father, Moses ibn Tibbon uses *mateket* (which usually means 'metal') in the sense of 'mineral'; see e.g. his *Sefer Taninim*, in id., *The Writings of R. Moshe Ibn Tibbon*, p. 243, line 13.

23 Id., *Answers to Queries on Physics*, MS Parma, fol. 93b (ed. Hagar Kahana-Smilansky, §§ 9–10). My translation.

24 Kahana-Smilansky, Moses Ibn Tibbon's *Answers to Queries on Physics*, pp. 214–6.

by the principle of natural motions, can be explained either with reference to God's command 'Let the water gather into one place' *or* through a naturalistic account. Moses ibn Tibbon avoids choosing between the fideist and the rationalist positions. He leaves unmentioned the fact that his father had construed the formation of mountains as a phase in the recurring flooding and emergence of the earth, nor does he refer to his father's thesis that the Psalms confirm the naturalistic account of the eternally repeated formation of dry land. The sensitive question of man's generation not from man is passed over in silence, too, although this may be due to the fact that he replied to those of his correspondent's questions that were limited to physics.

Moses ibn Tibbon comes back to the topic elsewhere. In one of his independent treatises, *Ma'amar ha-Taninim* (*Treatise on the Midrash on Great Whales*), an allegorical interpretation of a midrashic text as a geographical anthropology, Moses ibn Tibbon mentions *en passant* the fact that the globe of the earth is not spherical.²⁵ He refers to a verse in Job (26:10), 'He hath compassed the waters with bounds (*hoq*), until the day and night come to an end', and comments that the word *hoq* ('bound', 'limit') denotes a

natural state that is ordained through [God's] Will, a state which, at first blush [lit.: at the first stage of reflection; *bi-tehilat ha-'iyyun*], [man's] intellect does not judge to be a [natural] necessity ... God decreed a limit [*hoq*] according to which the [element] earth should break away from its natural existence, in order that dry land be visible above the water and that Providence may emanate and bring into existence the flora and the fauna.

In Moses' understanding, then, Job states that God has imposed on the natural order 'limits' such that the earth would not conform to the nature of its existence: this, he avers, was a necessary condition so that God could exercise His providence and bring into existence the living beings, including man, the most noble existent. From another verse Moses ibn Tibbon concludes that the fact that the inhabited world is located in the northern hemisphere is also 'contrary to its nature' and is also a consequence of the Will of the deity. Clearly, Moses ibn Tibbon prefers fideism to naturalism.

Elsewhere in the same treatise Moses ibn Tibbon refers to the notion that dry land is formed through the generation of mountains, which is followed by the formation of valleys, so that the water is 'gathered'.²⁶ Although his remark clearly echoes his father's account, there is again no trace here of the naturalistic cosmogony of which this idea was originally an integral part. Rather, Moses sees in these processes evidence for the trivial thesis that 'the deity is present

25 For what follows see Moses ibn Tibbon, *Sefer Taninim*, in *The Writings of R. Moshe Ibn Tibbon*, on pp. 251–2.

26 *Ibid.*, pp. 254–5.

everywhere, and His providence extends to the lowest places, including the depth of the seas’.

Moses ibn Tibbon occasionally alludes to so-called ‘spontaneous generation’, but according to him this process may bring forth some plants and—very rarely—mice; he conspicuously avoids any reference to man,²⁷ a stance reflecting his general adherence to Averroes.

Moses ibn Tibbon adumbrates the future: as a rule, Jewish philosophers writing on cosmogony in Hebrew will not be very audacious. Many of them echo Avicenna’s account of the generation of mountains, but they make it into one sublunar phenomenon among so many others; Avicenna’s and Samuel ibn Tibbon’s naturalist cosmogony will usually be watered down and its radical thrust defused.

IV

Two influential and widely diffused Hebrew works of natural philosophy illustrate this development. Seemingly both embrace Samuel ibn Tibbon’s bold theory, but we will see that this was a deadly embrace, much more fatal to the theory than its harshest critique.

(i) Chronologically the first of these is *Sefer ha-Šamayim we-ha-‘olam*, the Hebrew version of the Latin work *Liber de celo et mundo*, which the manuscript traditions wrongly attribute to Avicenna.²⁸ In her pioneering 1996 study of this work, Ruth Glasner has shown that the Hebrew version was written by Moses Melguiri in the third quarter of the thirteenth century and that it is a redaction—rather than a simple translation—of the Latin *Vorlage*: interspersed in the translation are additional passages, some of them quite substantial, interpolated by Melguiri.²⁹ *Sefer ha-Šamayim we-ha-‘olam* must therefore be considered as a distinct scientific composition. Glasner has also demonstrated that some of the interpolated passages directly derive from Samuel ibn Tibbon.³⁰ Melguiri was indeed very impressed by the *problématique* he discovered in Ibn Tibbon’s work: although the Latin work does not at all allude to the question of the balance of sea and dry land, Melguiri in three different contexts creatively integrated discussions of this topic.

(a) Chapter one is devoted to the demonstration of the following thesis: ‘for each material thing there is another material thing, less perfect than it; the

27 Moses ibn Tibbon, *Sefer Pe’ah*, in *The Writings of R. Moshe Ibn Tibbon*, pp. 92–4.

28 Pseudo-Avicenna, *Liber de celo et mundo*.

29 Glasner, *The Hebrew Version of De celo et mundo*, especially the ‘Appendix’, pp. 108–10.

30 *Ibid.*, ‘Appendix’, pp. 108–10.

heavenly body is more perfect and more flawless than any other body'.³¹ To prove that the heavenly sphere is perfect, the author wants to establish that it is self-sufficient—it has no need of any other body. He notes that each material shell is dependent upon the shell that is spatially above it and more perfect than it: 'the encompassed is dependent upon the encompassing'. Thus: 'all the living creatures [taken to consist essentially of the element 'earth'] need the air which surrounds them—and the earth [in general]—on all sides; the air requires the fire that surrounds it; the fire requires the sphere of the moon and the other celestial spheres whose circular motions cause its heat'.³² Each of the elements being more 'subtle' than the one it surrounds, it is also located above it. But what about the element earth? The author argues that it 'depends' on the element air inasmuch as living beings (consisting essentially of earth) need the air surrounding them and the dry land. But here a possible objection pops up: only about one quarter of the surface of the earth is dry land, and the latter's very existence seems 'counter to nature' and therefore contingent and passing. Thus the demonstration that the globe of the element earth 'depends' on the existence of the shell of air, and with it the author's entire theory of the dependence of the lower upon the superior, hinges on showing that the existence of dry land is the outcome of a natural necessity, not a transitory contingent fact.

Melguiri addresses this issue by explaining at some length how mountains and valleys come to be, so that, he argues, dry land *necessarily* exists. As Glasner has discovered, this demonstration is wholly derived from Samuel ibn Tibbon (and hence from Avicenna), whom Melguiri partly quotes, partly paraphrases (but without mentioning his name). As could be expected, he does not allude to the bold thesis of the recurrent flooding, and so he infers from his discussion that water never covered and never will cover the earth entirely and that land animals have always existed and will continue to do so. Hence, inasmuch as these animals breathe, the postulate that 'earth' depends upon air has been established. Melguiri concludes that '[the element] air is requisite for [the element] earth, and is also needed to preserve existence [presumably: of the flora and fauna], and this is why we said that any body requires the body that is above it, until the sphere of the moon'.³³

Needless to say, Melguiri put forward a thesis that is at the opposite of Avicenna's—and Ibn Tibbon's—original intention. What he integrated in his account are discrete, unconnected 'items' from Avicenna's theory, constructing

31 Melguiri, *Sefer ha-Šamayim we-ha-‘olam*, fol. 3a (heading of chapter one). I am grateful to Ruth Glasner for putting at my disposal a transcript of the full text. Here and elsewhere, the Hebrew text differs from the Latin *Vorlage*; as our interest is Melguiri I will not comment on these differences and follow the argument of the Hebrew text.

32 *Ibid.*, fol. 3b.

33 *Ibid.*, fol. 4a.

out of them an account according to which the existence of dry land is a permanent natural necessity: this, however, is Aristotle's and Averroes' view, not that of Avicenna and Ibn Tibbon. Whether or not Melguiri was aware of his unfaithfulness to his source is a matter on which we can only speculate.

(b) The topic comes up again in some detail in an unexpected context.³⁴ Chapter six is devoted to the question whether there is one world or many. *Sefer ha-Šamayim we-ha-‘olam* argues for a single world. To refute the possibility that there is another world to the east or the west of ours, it is maintained that if one or more such worlds existed, the uppermost spheres of the different worlds would be in contact and impart swift circular motions to one another. In this case, the rotation of the uppermost sphere in our world would be accelerated with respect to its 'normal' motion. As a result, the rotations of the seven planetary spheres enclosed within the uppermost sphere would be accelerated too. (All motions are supposed to go back to the uppermost sphere.) These exceedingly swift celestial rotations would in turn put the four sublunar elements in rotational motions. Then, 'necessarily, the four elements [would] move in a circular motion, and [would be] unable to come to a halt and come to their own [i.e. to their 'natural' state; *be-‘aşmam*], owing to the swift motion of the spheres and their strong rotational motion'.³⁵ But, the author now immediately observes, 'it is impossible that the earth move in a rotational motion, for this would make non-existent all existence, which would all be corrupted'. Why? Ptolemy and others refuted the heliocentric theory through numerous physical arguments showing why a rotation of the earth is impossible.³⁶ But the calamity envisioned by Moses Melguiri is different. A rotation of the earth, he reasons, would have the result that, at some point in time, the water would rush around the surface of the globe and inundate the entire dry land (which is a fourth of the globe). This means that on the hypothesis of the existence of another world and the consequent rotation of the earth, the total flooding of the entire globe would become *possible*. But, the argument continues, if this were *possible* then 'this possibility would have been actualized in the past time'. (Note that implicitly time is assumed to be infinite, i.e. the world eternal.) However, the actual existence of fauna and flora, including species that do not come to be spontaneously, shows that this possibility has not been realized. It follows 'that the existence of dry land is *necessary*, not [merely] possible'.³⁷ The hypothesis that another world exists to the west or east of ours thus leads to a conclusion known to be impossible; this refutes the hypothesis.

34 For what follows see *ibid.*, fol. 6b.

35 *Ibid.*, fol. 6b.

36 See Ptolemy, *Almagest* I, ch. 7.

37 Melguiri, *Sefer ha-Šamayim we-ha-‘olam*, fol. 6b.

It would have been good to stop here and move on. But Melguiri realizes that his argument does not hold water: this reasoning, he comments, ‘is far from the truth’. Consider why. From Samuel ibn Tibbon Melguiri learnt that it is possible that the fauna and flora could all be annihilated and subsequently come to be again. Referring to ‘this view’, he reasons as follows: ‘it is possible that the entire earth be covered with water, and all vegetation on it be washed away, and all the species on its dry part be corrupted ... And after this had happened ... a certain mixture naturally come to be in the earth and receive the form of each of the animals—human form and all others—as you see oftentimes that a mouse or a mole are born from dust and frogs from rain water, and lice out of sweat’.³⁸ In short: Melguiri knows the theory according to which *all* living beings, humans included, can be naturally generated through a process in which an appropriate mixture is produced in the earth and receives a suitable form. This implies that after all it *is* possible that the earth *was* flooded (once or more often) and the fauna and flora came to be again. It follows that the present existence of life on the earth after all does not refute the possibility of another world.

Melguiri, however, sticks to his guns: he is committed to the uniqueness of the world and wants to protect it from refutation. He bypasses the theory he found in Ibn Tibbon, without however daring to declare it false. He sheepishly says that the ‘generation of man not from man’ is ‘the rarest of the rare’, and that even the generation of frogs and their consorts is very rare.³⁹ He can rely here on Ibn Tibbon,⁴⁰ but contrary to the latter, he apparently forgot that in an infinite time even rare occurrences are realized; or he now implicitly assumes the world is not eternal. The bottom line thus is reassuring: ‘if there were another world to the west or the east [of our world] no one disagrees or doubts that the entire existence would have been destroyed on account of the excess of motion that would force the elements into a rotational motion, so that the entire earth would be covered by water that would surround it from all sides on account of its swift motion’.⁴¹ Q.E.D.

(c) One of the factors which Avicenna and, in his footsteps, Ibn Tibbon mention as contributing to the transformation of water into earth is ‘the power

38 Ibid., fol. 6b.

39 Melguiri also writes: ‘according to this view, the elements change into one another by their nature, as has been explained in the first chapter’ (ibid., fol. 7a), obviously referring to the Avicennian explanation borrowed from Samuel ibn Tibbon. It is not clear what this adds to his argument.

40 According to Avicenna, Samuel ibn Tibbon writes, spontaneous generation of individuals of any species of living beings and that of human beings differ only quantitatively: ‘in human-kind this kind of generation is very very infrequent, extremely rare, but that of the mouse and of the frog is not so rare, although it is infrequent’. Samuel ibn Tibbon, *Ma’amar Yiqqawu ha-mayim*, p. 8, lines 32–3.

41 Melguiri, *Sefer ha-Šamayim we-ha-‘olam*, fol. 7a.

[or: force] of [the rays] of the sun and the stars'.⁴² Neither of them elaborates on this topic any further. But in Melguiri's Hebrew version of *Liber de celo et mundo* the concept of the rays of light is given great importance. As Glasner has pointed out, the text puts forward a non-Aristotelian, non-conventional, 'theory of material light and heat rays'.⁴³ Chapter twelve of the treatise explains how light rays warm the air and in this context briefly remarks that the effects of the rays are 'the cause for the perseverance of the existence of the flora and the fauna'.⁴⁴ The author explains: 'the motions of the spheres and the rays of the stars maintain the existence [by ensuring] that the parts of the earth are not all [simultaneously] covered with water'.⁴⁵ This is again the very antithesis of Avicenna and Ibn Tibbon.

To conclude: One of the substantial differences between the Hebrew redaction of *On the Heaven and the World* and its Latin *Vorlage* is the intrusion of the question of the possible flooding of the terrestrial globe, to which Moses Melguiri was alerted by Samuel ibn Tibbon's *Ma'amar Yiqqawu ha-mayim*. Melguiri, we observe, did not follow the Talmudic norm according to which one should attribute an idea to the one who framed it (b. Megillah 15a). More important, in his interpolated passages, there is no trace anymore of Ibn Tibbon's radical stance. The idea of a periodically recurrent flooding and re-emergence of dry land followed by a regeneration of life on earth is silently abandoned. Indeed, the treatise's scope is limited to matters of physical science, excluding any allusion to theological issues or Jewish traditional texts. The Hebrew *Sefer ha-Šamayim we-ha-'olam* thus appeared to its readers as a scientific treatise by Avicenna that gives a purely descriptive, uncontroversial account of a few sublunar physical phenomena, including the formation of mountains. The original cosmogonical context in which Ibn Tibbon inserted Avicenna's theory was eliminated.

(ii) We now very briefly come to the second Hebrew treatise in natural philosophy to include an account of Avicenna's theory. Around the year 1280, the passages in Ibn Tibbon's *Ma'amar Yiqqawu ha-mayim* on the formation of stones and mountains within water and on the formation of man not from man were integrated, again without attribution, into *Sefer Ša'ar ha-šamayim (The Gate of Heaven)*, one of the most popular medieval Hebrew encyclopaedias of science. The author, Geršon ben Solomon, quoted the texts in full and ver-

42 Samuel ibn Tibbon, *Ma'amar Yiqqawu ha-mayim*, p. 8, lines 3–4 (cf. also p. 132, lines 14–16; p. 161, lines 2–3), and Glasner, *The Hebrew Version of De celo et mundo*, p. 109.

43 Glasner, *The Hebrew Version of De celo et mundo*, p. 102.

44 Melguiri, *Sefer ha-Šamayim we-ha-'olam*, fol. 10a. The author adds: 'and the generation of metals', but this is not germane to our present topic.

45 *Ibid.*, fol. 10a.

batim, including Ibn Tibbon's explicit reference to Avicenna and the *Šifā'*.⁴⁶ Nonetheless, there again was no trace of the described process being a phase of an endlessly recurring chain of physical events: any theological relevance vanished, as also the argument that the theory is consistent with Scripture. The theory again became part of a purportedly purely descriptive, unproblematic account of the sublunar world.

There is thus a hiatus between the theory offered in *Ma'amar Yiqqawu ha-mayim* and its lame presentations by the two plagiarists. In Ibn Tibbon's philosophical-theological treatise, the argument proceeded in parallel on two planes: that of science and that of scriptural hermeneutics. Ibn Tibbon's great ambition was to carry forward Maimonides' innovative but only partial naturalistic interpretation of the creation story, so as to develop a cosmogony that would be in full accord with both science and Scripture, an alternative to the traditional, fideist reading of Genesis. Ibn Tibbon was well aware that his cosmogony was highly non-conformist and audacious. By contrast, *Sefer ha-Šamayim we-ha-'olam* and *Ša'ar ha-šamayim* were works of science and of science alone, rather than theological-philosophical treatises: their purpose was to present the reader with a sober, factual description of the physical and eventually (in the case of *Ša'ar ha-šamayim*) metaphysical reality, dissociated from any reference to Jewish traditional texts. In both, the account of the formation of stones and mountains in the sea and that of the formation of man not from man appeared in the context of accounts of phenomena of the sublunar world, unconnected with cosmogony or the story of creation. Nor did they apprise the reader of the fact that Avicenna's account implies an eternal return of periods of total flooding and natural emergence of dry land. Once integrated in the two Hebrew works of science, Ibn Tibbon's bold cosmogony became a harmless and tame account of one among many natural phenomena, namely the (exceedingly rare) formation of mountains in the sea as a cause for the existence of dry land. The possibility of spontaneous generation of animals, including man, is mentioned in both works, but again downplayed, presented in another context, and devoid of any explosive potential. Paradoxically, whereas the Kabbalist Jacob ben Šešet well perceived—and rejected—the momentous and radical theological implications of Ibn Tibbon's work, they entirely vanished from sight in the works of the thirteenth-century rationalists. Ibn Tibbon's mountains, we may say, gave birth to a mouse.

One lesson we can draw from the way Ibn Tibbon's theory was received in *Sefer ha-Šamayim we-ha-'olam* and *Ša'ar ha-šamayim* is that the notion of 'reception' must be used with great circumspection and differentiation: the fact

46 Geršon ben Solomon, *Sefer Ša'ar ha-šamayim*, pp. 13a–b (the generation of mountains), and 47b (the generation of man not from man).

that an author drew on *Ma'amar Yiqqawu ha-mayim* and even quoted from it does not imply that he shared its radical message or even was fully aware of it. Our two Hebrew scientific authors selectively introduced their readers to some natural phenomena gleaned from Ibn Tibbon's book, avoiding any allusion to the radical stance of which these ideas were originally a part. Thus, to 'protect' the Jewish readers against a 'dangerous book' it was not necessary to burn it (as was reportedly done to some of Maimonides' writings in Montpellier in the very year *Ma'amar Yiqqawu ha-mayim* was completed), nor was it necessary to heap abuse on it, as did Jacob ben Šešet. A no less efficient strategy was to defuse its radical message through a skilled integration of selected, religiously inoffensive 'knowledge items' of it in purely scientific accounts.

It what follows, therefore, when we consider echoes of Avicenna's theory in the Hebrew philosophical literature, we will first of all have to ask what sources any given author had at his disposal: only those readers who knew the theory directly through *Ma'amar Yiqqawu ha-mayim* could be aware of its explosive potential.⁴⁷

V

The end of the thirteenth century brings us to the notorious R. Levi ben Abraham ben Ḥayyim, who became a *cause célèbre* during the great controversy of 1303–5 over the legitimacy of philosophical studies, the target of virulent attacks by the anti-philosophic camp.⁴⁸ Levi began to write his very voluminous work *Livyat hen (Ornament of Grace)* in 1276 and completed a revised long redaction in 1295.⁴⁹ He already had at his disposal Averroes' recently translated epitomes, although he does not refer to them explicitly,⁵⁰ and he was acquainted with Samuel ibn Tibbon's *Ma'amar Yiqqawu ha-mayim* and Melguiri's *Sefer ha-Šamayim we-ha-'olam*, as well as with Moses ibn Tibbon's translation of Alfarabi's *Political Regime* and al-Batalyawsi's *Sefer ha-'Agulot*

47 Avicenna was very little translated into Hebrew; for the Hebrew reader he was not an author associated with a corpus of writings. His naturalistic account of the formation of dry land is one of the few that have come to the attention of the Hebrew scholar, albeit in a defused form. See Freudenthal and Zonta, *Avicenna amongst Medieval Jews*.

48 Halkin, *Why Was Levi Ben Ḥayyim Hounded?*, and Harvey, *Levi ben Abraham of Villefranche's Controversial Encyclopedia*.

49 Levi ben Abraham, *Livyat hen: Work of Creation*, Editor's Introduction, pp. 4 and 32.

50 I am grateful to Prof. Haim Kreisel, Levi ben Abraham's editor, for this information. According to Kreisel (email of June 16, 2013), Levi used (among others) the Hebrew translations of the epitomes of *Parva naturalia*, *Metaphysics*, *Physics*, *On Generation and Corruption*, *On the Heavens* and others (the epitomes were usually transmitted together).

ha-ra 'ayoniyot (Imaginary Circles) to which he accorded great importance.⁵¹ Levi is not particularly profound, but does not make easy reading, and that for two reasons. First, he is very verbose, and throughout heaps hypothesis upon hypothesis, exegesis upon exegesis, making it often difficult to determine what his view was. Second, he does not proceed *more philosophico*, but rather *more midrashico*: his point of departure in any context is a text drawn from Scripture or Midrashim, which he then interprets in (among other things) philosophical terms, often proceeding by free association of ideas. In what follows I will try to give an ordered rational reconstruction of Levi's thought, aware that I lift isolated assertions from their exegetical contexts.

We first have to determine whether in Levi's view the world was eternal or 'newly' created. (The following brief account has no pretension to be comprehensive, however.) The discussion of Levi's cosmogony will provide an instance of Avicennian ideas embraced by a Jewish scholar who had no access to Avicenna's writings,⁵² an intriguing illustration of the phenomenon of 'Avicennian knowledge without Avicenna'.⁵³ Levi discusses creation in two parts of *Livyat hen*, pillar II (called *Boaz*, investigating 'tradition'), book 6, namely: part 2 (called *The Secrets of Faith*), and part 3 (called *The Work of Creation*).⁵⁴ Chronologically, Levi first wrote a short treatment in *The Secrets of Faith*, chapter nine (merely nine pages), followed by the fifty pages of chapter ten in *The Work of Creation*.⁵⁵ The former is thus a sort of a research program, of which the latter is the outcome. We will see that the early account was more timid and conservative, the later treatment more audacious, although at bottom Levi did not escape the inconsistency of his attempt to offer a cosmogony that would be both faithful to the Jewish tradition and philosophical. I will begin with the later, more detailed account, on which the earlier more schematic account will then throw additional light.

Levi sought to elaborate an interesting (possibly original but ultimately inadequate) cosmogony, midway between Avicenna's emanationism (limited however to the intellects and celestial spheres, which are thus taken to be co-eternal with the deity) and the traditional Jewish belief in *hidduš*, i.e. the

51 On this work and its influence see Eliahu, *Ibn al-Sid Batalyawsi*.

52 See Baeck, *Zur Charakteristik des Levi ben Abraham ben Chajim*, p. 159, and Harvey, *Levi ben Abraham of Villefranche's Controversial Encyclopedia*, p. 177, n. 21.

53 Freudenthal and Zonta, *Avicenna amongst Medieval Jews*. Levi did not read Arabic and Avicenna's writings were not available in Hebrew.

54 Published respectively in Levi ben Abraham, *Livyat hen. Book Six, Part Two: The Secrets of Faith. Book Seven, Part Two: The Gate of the Haggadah* (ed. Kreisel), and id., *Livyat hen. Book Six, Part Three: The Work of Creation* (ed. Kreisel). For an overview of the structure cf. Harvey, *Levi ben Abraham of Villefranche's Controversial Encyclopedia*, p. 174.

55 Levi ben Abraham, *Livyat hen: Secrets of Faith*, p. 79: 'We will discuss the secrets of creation during the Work of Creation soon'.

belief that creation was *ex nihilo* and *a novo*. Levi subscribes to the Avicennian postulate of the Necessary Existent (also endorsed by Maimonides): ‘there is absolutely nothing that is a Necessary Existent, except the deity, be He exalted’.⁵⁶ All existence results through emanation, following God’s eternal Will: ‘He [God] created everything when He willed, by way of grace [or: kindness], and everything depends on His Will’.⁵⁷ Here one immediately wonders: is this Will eternal? Or can it be that Levi construes it as ‘new’, so that emanation (and hence the beginning of coming-to-be) was, as it were, ‘kicked off’ after not having been? Inasmuch as God’s Will is a consequence and expression of His kindness and grace this seems very unlikely,⁵⁸ and apparently Levi construed the divine Will as eternal. He thus states that ‘creation’ followed upon ‘God’s eternal [*qadum*] Will’,⁵⁹ and clearly affirms that ‘any action upon the separate [entities] is everlasting [*kol po ‘al timmaše’ ba-nifradim hu temidi*]’.⁶⁰ Levi further explains that the term ‘creation’ [*bri’ah*] ‘is applied primarily to the bringing-into-existence [*hamša’ah*] of a spiritual [*ruhani*] substance, without matter, by way of emanation’, namely the intellects.⁶¹ He thus regards creation as a process in which something comes to be out of nothingness or privation.⁶²

In addition to the intellects, the celestial spheres, too, proceed from God through emanation: the creation of ‘light’ mentioned in Gen. 1:3, Levi asserts, refers to that of the angels, from which in turn the spheres have come to be through emanation.⁶³ Thus, the verse ‘He [God] created the heavens and what moves them [*we-noṭehem*]’ (Is. 42:5)⁶⁴ refers to ‘Him Who created the celestial spheres and their movers [*ha-noṭim otam*], that is, the angels, for everything was created simultaneously—I mean: the angels and the spheres—by way of emanation, one [proceeding] from the other, in an orderly fashion’.⁶⁵ Levi thus

56 Id., *Livyat ḥen: Work of Creation*, p. 219.

57 Ibid., p. 219.

58 As Levi ben Abraham well realized; see id., *Livyat ḥen: Secrets of Faith*, pp. 70–71, and Baeck, *Zur Charakteristik des Levi ben Abraham ben Chajim*, p. 165.

59 Levi ben Abraham, *Livyat ḥen: Work of Creation*, p. 218.

60 Ibid., p. 212.

61 Ibid., p. 213. Similarly: ‘the foundation of our belief is that the deity created all existents through the emanation of His Glory [*mi-sefa’ kevodo*], and all that He willed was done instantly’ (ibid., p. 217). Properly understood, ‘creation’ refers to ‘bringing into existence through His emanation’ (ibid., p. 219). Levi gives the term ‘creation’ also another meaning (below); this is why he refers here to the ‘primary meaning’ (*lašon ‘bri’ah’ ... ye’amer tehilah...*).

62 Ibid., pp. 217 and 229; Levi ben Abraham, *Livyat ḥen: Secrets of Faith*, pp. 66–8; see also Harvey, *Levi ben Abraham of Villefranche’s Controversial Encyclopedia*, p. 177.

63 Levi ben Abraham, *Livyat ḥen: Work of Creation*, pp. 212–13 and 268. Shorter account in id., *Livyat ḥen: Secrets of Faith*, p. 66.

64 The translation obviously follows Levi’s understanding.

65 Levi ben Abraham, *Livyat ḥen: Work of Creation*, pp. 212–13.

explicitly states that the ‘heavens [in the sense of ‘spheres’] are eternal and everlasting [*qedumim we-‘omedim*].⁶⁶ How does this view square with the statement that the deity emanated only spiritual, matter-less substances? Levi was certainly aware of the problem, for already in the earlier ‘The Secrets of Faith’ he explicitly referred to it.⁶⁷ To be sure, Avicenna, too, was confronted with precisely this difficulty and offered his solution to it,⁶⁸ but there is no reason to think that Levi was aware of it. He in fact has no answer to this difficulty.

Levi is philosophically sensitive and notes that ‘time is measured only by motion, and [only] if there is motion is there time’.⁶⁹ Hence, when the deity created ‘the heavens and the earth’, He ‘created time together with them, for time was one of all created things’.⁷⁰ Levi therefore takes care to state that ‘the heavens were created not-in-time [*be-zulat zeman*]; rather, time was created with them’.⁷¹ It follows that the phrase ‘in the beginning [*berešit*]’ must be understood in a causal, rather than temporal, sense.⁷²

The coming-to-be of the sublunar world followed natural necessity, too: ‘The circumference and its centre’, Levi explains, are ‘relatives’, they ‘are like cause and effect’.⁷³ Specifically, ‘as soon as the sphere rotated’, he writes, ‘the coarse and murky [matter] moved downward, toward the centre, and became earth’.⁷⁴ The words ‘as soon as’ make us pause: does Levi imply that the spheres, although co-eternal with the deity and the intellects, did not *always* rotate? We will come back to this point. The upper and lower material realms having been separated, they were endowed with ‘supernal powers’ (*koḥot ‘elyonim*) that have caused the coming-into-being of the sublunar world: ‘a nature was put

66 Ibid., p. 279.

67 ‘He [God] did not mention the material cause, but mentioned the efficient cause and the form’; Levi ben Abraham, *Livyat ḥen: Secrets of Faith*, p. 65 (this seems to me to be the correct reading, but one manuscript carries a text with the opposite message, preferred by the editor: ‘He did not mention only the material cause, but [also] the efficient cause and the form’).

68 Avicenna, H.A. Davidson writes, ‘knit[ted] intelligences and spheres together through a series of emanations’; see his *Alfarabi, Avicenna and Averroes on Intellect*, p. 74.

69 Levi ben Abraham, *Livyat ḥen: Work of Creation*, p. 230.

70 Ibid., p. 217.

71 Ibid., p. 217. Similarly: ‘time can be measured only by motion, and if motion exists, the sphere exists’ (ibid., p. 230).

72 Ibid., p. 217. This is why *rešit* can be identified with the separate intellects; see ibid., p. 218. See also *infra*, n. 106.

73 Ibid., p. 208.

74 Ibid., p. 210. Levi here follows Averroes’ Epitome of *Metaphysics*; see Davidson, *Alfarabi, Avicenna and Averroes on Intellect*, p. 236; cf. also Maimonides, *Guide of the Perplexed* II, 19. Note that Levi uses the term *mušaq* in the sense given to it by Abraham ibn Ezra (*viz.* ‘centre’).

into the heavens and the elements, such that the supernal powers generate out of them [i.e. the elements] all that has come to be'.⁷⁵ As we are led to understand later, for Levi, saying 'a nature was put into the heavens and the elements' is tantamount to saying that the heavens and elements were infused with the *forms* of all sublunar substances, although only *in potentia*.

Through the action of the supernal forces on the sublunar elements, mountains, mineral, flowers, and 'some animals' have come to be.⁷⁶ All sublunar existents were generated through the sole action of 'supernal powers' (notably those of the planets⁷⁷), i.e. through mere natural necessities. In this process, 'everything came to be through the intermediary of the heat and the cold, the light and the darkness, for the cold constricts and limits the existents and the heat expands and increases them.'⁷⁸ This naturalistic account implies that the causal chain is everlasting: 'The Lord produces them continuously [*tamid*] and perpetuates their existence',⁷⁹ and the bottom line is this: 'Whatever the Lord pleases He does' (Ps. 135:6),⁸⁰ namely by natural necessities.

Does this mean that the sublunar world in which we live is co-eternal with the deity, the intellects and the spheres? God forbid! Levi is intent on avoiding this hazardous consequence of emanationist cosmogony and introduces the time factor. In what may be an original idea, he makes the following distinction: the *forms* of all species (i.e. the 'supernal forces') were indeed 'created' on 'Day one', namely *in potentia*,⁸¹ but their real, *enmattered* existence was realized only gradually, in a process extended in *time*.⁸² Properly speaking, therefore, the term 'creation' 'denotes bringing into existence something that had [already] existed potentially'.⁸³ It follows that 'creation' refers only to the coming-to-be

75 Levi ben Abraham, *Livyat hen: Work of Creation*, p. 210.

76 Ibid., p. 212. Levi says 'some animals' because he refers only to those that come to be through the so-called 'spontaneous generation'; the others, the great majority, do not come to be through the mere mingling of the elements and the action of the supernal powers—their formation requires in addition the 'formative force that is carried by the male's semen' (ibid., p. 212); Levi also refers to this force as 'divine' (ibid., p. 223).

77 Ibid., p. 211 (where this theory is associated with astrological theory).

78 Ibid., p. 213.

79 Ibid., p. 212.

80 Ibid., p. 210.

81 Ibid., p. 210: 'as soon as' the spheres rotated, the earth and the heaven came to be; this must be 'Day one'. On that same 'Day', also the 'supernal powers' were infused into the heavens and the elements.

82 Ibid., p. 213.

83 Ibid., p. 221: 'hamša'at davar še-haya be-koah' (cf. Abraham ibn Ezra on Gen. 1:1); see also p. 223: 'hevinu "beri'ah" 'al hawayat davar mi-davar še-haya bo tehilah be-koah we-ha-Šem natan bo šurah'. Elsewhere (ibid., p. 212) Levi writes that 'creation' refers not to bringing into *actual* existence, but only to bringing into existence *in potentia* (*ha-beri'ah hi' be-koah*), but this seems to be a slip of the pen, induced by the context.

of ‘perceptible [i.e. material] things, that came to be through the intermediaries [i.e. the intellects, spheres, supernal powers], not to the separate intellects, which have come to be through the emanation from the Blessed-be-He, without any intermediary’ (and are therefore eternal).⁸⁴ It is only when the sublunar matter enters the picture that the process is extended in time. The ‘gathering of the water’ (to which we will come shortly) was retarded by ‘thousands of years’ because one of its causes was the—slow—movement of the fixed stars.⁸⁵ The various species, Levi explains, have come to be successively, ‘each species on its [appointed] day, according to the order’.⁸⁶ Thus, ‘it is the foundation of our belief that God created ‘out of nothing, by the emanation from His Glory and that what He willed came to be *instantly*’⁸⁷—a statement that obviously relates only to the intellects and heavenly bodies. By contrast, ‘the lower forms, inasmuch as they are [embedded] in matter, revealed themselves little by little, and became actual in accordance with the mingling of the particles of matter and their [viz. the particles’] preparation [to receive forms]. Each species that is prior to another in nature, *also precedes it in time*’.⁸⁸ It follows that ‘all the created things in the lower [sublunar] world ... came to be in a natural way and *in time* [*ba-zeman*, i.e. in a process extended in time]’.⁸⁹ (Nonetheless, inasmuch as the entire process hinges on the intellects and spheres, which are co-eternal with the deity, ‘the species are everlasting’.⁹⁰) Levi posits (following in the footsteps of Avicenna) that a form that is high on the *scala naturae* can be enmattered only in a material substrate that is very subtle and balanced; and it takes time for such a mixture to be appropriately ‘prepared’ by the heavenly bodies.⁹¹ This is why man, the noblest sublunar substance, concluded the process of creation.⁹² The felicitous conclusion of this theory is that the sublunar world came to be in a definite past—it is ‘newly created’.

The preceding developments are the basis for Levi’s view that what the Book of Genesis narrates is the coming-to-be of the sublunar substances in a process that proceeds from the ontologically lower, which is also temporally

84 Ibid., p. 226.

85 Ibid., p. 230 (see also *infra*, at n. 104).

86 Ibid., p. 213.

87 Ibid., p. 217; see also p. 230, where Levi states that according to the belief in *ḥidduš ha-‘olam* the deity acts ‘not in time’ [*beli zeman*], so that from the Jewish perspective there is no difference between six days and six thousand years.

88 Ibid., p. 217.

89 Ibid., p. 221.

90 Ibid., p. 210.

91 Ibid., p. 214: ‘the more a species is subtle, the later was its coming-to-be, [namely] until fitting material and an adequate mixture existed, suitable to receive that form’.

92 Ibid., p. 214.

prior, to the ontologically higher and temporally posterior.⁹³ It is the acceptance of this idea, Levi points out, that distinguishes the stance of *hidduš* from the eternity-of-the-world thesis. Both positions agree that ‘all species are eternal and everlasting’. But the adherents of the eternity thesis uphold that ‘the [ontological] order is only in the soul, not in time’—namely, because *all* species—lower and higher—are co-eternal with the deity, so that there can be no correspondence between the ontological and the temporal orders; as against this, the advocates of the ‘newness’ of the world maintain that the ontological order of the ‘higher’ and ‘lower’ corresponds to the chronological order of coming-to-be.⁹⁴ Levi time and again declares his faithfulness to the *hidduš* position.⁹⁵

How precisely does Levi read his cosmogony into the narrative of the Book of Genesis? His account has two parts. A first idea is directly borrowed from Samuel ibn Tibbon: ‘[in the account given in the Book of Genesis] Moses did not describe the creation of the superior Beings, namely because they are things that came to be through [divine] Will’.⁹⁶ Inasmuch as the superior Beings (intellects and celestial spheres) emanate from the deity, their coming-to-be is not referred to by the term ‘creation’.⁹⁷ The second part of Levi’s attempt to harmonize Scripture and emanationist theory is his account of the gradual coming-to-be of the sublunar world. Levi writes: ‘the work of each day, was *the material* for the work of the following day’.⁹⁸ What came to be on Day *n*, was a preparatory phase for what was to follow on Day *n+1*. For example: without the gathering of the water there cannot be dry land; without dry land there cannot be plants, which in turn are a *sine qua non* for the existence of living beings, including man.⁹⁹ Thus, as a result of the initial separation of the elements (itself a consequence of the existence of the heavenly spheres in rotation), the coming-to-be of the sublunar world followed naturally and autonomously in successive phases extended in time, described in the Book of Genesis. In sum,

93 Ibid., p. 214.

94 Ibid., p. 214: ‘u-le-da‘at ha-qademut lo tihye ha-qedimah tivi‘it, raq ba-nefeš, lo ba-zeman; ki le-da‘at kullam kol min qademon, nišhi’.

95 See e.g. *ibid.*, pp. 209, 230 (‘our belief in *hidduš*’) and 290. Also in *id.*, *Livyat hen: Secrets of Faith*, p. 67 (= Baeck, *Zur Charakteristik des Levi ben Abraham ben Chajim*, p. 161, n. 1): “‘the belief in *hidduš*’ is the benefit of the entire Torah ... and whoever believes in the eternity of the world denies the Torah’; similarly, *ibid.*, p. 77: ‘Know that Solomon and all the sages of Israel believed in *hidduš* and coming-to-be *ex nihilo*’.

96 Levi ben Abraham, *Livyat hen: Work of Creation*, p. 225. See also p. 221, with the editor’s n. 142.

97 This, Levi observes, is reflected in the Morning Prayer (*Yošer ‘or*): When it says, ‘[Blessed be He] Who by His kindness each and every day constantly [or: for ever; *tamid*] renews the Work of Creation’, this refers to the ‘lower existents only, which come to be daily’. *Ibid.*, p. 225.

98 *Ibid.*, p. 214. See also p. 285 (quoted below, at n. 109).

99 *Ibid.*, p. 214.

once the intellects and, consequently, the spheres and matter existed, ‘all acts of creation were complete’,¹⁰⁰ for the forms of the sublunar substances have also come to exist (*in potentia*) and it only needed time to materialize. (The miracles, too, were already ‘pre-programmed’ in Nature.¹⁰¹) In this sense it can be said that ‘there is nothing new [under the sun] (Eccl. 1:9)’.¹⁰²

Let me recapitulate. To create a ‘synthesis’ of Avicennian emanationism and the thesis of the ‘novelty’ of the world, Levi distinguished between, on the one hand, the eternally existing intellects and the celestial spheres, and, on the other hand, the sublunar substances, which came to be in a finite past. For this, he introduced the time factor, as follows. He posits that the intellects and spheres emanate from the deity and are therefore co-eternal with it. The rotatory movements of the celestial bodies have produced light matter at the circumference and heavy matter at the centre, and so the elements came to be. (The origin of matter is left unexplained, however.) ‘Supernal (‘divine’) forces’, or forms *in potentia*, were infused into this material reality. Owing to the circular movements of the celestial bodies, the elements have been continually mixed, little by little producing increasingly balanced mixtures. (It is here that the time factor comes to play.) In due course, these mixtures were suitable to receive the pre-existing forms (another obviously Avicennian idea), and so the substances of our sublunar world came to be through natural necessity, the temporal order of their appearance being in conformity with the ontological hierarchy. The process of ‘creation’ thus consists in the actualization of the forms in the sublunar matter in a process that is extended in time. Levi ben Abraham’s account of the coming-to-be of the world is thus a ‘softened’ version of the naturalistic theory put forward by Avicenna and Samuel ibn Tibbon (whom Levi indeed often follows, although without ever saying so¹⁰³).

Does this synthesis between the emanationist theory and ‘novelty’ thesis hold water? Not really. For example, although Levi affirms (à la Avicenna) that the celestial spheres emanate from the intellects, the origin of matter, especially that of sublunar matter, remains shrouded in the dark, a difficulty of which Levi seems to have been aware. Another point is this: since the celestial spheres are co-eternal with the deity, their actions—notably the separation of the elements and their mingling—must also be eternal; therefore, according to the principle of plenitude, the realization in matter of the sublunar forms (that have

100 Ibid., pp. 210–11.

101 Ibid., p. 210.

102 Ibid., p. 210.

103 Levi speaks of ‘some of the sages of Israel [who] endorse the *hidduš* solely with respect to the lower existents, that the deity has “newly” brought into existence’ (ibid., p. 225). The reference is certainly to Samuel ibn Tibbon, as suggested in the editor’s note *ad loc.* (n. 187). Although the formulation advisedly suggests a distanciation, this is precisely also Levi’s own position.

existed eternally *in potentia*) cannot go back to a finite past only. Levi *malgré lui* acknowledges as much when he uses the expression ‘as soon as the sphere rotated’ (above, p. 286): he must have realized that if the spheres’ rotation is taken to be co-eternal with the spheres themselves and with the deity, then it necessarily would follow that the sublunar world is eternal, too. Levi was well aware that the notion according to which the spheres began their rotations after having been at rest is philosophical nonsense, and thus avoided saying so explicitly; but his slip of the tongue (if this is what it was) shows that the problem did not escape him and that he sought to solve it the best he could. A further limitation of Levi’s synthesis is that it does not explain how the human form (soul) was instilled in matter.

When he wrote his earlier *The Secrets of Faith* Levi had not yet developed this theory; it apparently was still a project. In this work he therefore more openly acknowledges the difficulties posed by an Avicennian naturalistic account and more than once retreats to an agnostic position, à la Maimonides. For example: ‘what was the deity’s intention in creating the world, and knowing how it was created, and how it comes that He did not create it earlier than that, and how body came to be from what is not body,¹⁰⁴ and similar questions—we have no knowledge of this, and have no way to attain it, and no man can have an apodictic proof of this’.¹⁰⁵ Levi refers to Maimonides and develops in some detail the stance according to which the origin of the world is unknowable to man.¹⁰⁶ He explicitly formulates the crucial question: ‘since God’s perfection is in actuality at any time, how is it that there was a time at which He did not create?’¹⁰⁷ In *The Secrets of Faith* he crisply replies that God created the world when His wisdom so decreed.¹⁰⁸ In the later *Work of Creation* he was more ambitious and replaced this resigned position with his (possibly original) account of ‘creation’ of the sublunar world as a process stretched in time. In *The Secrets of Faith*, Levi’s commitment to naturalism was unenthusiastic:

104 As already noted, the question how matter can emanate from an entirely immaterial Entity troubled Levi. See the uneasy and embarrassed discussion in Levi ben Abraham, *Livyat hen: Secrets of Faith*, p. 68 (= Baeck, *Zur Charakteristik des Levi ben Abraham ben Chajim*, p. 161, n. 1, toward the end). See also above, n. 58.

105 Levi ben Abraham, *Livyat hen: Secrets of Faith*, p. 68.

106 *Ibid.*, p. 73 (and the editor’s introduction, p. 77), and Baeck, *Zur Charakteristik des Levi ben Abraham ben Chajim*, pp. 162–7.

107 Levi ben Abraham, *Livyat hen: Secrets of Faith*, p. 75. As already noted, Levi is aware that time depends on the existence of rotating spheres and in an afterthought he adds: ‘Do not be pedantic apropos of our saying “before”, “prior to”, “then”, “when”, and other [adverbs] indicating time, for it all [is said] metaphorically and according to the usual language’ (*ibid.*, p. 76; see also p. 77).

108 *Ibid.*, p. 76.

‘The secret of creation is something above nature, suspended on God’s Will and concealed, for His Will and His Essence are all one.’¹⁰⁹

In sum it may be said that Levi did not succeed in finding a way to embed the thesis of the ‘novelty’ of the world within emanationist theory, which inescapably pulls toward the thesis of the eternity of the world.¹¹⁰ Levi seems to have perceived at least some of the limitations of his naturalistic account of *The Work of Creation* and therefore retreated to the Maimonidean stance according to which the origin of the world is unknowable.¹¹¹

Having sketched in outline Levi ben Abraham’s cosmogony, and given Levi’s familiarity with the ideas of Samuel ibn Tibbon, we may now ask how he tackled the issue that was so crucial to the latter—the issue of the ‘gathering of the water’. We will see that for Levi it plays a minor role. The reason is not far to seek. Ibn Tibbon accepted without qualms the eternity of the world, which he reconciled with the traditional doctrine of *hidduš* by embracing Avicenna’s bold theory according to which each ‘gathering of the water’ is followed by a flooding, which is again followed by a gathering, and so on in an eternal cycle. On this construal, the presently existing sublunar world indeed has a finite past, but it is one in a series of worlds, extending indefinitely into the past and the future. Levi, we just saw, rejects the eternity thesis: for him, the present sublunar world is the only one that has come into being, and it is the culmination of the emanation process. Therefore, in his view, a situation in which the surface of the earth will be entirely submerged under water as it was ‘in the beginning’ will never again occur. Strikingly, Levi never quotes the verse in Genesis (1:9) stating that ‘in the beginning’ the surface of the earth was entirely covered by water, which had triggered Samuel ibn Tibbon’s research program. In the context of Levi’s scheme, therefore, the issue of the ‘gathering of the water’ was of minor importance.

Levi’s fullest treatment of the ‘gathering of the water’ is given in chapter twelve of *The Work of Creation*, devoted to the coming-to-be of the heavens, on Day two. Most of the discussion proceeds by way of a verse-by-verse exegesis of Psalm 104, just as Samuel ibn Tibbon had done. Levi begins with the philosophical statement that ‘according to the natural order, in which the elements enclose one another as onion peels’,¹¹² it would have been lawful [*min ha-din*] that the earth be covered by water on all sides, and that water surround it all

109 Ibid., p. 74.

110 See again the discussion in Baeck, *Zur Charakteristik des Levi ben Abraham ben Chajim*, p. 165. Levi ben Abraham, *Livyat ħen: Work of Creation*, p. 218.

111 Baeck, *Zur Charakteristik des Levi ben Abraham ben Chajim*, pp. 162–7.

112 Levi ben Abraham, *Livyat ħen: Work of Creation*, p. 290. This phrase is a literal quotation from the Hebrew *Sefer ha-Šamayim we-ha-‘olam*, gate 9.

around'.¹¹³ To buttress the point, Levi quotes Ps. 104:9: '[Thou hast set a bound that the {waters} may not pass over]; that they turn not *again* to cover the earth'. The Psalmist thus confirms that 'initially [or: at the outset; *mi-tehilah*] the water was surrounding the earth, in accordance with our belief in the novelty of the world'.¹¹⁴ Other verses supply further confirmation. E.g. 'the waters stood above the mountains' (Ps. 104:7), meaning that it was 'in conformity with the law that water would be in [low] places that later became mountains'.¹¹⁵ 'This is what is appropriate according to Nature', Levi concludes.¹¹⁶ However, he continues, now quoting Psalm 104:7–8, when You—God—so willed, 'At thy rebuke they [the waters] fled; at the voice of thy thunder they hastened away ... unto the place which thou hast founded for them'. What caused this?, Levi asks, and replies with the sequel of the same verse: 'They [the waters] go up by the mountains; they go down by the valleys' (Ps. 104:8). In what follows, Levi gives a short, fully naturalistic account of 'the cause of the land becoming visible [i.e. dry]'.¹¹⁷ This cause is the motion of the heavenly bodies, notably of the sun.¹¹⁸ He explains that 'with its rays' the sun raises one kind of exhalation from the land and another from the seas, and goes on to explain the theory of exhalations, which he puts in parallel with various rabbinic statements.¹¹⁹ The

113 Levi ben Abraham, *Livyat hen: Work of Creation*, p. 291; similarly pp. 271 and 272. The rare expression *min ha-din* is used by the radical Averroist philosopher Isaac Albalag, in his work *Sefer Tiqqun ha-de'ot* (*Correction of Opinions*; completed between 1290 and 1310), a Hebrew translation of al-Gazālī's *Maqāṣid al-falāsifa* (*The Intentions of the Philosophers*), in which the author inserted long glosses discussing (and often refuting) al-Gazālī. Albalag very briefly alludes to the issue of the 'gathering of the water', saying that according to the natural order it would have been 'lawful' (*min ha-din*) that the surface of the earth be entirely covered with water. The employment of this term suggests that Albalag may have been acquainted with *Livyat hen*. Albalag accounts for the existence of dry land in a single sentence: 'Philosophy provides an evident explanation for the becoming-visible of dry land (which is the extremity of the earth). Namely: owing to the heat of the sun, the subtle and light part of water is loosened and becomes the moist exhalation [*ed*], which is the matter of dew and rain. The gross and turbid part [of the water], which is close to clay, remains behind, and—when it dries in the heat of the sun and of the stars and in the blowing winds—it becomes dry land'. See Albalag, *Sefer Tiqqun ha-de'ot*, pp. 39–40, and Vajda, *Isaac Albalag*, pp. 147–8; clearly, Avicenna's account echoes in this brief statement, but it does not seem that Albalag was acquainted with Ibn Tibbon's work.

114 Levi ben Abraham, *Livyat hen: Work of Creation*, p. 290. Interestingly, one manuscript has the reading *lefi emunatam* (= according to *their* belief), instead of *lefi emunatenu* (= according to *our* belief). This reading also appears the short version (p. 407), and may not be a copyist's error (it is also the *lectio difficilior*).

115 Levi ben Abraham, *Livyat hen: Work of Creation*, p. 291.

116 *Ibid.*, p. 291.

117 *Ibid.*, p. 291.

118 *Ibid.*, p. 291.

119 *Ibid.*, pp. 291–301 (also pp. 228, 231 and 272); see also short version, pp. 407–9. Levi discusses the topic in some length also in the astronomical part of *Livyat hen*, section 12 (MS

entire discussion follows Ibn Tibbon's account. Levi is however carried away by his exposé and the wealth of rabbinic quotations and hardly comes back to the issue that he intended to treat—the appearance of dry land. Only *en passant* does he suggest that the exhalations which are raised by the sun bring about the formation of the 'heaven'—by this he here means the upper strata of the sublunar world¹²⁰—and, ipso facto (owing to the evaporation of the water), the appearance of dry land, notably of mountains, and, as a result, the accumulation of water in the deep places.¹²¹ Thus, 'the emergence [lit. becoming visible] of dry land hinges on the coming-to-be of the heaven'.¹²² In another context, as already noted, Levi ascribes the coming-to-be of dry land to the action of the fixed stars¹²³ and argues that owing to the slowness of their motion the appearance of dry land was 'retarded by thousands of years'.¹²⁴ Levi thus holds that it is the 'action of the stars' that produces mountains and makes the earth visible, namely by 'raising the exhalations'.¹²⁵ Other exhalations directly caused the emergence of mountains in (what we call) 'volcanic phenomena'.¹²⁶ Levi summarizes the idea that the formation of the 'heaven' (i.e. the upper strata of the sublunar world) is caused by the rays of the celestial bodies by saying 'by means of the light He suspended the lower heaven', an idea that is reflected in the fact that in Genesis 'let there be light' (Gen. 1:3) precedes the verse 'let the heaven be' (Gen. 1:6). In sum, it is 'owing to the action of the sun that the earth became visible, and the existents [i.e. the elementary mixtures] came to be in it, until [the matter] was suitable to receive the actions of the other planets and the rest of the stars was prepared'.¹²⁷ We may note that this account is in keeping with the general scheme described above, according to which 'in the Work of Creation in its entirety, the work of one day was the cause for that of the other, which is its *telos*'.¹²⁸

Vatican 383, fols 180a–182a; I am grateful to Prof. H. Kreisel for having sent me a copy of these folios). His account of the action of the rays seems to be traditional, Aristotelian-Averroean, but he also laconically refers to Avicenna: 'another reason for the sun's chafing the world was given by Avicenna' (fol. 181b). Possibly Levi here refers to *Sefer ha-Šamayim we-ha-'olam*. On the different relevant theories see Mandosio, *Latin technique du XII^e au XVII^e siècle*, pp. 123–30.

120 Levi clearly states the equivocation of the terms 'šamayim' and 'raqi'a' at *Livyat hen: Work of Creation*, p. 267; see also pp. 276 and 278–9.

121 Levi ben Abraham, *Livyat hen: Work of Creation*, p. 291; see also short version, p. 406.

122 *Ibid.*, p. 271. Similarly, *ibid.*, pp. 285 and 299.

123 Following Samuel ibn Tibbon, *Ma'amar Yiqqawu ha-mayim*, p. 161, lines 2–3. See also above, n. 21.

124 Levi ben Abraham, *Livyat hen: Work of Creation*, p. 231.

125 *Ibid.*, p. 272.

126 *Ibid.*, p. 269.

127 *Id.*, *Livyat hen: Quality of Prophecy*, p. 524 (with n. 28).

128 *Id.*, *Livyat hen: Work of Creation*, p. 285.

Levi ben Abraham never alludes—positively or negatively—to the theory of eternal cycle of flooding and re-appearance of dry earth. Although he endorsed the eternity of the celestial spheres, he nonetheless described the ‘creation’ of the sublunar world as a one-time process with a beginning in a finite past. Levi thus offers a further illustration of how Avicenna’s sophisticated scientific ideas, accurately presented by Samuel ibn Tibbon who also ‘legitimized’ them by integrating them in a Jewish interpretive scheme, were trimmed and welded into traditional Jewish lore, thereby losing their explosive character. The naturalism of most medieval Jewish thinkers in Provence was in shackles and had narrow limits. Levi says it in so many words: ‘We should stick to opinion of our faith, and uphold the [truths transmitted by] our Tradition. It is inappropriate to overturn what has been accepted [by Tradition], unless apropos of something that has been demonstrated by apodictic proof’.¹²⁹ Levi has thus rightly been called a ‘conservative Maimonidean’,¹³⁰ and the fact that contemporaries famously ‘hounded’ him cannot be due to his ideas, which were rather moderate. The reasons for his harassment are rather to be sought in his social standing and his activity as a ‘popularizer of philosophy’.¹³¹

VI

The loss of theological relevance explains how Avicenna’s ideas—curtailed and diluted—found their way into the thought of two rabbinic authorities of the second half of the thirteenth century. In that period the presence of Maimonides’ thought had grown to an extent that an outright rejection of any naturalism was an increasingly untenable position. We already noted this phenomenon apropos of the Kabbalist Jacob ben Šešet, and we will now see that it concerns also another social type of Jewish intellectuals, namely the ‘Halakhists’, rabbis whose occupation was the Halakhah (Jewish Law), and who were occasionally led to offer exegesis of the Scriptures in which matters of doctrine played a role.¹³² These rabbinic authorities are R. Reuben ben Ḥayyim, and his student, the noted Talmudic scholar R. Menachem Ha-Meiri. Both were acquainted (albeit to different degrees) with Maimonidean naturalism and drew on it in their understanding of Scriptures.

Only very little of what R. Reuben ben Ḥayyim (fl. toward the middle of the thirteenth century) wrote is extant, and the following short discussion is based only on his partially preserved *Sefer ha-Tamid* (*Book of Continuous [Prayer]*),

129 Levi ben Abraham, *Livyat hen: Secrets of Faith*, p. 74.

130 Harvey, Levi ben Abraham of Villefranche’s Controversial Encyclopedia, p. 177.

131 As suggested *ibid.*, p. 179.

132 In recent years, the penetration of naturalism into the worldview of Halakhists has been highlighted by Moshe Halbertal; see especially his *Between Torah and Wisdom*.

an exegesis of prayer.¹³³ The comments are brief and disconnected and thus do not offer a systematic discussion of natural phenomena; nonetheless, here and there the exegesis integrates rationalist and naturalist ideas which bear on the question of the coming-to-be of dry land. R. Reuben was familiar with some of Averroes' works and other philosophical writings, but the precise source for his acquaintance with the ideas to be discussed here remains to be identified.

R. Reuben holds that the deity has established a natural order in the world, implemented by the angels/separate intellects, which in turn employ the heavenly bodies as tools. Specifically, the heavenly bodies act on the four elements, and it is they that cause all changes in sublunar substances.¹³⁴ R. Reuben interprets the verse 'His grace [or: mercy] endures for ever' (Ps. 136) as follows: 'the grace [consisting of] the continuity of existence, forever [and] without interruption, is brought about through the intermediary of the angels and the [heavenly] spheres'.¹³⁵ These 'intermediaries' have no power to outstep the natural order established by God—they merely realize it.¹³⁶ Wonders, both in nature and in human (Jewish) history, are therefore attributable to God's Will;¹³⁷ they are a testimony that the world was created *a novo*. Reuben is philosophically perspicacious and takes care to note that wonders, like creation itself, are not due to a *change* of Will on the part of the deity, but he does not explain this idea.¹³⁸ In another philosophically remarkable statement, R. Reuben affirms that the very coming-to-be of composite substances and their continued existence is a 'wonder' (*pele*).¹³⁹ The thought underlying this (prima facie surprising) statement is this: according to Aristotelian natural philosophy, any composite substance has a built-in natural propensity toward disintegration, due to the opposite natures of the composing four elements¹⁴⁰; consequently, the very coming-to-be of a composite substance out of the opposite elements and its subsequent perseverance are in fact counter-natural and should be considered as a wonder. 'All the wonders, which are a change of nature—it is the Creator's Will

133 Reuben ben Hayyim, *Sefer ha-Tamid*. The only other extant writing by R. Reuben, Commentary on the Bible Portion 'Bereshit', is also extant in part only and the preserved sections are not relevant to our discussion. See also Halbertal, *Between Torah and Wisdom*, pp. 133–44. R. Reuben ben Hayyim was apparently Levi ben Abraham's uncle; see e.g. Levi ben Abraham, *Livyat hen: Work of Creation*, pp. 241 (n. 351, with the text), and 398. On Levi ben Abraham's father, R. Abraham bar Hayyim (R. Reuben's brother), see Bar-Tiqva, *Genres and Topics in Provençal and Catalan Piyut*, pp. 34–5.

134 Reuben ben Hayyim, *Sefer ha-Tamid*, p. 16.

135 *Ibid.*, p. 17.

136 *Ibid.*, pp. 17, 27 and 31; on the immutability of nature see also p. 29.

137 *Ibid.*, pp. 17 and 27.

138 *Ibid.*, p. 17.

139 *Ibid.*, p. 17.

140 On this theory see Freudenthal, *Aristotle's Theory*, passim, and Fontaine and Freudenthal, Gersonides on the Dis-/Order of the Sublunar World.

that produces them, not the providence [or: governance] of the angel and the sphere; rather, the Creator's Will forces them to depart from it [viz. Nature].¹⁴¹

R. Reuben comments on some aspects of the story of creation, including the 'gathering of the water', in a similar way. Again, his treatment is not systematic, but triggered by one or another phrase of the prayer he comments. Apropos of the verse 'To Him that stretched out the earth above the waters' (Ps. 136:6) R. Reuben remarks: 'the nature of water is to be above the earth. However, the [heavenly] spheres are the cause of the coming-to-be of the mountains and valleys, which [in turn] are the cause of the becoming-visible of dry land, whereas the water descended to the depths of the earth. You also see that the sea and the rivers are below the earth, [for] "Thou hast set a bound that they may not pass over" (Ps. 104:9), and it also says: "They that go down to the sea in ships" (Ps. 107:23)'.¹⁴² Just like the existence of composite substances, the existence of dry land above water is a phenomenon that goes against the innate natures of the elements, and is a 'wonder' produced through the action of the spheres and the intellects.

R. Reuben ben Ḥayyim obviously integrated into his worldview the idea of an autonomous natural order instituted by God, to Whom ultimately all natural phenomena go back. He seems to have put particular emphasis on phenomena that at first blush may seem to be counter to nature, such as the existence of composite substances and the existence of dry land: had the sublunar world functioned only by virtue of the innate qualities of the elements, these phenomena would not have come to pass; their existence thus testifies to a causal 'input' from outside the sublunar world, viz. from the spheres and the intellects, which are God's instruments in instituting the natural order.¹⁴³ The phenomenon in which we are specifically interested—the 'gathering of the water'—is smoothly and consistently integrated within this scheme. Although vague echoes of Ibn Tibbon's account are discernible in R. Reuben's discussion, he seems unaware of the full scope of Ibn Tibbon's project. He upheld as indubitable the idea of creation *a novo*: *ḥidduš* is the 'true' and 'good' belief to which the Sabbath alerts the Jew constantly.¹⁴⁴ R. Reuben does not offer a naturalist interpretation of *ḥidduš*: all he writes is that 'He [God] said the heaven should come to be and they came to be; He commanded the earth to bring forth its progeny and it brought [them] forth'¹⁴⁵—but he leaves the reader in the dark about how the act of 'saying' is connected to the processes in the material world. By the same token, R. Reuben is silent on how the notion of the intellects and

141 Reuben ben Ḥayyim, *Sefer ha-Tamid*, p. 27.

142 Ibid., p. 18.

143 This argument is frequent. See Freudenthal, *Cosmology: The Heavenly Bodies*.

144 Reuben ben Ḥayyim, *Sefer ha-Tamid*, pp. 32 and 34; see also p. 11.

145 Ibid., p. 19.

spheres tallies with the idea of *ḥidduṣ* (are they eternal or also ‘new’?). In sum, it can be said that while he integrated some naturalist statements in his exposé, the ‘integration’ remained fairly superficial: for the halakhists, as we shall see again immediately below, natural philosophy was one exegetic resource among others, not a commitment to a worldview. Halakhists accepted the notion of an autonomous natural order and some ideas about how the natural world ‘functions’, but they turned their backs to rationalism as a method of inquiry and thus were not troubled by the menace of inconsistency within their thought (as between the idea of *ḥidduṣ* and the notion of intellect).

R. Reuben ben Ḥayyim’s student, R. Menachem Ha-Meiri (1249–ca. 1310), one of the greatest and most respected medieval Provençal Talmudists, was more articulate on the ‘gathering of the waters’, because he was already familiar with Levi ben Abraham’s encyclopaedic work. I have studied Ha-Meiri’s views in detail in a recent paper and will only summarize them very briefly.¹⁴⁶ First, Ha-Meiri’s principled position on the relative authority of Scripture and science as sources of knowledge must be noted. Ha-Meiri’s view is unambiguous: the Torah—i.e. the totality of the Jewish tradition—has absolute epistemological priority, and science and philosophy merely complement it. For Ha-Meiri, the commitment to the Torah results from a primary act of man’s free will that cannot and need not be rationally justified. In his view, the doctrine of creation *a novo* and *ex nihilo* is the ‘cornerstone’ of the Torah.

In an early phase of his intellectual development, Ha-Meiri was already familiar with the problem of the ‘gathering of the water’ and used it to buttress his traditionalist position: the philosophers, he argued, admit that the existence of dry land runs against the basic principles of natural philosophy. Their avowal shows that this topic is beyond human ken and that it is the deity’s sovereign Will that changed the nature of dry land so that it may remain above the water.

In later writings Ha-Meiri on several occasions gives an ostensibly naturalistic account of the processes through which the world came to be after the initial moment of ‘creation’. Of course, the ‘Torah’ was still posited as a ‘cornerstone’. Ha-Meiri borrowed the account from Levi ben Abraham, whose name, however, he never mentions. (Levi ben Abraham was the nephew of the Reuben ben Ḥayyim, Ha-Meiri’s master.¹⁴⁷) We saw that Levi tried the best he could to integrate his emanationist conception with the traditionalist position that posited creation *a novo* and *ex nihilo*. Ha-Meiri, for his part, was much less committed to the principles of philosophy than Levi and therefore was not in the least perplexed: he simply ‘overcame’ the incompatibility of the naturalistic and the traditionalist stances by blatantly assigning to the posited philosophical

146 Freudenthal, ‘The Gathering of the Waters’.

147 Levi ben Abraham occasionally mentions him; see e.g. *Livyat ḥen: Work of Creation*, pp. 241 and 398 with the editor’s n. 351.

entities modes of functioning that run against the fundamentals of the philosophical theories in which they are grounded. For example: he affirms the separate intellects to have been created *a novo*; similarly, he says that the celestial spheres were put in motion after having been at rest ('the spheres turned for twelve hours, and then time came to be'). Superficially, these statements follow what Ha-Meiri found in the writings of Levi ben Abraham, but in truth he modified them so that they conform to a traditionalist understanding of creation *a novo*; needless to say, they thereby became entirely incompatible with the philosophical principles. Thus, at bottom, Ha-Meiri was a fideist who just wove some philosophical images into his traditionalist account, affording it a seemingly rationalist and naturalist coating.

With this initial phase accomplished, Ha-Meiri can now describe the next steps of the coming-to-be of the world as a chain of formation *processes* that is extended in time and brought about by natural necessities only. This dynamic account (which Ha-Meiri grounds in several Psalms) is a religiously acceptable alternative to a literalist reading of the processes described in Genesis. According to Ha-Meiri, once the world, material and immaterial, 'got started' through a divine act in a finite past, the entire creation existed potentially, and proceeded autonomously step by step, an idea obviously also borrowed from Levi ben Abraham. This gradual process includes also the 'gathering of the water', a topic to which Ha-Meiri comes back repeatedly.

Ha-Meiri thus embraced yet another truncated version of Avicenna's account, which, as noted, reached him via Levi ben Abraham. (He does not seem to have seen *Ma'amar Yiqqawu ha-mayim*.) We thus see that Avicenna's theory passed from one intellectual milieu to another, albeit in a series of curtailed versions. The fact that this account posited *dynamic* processes made it into a suitable complement of the quasi-naturalistic account of creation as exposed in Maimonides' *Guide*.

VII

A very different approach is found in the work of Levi ben Geršom, Gersonides (1288–1344), certainly the most original and broad-minded philosopher-scientist to write in Hebrew in the Middle Ages. Gersonides wrote supercommentaries on many of Averroes' commentaries on Aristotle and played a crucial role in introducing the study of Averroes into the Jewish culture of the Midi.¹⁴⁸ Contrary to Maimonides, Gersonides believed that the traditionalist Jewish stance, according to which the world was created *a novo* (although not completely *ex nihilo*), could be *demonstrated* scientifically. Book VI of his *Milḥamot ha-Šem*

148 Glasner, Levi ben Gershon and the Study of Ibn Rushd.

(*Wars of the Lord*) is dedicated to the proof that the world is ‘newly created’, and that the entire existence (heaven, time, motion, fauna, flora, etc.) all came to be after not having been. Gersonides offered a rationalist account of how the world came to exist out of a pre-existent ‘formless body’ in a finite past.¹⁴⁹ Here I will attend only to his treatment of the ‘gathering of the water’.

Chapter 13 of book VI, part I of the *Wars of the Lord* is devoted to investigating whether ‘the uncovered [dry] land is eternal or [came to be] *a novo*’.¹⁵⁰ Gersonides’ argument is this:

We should investigate apropos of the visible [uncovered, dry] part of the [surface of] the earth whether it is eternal, or generated *a novo* [*mehuddaš*].

[In fact,] it is among the things whose existence is continuous [i.e. uninterrupted by flooding]. [For the following reason:] If it were possible that this part [of the surface of the earth, namely dry land] be destroyed, [i.e.] that it become surrounded by the watery element, then all those sublunar existents that are born from [an individual of their] own species would be destroyed. Now, it is impossible that they come to be again naturally. For we observe that man comes to be from man, and the oxen from an oxen, and the date-tree from a date-tree. It is therefore evident that if the existent[s] of these species were destroyed, none could possibly come to be [again] naturally through the mingling of the elements, as do the other [viz. inanimate] species. This is evident to whoever studied natural philosophy.

It has thus been established that the dry [lit. uncovered] part of the earth is among the things whose existence is continuous, inasmuch as [various] species that are compounded of elements and which come to be on it have existed continuously.¹⁵¹

The question that Gersonides wishes to investigate is whether dry land is eternal or newly generated: the proof that it is ‘newly generated’ will corroborate the claim that the entire world was created *a novo*. Gersonides had to battle on two fronts and counter two theories that posited that the world is eternal: that of Avicenna, which upheld that dry land is cyclically flooded but comes to be again; and that of Averroes, which upheld that the existence of dry land is eternal and uninterrupted. He names neither of these thinkers, but his invisible interlocutors are easily identified.

Gersonides now seeks to establish that the existence of dry land has been ‘continuous’, i.e. it has never been interrupted. The demonstration is simple: had the existence of dry land been interrupted, all fauna and flora would have been destroyed. But many living beings (plants and animals) come to be *only* through a parent of their own species, and not through a mere mingling of the elements.

149 See Freudenthal, *Cosmogonie et physique*; id., *Levi ben Gershom (Gersonides)*, and Glasner, *Gersonides*.

150 Gersonides, *Sefer Milhamot ha-Šem*, p. 349.

151 *Ibid.*, pp. 349–50.

Therefore, had dry land been destroyed in the past, those species would no longer exist. (The argument obviously rests on the rejection of the theory of spontaneous generation.¹⁵²) Gersonides concludes that the existence of dry earth is continuous. ‘The dry [uncovered] part of the [surface of] the earth will ever be dry, and the sea will ever be sea, so that the dry place will not be extinguished *in toto*’.¹⁵³

This argument of Gersonides is clearly directed against Avicenna: Averroes upholds the ‘continuity’ of the species of dry land no less than Gersonides, and it is only Avicenna’s theory of recurrent flooding that negates it, sustained (among other things) by the theory of spontaneous generation. Gersonides had *Ma’amar Yiqqawu ha-mayim* in his library, and we can suppose that he was familiar with Avicenna’s argument through it.¹⁵⁴

In the sequel, Gersonides argues against Averroes. He assumes that ‘dry [visible] land is among the things whose existence is continuous, i.e. the species of bodies compounded of the elements exist continually’¹⁵⁵; an interruption of their existence is impossible. The question that remains to be explored is whether this continuity is only *a parte post* (as Gersonides wishes to argue) or also *a parte ante* (as Averroes holds). Gersonides formulates this question as follows: ‘we should now investigate whether or not [dry land] has one of the specific properties of *generated* things’.¹⁵⁶ His considerations are anchored in his global philosophy of nature, with its strong commitment to the view that all reality was designed by a benevolent deity Who created a world in which any existent has a purpose. Gersonides offers a résumé of his argument as follows:

It can be seen that the becoming visible [i.e. dry] of this part [of the globe] is for the [same] purpose as that which have [all] the sublunar existents. For [dry land] is not brought about by the nature[s] of the earthy and watery element[s], nor by the nature of the celestial bodie[s], as will be made clear in what follows. This being so, it is established that dry land has all the specific properties of a generated existent inasmuch as it is a generated existent, namely that it has a purpose. This [viz. having a purpose] is something that is not a result of its nature, nor does it result from the nature that is emanated upon it from the heavenly bodies. Moreover, it [dry land] exists for the benefit of something else. This being so, necessarily the existence of dry land is *a novo*.¹⁵⁷

152 A coming-to-be of an individual not from another individual is qualified by Gersonides as a ‘miracle’ and is therefore an act that the Torah ascribes to God; see Gersonides, *Sefer Milhamot ha-Šem*, p. 428.

153 Id., *Commentary on the Pentateuch: Genesis*, p. 54.

154 Weil, *La bibliothèque de Gersonide*, p. 46: ‘Books of Science’, item 7. Gersonides also had Ps.-Avicenna’s *Sefer ha-Šamayim we-ha-‘olam* in his library (ibid., p. 47: ‘Books of Science’, item 26), but he seems to respond to the fuller version of the theory as presented in Ibn Tibbon’s work.

155 Gersonides, *Sefer Milhamot ha-Šem*, p. 350.

156 Ibid., p. 350.

157 Ibid., p. 350.

Gersonides here argues that if dry land is an existent that came to be *a novo*, then it must have a purpose, as do all existents that come to be. He next states his view (for which he will argue in the sequel) that dry land is indeed purposeful, i.e. it is not the outcome of natural necessities. The purpose of dry land, as Gersonides identifies it, is to give rise to the existents of the sublunar world.¹⁵⁸ As announced, Gersonides continues by adducing several arguments to the effect that dry land cannot come to be out of mere natural necessities alone, be it the natures of the elements or the actions of the planets¹⁵⁹: this argument implicitly rejects both Avicenna's and Averroes' accounts, so as to buttress the contention that the existence of dry land is purposeful. Further analysis leads Gersonides to conclude that dry land came to be as the immediate result of a purposeful act by an Agent,¹⁶⁰ and that its continuous existence thereafter is 'preserved' by the heavenly bodies.¹⁶¹ Thus, Averroes' view, too, has been refuted.

Gersonides, in sum, implicitly takes issue with both Avicenna and Averroes. Avicenna's thoroughly naturalistic theory is incompatible with Gersonides' creationist worldview, which allocates to the deity a prime role in devising the most perfect world. Gersonides argues against Avicenna not from general theological-philosophical principles, but by assuming that for many existing species, spontaneous generation is not possible and so a repeated flooding would have resulted in a world without these species. The argument is not really conclusive—notably because Gersonides posits without argument the impossibility of spontaneous generation. Gersonides agrees with Averroes that the existence of dry land is uninterrupted, but of course rejects the idea that the world is eternal: his own world is purposeful and created *a novo* by an Agent.

VIII

I will end by looking at two fourteenth-century members of the illustrious Israeli family of Toledo who held opposite views on the gathering of the water and indeed on the relationship of religious tradition and philosophical inquiry. Like many of their contemporaries in fourteenth-century Toledo, the two Israelis were both arabophone, which puts them in an intellectual context other than

158 *Ibid.*, p. 350; similarly, p. 431, and Gersonides, *Commentary on the Pentateuch: Genesis*, p. 54.

159 *Id.*, *Sefer Milḥamot ha-Šem*, pp. 350–51, and *id.*, *Commentary on the Pentateuch: Genesis*, p. 53.

160 *Id.*, *Sefer Milḥamot ha-Šem*, pp. 351 and 430.

161 *Ibid.*, p. 351.

Provence; there is no reason to think that Ḥayyim Israeli was acquainted with Samuel ibn Tibbon's book.¹⁶²

I begin with Isaac Israeli, the noted astronomer, who, in his astronomical work *Yesod 'olam* (*The Foundation of the World*, ca. 1320), included a précis of cosmology. From an arabophone astronomer—and Israeli was still an arabophone—one would expect a frame of mind informed by Greco-Arabic science and philosophy: this is indeed the case as far as mathematical astronomy is concerned, but with respect to theology or philosophy Israeli is a staunch fideist. He is true to the spirit of his patron, the reputed Talmudist Asher ben Yehiel, who hailed from Germany in the first decade of the fourteenth century, and who, by his own proud admission, was a stranger to all 'alien' (i.e. secular) science and philosophy.¹⁶³

Isaac Israeli expressly states that the study of astronomy is not the proper place to inquire into the 'creation of heaven and earth',¹⁶⁴ but nonetheless devoted some pages to precisely this topic. Chapter two of the second Section of *Yesod 'olam* is devoted to explaining why a part of the surface of the earth is dry land. Isaac Israeli writes that according to 'absolute nature' the entire globe should have been covered with water, as indeed it was on Days one and two of creation. However, on Day three, God, seeing that the world was *tohu bohu*, commanded the water to gather, whereupon it accumulated in one place, forming a 'wall of water', thereby creating the ocean; as a result of this accumulation of the water on one 'side' of the surface of the earth, its other half was uncovered. Like this, Israeli explains, 'nature was repelled and pushed back through God's Will'.¹⁶⁵ Nature is indeed 'one of God's slaves and servants'.¹⁶⁶ Much the same, Israeli adds, holds of all miracles. God thus arranged His world for the benefit of the fauna and flora, above all of man, the crown of creation.¹⁶⁷

We need not go into further detail: Isaac Israeli combines high mathematical competence with theological literalism and fideism. He says his argument is directed against 'the deniers among the gentile nations'¹⁶⁸: he must have in mind Avicenna and/or Averroes. The fact that the gathering of the water (and other phenomena) follow God's Will and not nature opens a window to the

162 Ibn Tibbon is not mentioned in Isaac Israeli's listing of the interpretations of the *raqi'a* that is within the *raqi'a*; Isaac Israeli, *Yesod 'olam*, p. 16b. Ḥayyim Israeli (*Ma'amar Gan 'Eden*, p. 39) mentions Ibn Tibbon's commentary of Ecclesiastes, but not his *Ma'amar Yiqqawu ha-mayim*. Recent research increasingly shows that the literary productions of Provence (translations and original compositions) were little disseminated in Christian Spain.

163 Freudenthal, *Science in the Medieval Jewish Culture of Southern France*, p. 25.

164 Isaac Israeli, *Yesod 'olam*, p. 15a.

165 *Ibid.*, p. 17b.

166 *Ibid.*, p. 18a.

167 *Ibid.*, p. 17b.

168 *Ibid.*, p. 18a.

High Wisdom, allowing one to recognize the One Who brought the world into being. Israeli adds that he wrote so extensively on this issue because he noticed that it was useful in establishing ‘the principle of faith and the root of belief’.¹⁶⁹

Isaac Israeli’s exposé appealed to the notorious plagiarist Meir Aldabi, who composed his encyclopedic work *Šviley emunah (Paths of Faith)* in Jerusalem in 1360 after having fled from his native Spain. He puts forward two arguments.¹⁷⁰ First, on Day three, God commanded the water to one side, so that the other part of the surface of the globe became visible; this argument is quoted (unacknowledged) almost verbatim from Isaac Israeli. Second, he argues that concerning anything that took place during the six days of creation one must not ask how it was possible, for nature was not then as it is now: the argument is obviously Maimonidean, and is stated by Isaac Israeli; Aldabi either paraphrased (rather than quoted) him, or borrowed his formulation from another source that remains to be identified.

For his views on the ‘gathering of water’, Isaac Israeli was taken to task by his uncle, R. Ḥayyim b. Isaac Israeli, who, in 1329, addressed to Isaac a vehement refutation of his view as just described. Ḥayyim’s letter is unfortunately lost, but Isaac Israeli’s reply is preserved and has been published by Y. Tzvi Langermann in 1988.¹⁷¹ Before trying to extract from it Ḥayyim’s views of the ‘gathering of the water’, we will consider another writing by Ḥayyim Israeli in which the issue is mentioned, albeit *en passant* only. This is his *Ma’amar Gan ‘Eden (Treatise on the Garden of Eden)*, devoted to a discussion of the geographical location of the Garden of Eden. Ḥayyim Israeli more than once explicitly refers to ‘the wonderful sage, Abū Alī Avicenna’,¹⁷² and his work *Šifā’*, although he may have known it only via its refutation by Averroes.¹⁷³ Ḥayyim Israeli audaciously affirms that Avicenna’s naturalistic account of the formation of dry land is identical with the belief in creation *a novo* (*ḥidduš*) as ‘affirmed by our perfect Torah’.¹⁷⁴ ‘It is extraordinary’, Ḥayyim enthuses, ‘that a man [Avicenna] would arrive through his own intellect at the foundations of the Torah as transmitted by Tradition’.¹⁷⁵ ‘I embraced the opinion of the sage Avicenna’, he adds, ‘because I found that his belief on any philosophical subject, which he reached by the power of his intellect, are close to the belief of the tradition of our perfect Torah’.¹⁷⁶ These brief statements are sufficient to

169 Ibid., p. 18a.

170 Aldabi, *Šviley emunah* 2:2, p. 47b.

171 Langermann, ‘The Making of the Firmament’.

172 Ḥayyim Israeli, *Ma’amar Gan ‘Eden*, p. 21, line 33 and p. 25, line 17.

173 Ibid., p. 25, lines 17–18.

174 Ibid., p. 30, lines 7–8. The following account draws on Freudenthal and Zonta, Avicenna amongst Medieval Jews, pp. 264–5.

175 Ḥayyim Israeli, *Ma’amar Gan ‘Eden*, p. 30, lines 14–15.

176 Ibid., p. 30, lines 7–8.

show that Ḥayyim Israeli's frame of mind was totally unlike that of his relative Isaac Israeli.

On the 'gathering of the water', too, Ḥayyim Israeli takes Avicenna's views as exposed in his 'great book' called *al-Šifā'* to be identical with those of the Torah, as—he suggests—was already perceived by Abraham ibn Ezra.¹⁷⁷ The core of Avicenna's theory is that it offers a causal naturalistic account of the 'gathering of the water': Avicenna has shown that 'it is possible that there be on the globe of the earth place[s] which are visible and place[s] in which water is gathered, by the way of nature'. All other philosophers, by contrast, 'did not seek and did not inquire the cause [of the dry land]'.¹⁷⁸ Avicenna alone 'gave a natural cause for the existence of dry, habitable land on the surface of the terrestrial globe, in conformity with the tradition of our Torah'.¹⁷⁹ So far for Ḥayyim Israeli's incidental observation in his Treatise on the *Garden of Eden*.

Another portion of Ḥayyim Israeli's views on this issue as expressed in his lost letter to his nephew Isaac can be extracted from the latter's précis of them. Israel maintained that on Day one of creation the water entirely covered the surface of the globe.

When the idea was framed [by God] to create the individual substances of the sublunar world, [He] created the light and strengthened the light rays of the sun very very much, reinforcing them until they consumed all that part of the water that was facing [i.e. covering] [the surface that was to become] the inhabited part [of the earth], so that it became pure air ... This is why he [Ḥayyim Israeli] affirmed that there was no point to saying 'Let the water gather', for it was not followed by any activity and nothing new occurred in the world ... The significance of 'Let the water gather' was [merely] as if He said 'Let the water of the ocean remain gathered as it is'.¹⁸⁰

The exchange did not turn on the issue of the coming-to-be of dry land, but about the identity of the *raqi'a* mentioned in Genesis. Isaac Israeli's short précis of Ḥayyim Israeli's 'long book'¹⁸¹ is therefore partial and perhaps also biased. We thus do not know the details of Ḥayyim Israeli's reception of Avicenna's theory, although it would seem that he did not affirm an eternal cycle of flooding and drying. What is important, however, is that he clearly subscribed to an entirely naturalistic account of creation, in diametrical opposition to his

177 According to one of the numerous interpretations of Ibn Ezra's enigmatic discussion of creation, Ibn Ezra indeed subscribed to Avicenna's theory. See Lifschitz, *Le-torat ha-beri'ah shel R. Abraham Ibn Ezra*.

178 Ḥayyim Israeli, *Ma'amar Gan 'Eden*, p. 30, lines 10–13.

179 *Ibid.*, p. 30, lines 13–14.

180 Langermann, 'The Making of the Firmament', pp. 464–5; partly repeated on p. 466.

181 *Ibid.*, p. 464.

conservative nephew. This is consistent with his classification as one of the few ‘true Avicennians’ in Hebrew-writing medieval Jewish culture.¹⁸²

Conclusion

My conclusion will be short and simplistic. In medieval Jewish philosophy, the issue of the ‘gathering of the water’—i.e. of the existence of dry land—became an intellectual yardstick. It demarcated true naturalists, half-hearted naturalists, traditionalists, and the fifty shades of grey between them. The question of the ‘gathering of the water’ (and that of the ‘account of creation’ more generally) repeatedly brought the Torah and Aristotelian science into a nearly inevitable head-on collision. ‘Inevitable?’ one may sceptically frown: Did not Maimonides assure his readers that if the eternity of the world were proved, he would easily find a suitable interpretation of Scripture? Did he not boldly declare that ‘the gates of interpretation are not shut to us’¹⁸³?

Yes, he did. But Maimonides at the same time also warned of the great dangers, spiritual and social, looming behind the recognition of a cosmos fully governed by natural necessities: the denial of *hidduš ha-‘olam*, of a willed creation *a novo* by a particularizing Agent, implies the denial of miracles, opening the door to unbelief and the undermining of social order.¹⁸⁴ Maimonides the political theorist and communal leader himself thus to a great extent shut the gates of interpretation that Maimonides the hermeneutical philosopher had identified, curtailing the space of interpretive possibilities. This means that each thinker who thought of himself as a Maimonidean had to define for himself the level of naturalism he wished to adopt, in accordance with his personal temperament and the social pressure of his environment.

In the preceding pages we have seen that, in point of fact, the gates of interpretation remained shut and sealed most of the time—not by hermeneutic necessity, but by the burden of Tradition reinforced by a conformist leadership and fideistically-inclined ‘public opinion’. This has been well perceived by Leon Joseph of Carcassonne, a Provençal doctor who was one of the first Jews to be allowed to study in the University of Montpellier. In 1394, reflecting on what he identified as the low state of the rationalist sciences among the Jews as compared with the Christians’, he wrote:

Even those few, who, by God’s grace, inquired into [the sciences] ... were forced to do this in secret and hidden away, ‘in the clefts of the rocks and in the secret places’ (Song

182 Freudenthal and Zonta, *Avicenna amongst Medieval Jews*.

183 Maimonides, *Guide of the Perplexed* II, 25.

184 *Ibid.*

of Songs 2:14). They were not allowed to teach the rationalist science in the market-places and in the streets, nor to discuss it and explain its rationale or set up a public place of study ... [This was so] because they feared the tongues of the multitude of ignoramuses, for they [the true scholars] are few, but the others are legion. In addition, they dreaded some of the Torah-scholars, who are stripped of all other sciences and who intimidate the rationalist inquirers—not by virtue of their [intellectual] power and the breadth of their knowledge, but only on account of the strength of their arms and their many frauds. For the masses heed them, believing that those [rationalist] sciences and those who investigate them, are detached from the community of those who adhere to the Torah ... I saw what was written about Maimonides's book *The Guide of the Perplexed*, and what they did to it in the early days, notwithstanding [the fact] that he [Maimonides] was a majestic [scholar], a thousand or ten thousand times more accomplished in the science of the Torah than they.¹⁸⁵

Talmudist Menachem Ha-Meiri, more clear-minded and outspoken than most others, unambiguously proclaimed that the belief in creation *a novo* and *ex nihilo* was the 'cornerstone' of Judaism and he explicitly gave it absolute epistemic precedence over any rationalist demonstration. He was prepared to pay the price for this stance, namely a philosophically self-contradictory position. This was not an absolute necessity: Samuel ibn Tibbon and, two centuries later, Hayyim Israeli fully embraced Avicenna's radical natural history of the universe, arguing in detail that it was in conformity with Scripture, thereby illustrating Maimonides' claim that the 'gates of interpretation' are not shut. Most Jewish scholars, however, refused to walk through them, heeding Maimonides' warning of the spiritual-*cum*-social dangers looming behind them. (Yes, there was 'warfare' here between science and religion, although it has become unfashionable to say so.)

Not that Ibn Tibbon's account was suppressed and disappeared without leaving traces. As we saw, bits and pieces of Avicenna's theory as expounded by Ibn Tibbon, including the account of the generation of mountains and the consequent gathering of water, and even the account of the spontaneous generation of man, were embedded in several important Hebrew treatises of the thirteenth and fourteenth centuries. But these have now become discrete, unconnected 'doctrinal items',¹⁸⁶ dissociated from the global cosmological theory and thus with the naturalistic drive defused. What was left of Ibn Tibbon's ambitious theory is a set of descriptive statements of natural phenomena, one hermeneutic resource among so many others. The theory's potential to disenchant the world and to generate a drive toward theological and philosophical enlightenment was neutralized. This means that, with rare exceptions, the commitment to the Torah

185 Quoted from Freudenthal, *The Brighter Side of Medieval Christian Jewish Polemical Encounters*, pp. 50–51, §§6–7.

186 Freudenthal and Zonta, *Avicenna amongst Medieval Jews*, p. 224.

put shackles on the minds of the medieval Jewish thinkers, hampering their scientific pursuits, especially in domains impinging on theology. It is therefore particularly satisfying to identify and acknowledge those few past thinkers who ignored an unfavourable climate of opinion and marshalled the ‘courage to use their own understanding’.

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Notes on Anonymous Twelfth-Century Translations of Philosophical Texts from Arabic into Latin on the Iberian Peninsula

Dag Nikolaus Hasse and Andreas Büttner¹

It is well known that the translators Dominicus Gundisalvi, Avendauth, Johannes Hispanus and Alfred of Shareshill were responsible for a good number of Avicenna translations from Arabic into Latin in twelfth-century Spain. Some Avicenna translations, however, are anonymous, notably the *Isagoge* and *Physics* parts of the summa *al-Šifāʾ* (*The Cure*). The *Physics* part, in fact, was translated into Latin in two steps. The first two books and the beginning of the third book were translated in the twelfth century by an unknown translator. About a century later, in the 1270s, the remainder of book three and book four were translated by Juan Gonzalves de Burgos and a companion translator named Salomon. In addition to the two anonymous Avicenna translations of *Isagoge* and *Physics*, there are at least seventeen further anonymous translations of Arabic philosophical texts in twelfth-century Spain. The present paper makes an attempt to lift the anonymity of these translations.

Earlier studies have shown that anonymous medieval translations from Greek or Arabic can be attributed to known translators by studying the usage of non-technical, non-disciplinary vocabulary, that is, everyday words, particles and short phrases. Stylistic analysis made it possible, for instance, to attribute anonymous Greek-Latin translations of Aristotle to James of Venice and Arabic-Latin translations of Averroes to Michael Scot, William of Luna and Her-

1 This paper started as a study on the anonymous translator of Avicenna's *Physics* and then grew into a more comprehensive study. It was written by Dag Nikolaus Hasse. Andreas Büttner contributed significantly by creating a digitized and fully searchable corpus of the translations, by developing an interface to improve the workflow of the computational analysis with Cosine Delta, and by programming a search tool for analysing the corpus manually. We are grateful for having received very helpful advice, especially from Stefan Georges, Jonathan Maier, Katrin Fischer, Amos Bertolacci, Nicola Polloni, Charles Burnett, Fotis Jannidis and Christof Schöch, and for the transcription work of Monika Isépy and Eva Sahr. Research for this paper was funded by the German Federal Ministry of Education and Research as part of *Kallimachos: Zentrum für digitale Edition und quantitative Analyse* at the University of Würzburg.

mannus Alemannus.² The great translation movement in Spain in the twelfth century is a deserving but difficult target for such an analysis. Here, too, we have many anonymous translations, but the textual situation is complicated. The translation movement in Spain is large, and the number of anonymous translations is considerable. Also, texts by many different Arabic and Greek authors are involved, not only by one, such as Aristotle or Averroes, so that the stylistic differences between the authors may obscure the stylistic differences between the translators. Some anonymous translations, for instance those of Alkindi, are very short, which makes them a difficult target for stylistic analysis. In order to keep the size manageable and the corpus coherent, I decided to concentrate on philosophical texts, as exhibited on the table below, and to exclude, for the purpose of the present study, other disciplines such as medicine, mathematics or the occult sciences. In a paper focusing on the translator John of Seville which was written in parallel with the present one, I discuss first results of a stylistic analysis of anonymous twelfth-century translations in the field of astronomy and astrology.³

Twelfth-Century Latin Translations of Arabic Philosophical Texts
on the Iberian Peninsula

anonymous	01-Aristotle, <i>Metaphysica A</i> , fragm.	ed. Martini
	02-Alexander of Aphrodisias, <i>De intellectu et intellecto</i>	ed. Théry, pp. 74–82
	03-Anonymous, <i>Turba philosophorum</i>	ed. Ruska
	04-Alkindi, <i>De intellectu et intellecto</i>	ed. Nagy, pp. 1–11
	05-Alkindi, <i>De mutatione temporum</i>	ed. Bos/Burnett
	06-Alkindi, <i>De radiis</i>	ed. d’Alverny/Hudry
	07-Alfarabi, <i>De intellectu et intellecto</i>	ed. Gilson, pp. 115–26
	08-Alfarabi, <i>Liber excitationis ad viam felicitatis</i>	ed. Salman
	09-Alfarabi, <i>De scientiis</i> (or: <i>De divisione scientiarum</i>)	ed. Alonso, repr. Schneider
	10-Ps.-Alfarabi, <i>Flos</i> (or: <i>Fontes quaestionum</i>) (<i>‘Uyūn al-masā’il</i>)	ed. Cruz Hernández
	11-Alfarabi, <i>Quintus liber</i> (Comm. on Euclid’s <i>Elements V</i>)	ed. Burnett
	12-Ps.-Alfarabi, <i>De ortu scientiarum</i>	ed. Baeumker

2 Minio-Paluello, Iacobus Veneticus Grecus, and Hasse, *Latin Averroes Translations*. Cf. also McVaugh, *Towards a Stylistic Grouping*.

3 Hasse, *Stylistic Evidence*.

	13-Iḥwān al-Šafāʿ, <i>Liber introductorius in artem logicae demonstrationis</i> 14-Iḥwān al-Šafāʿ, <i>Cosmographia</i> 15-Anonymous, <i>Liber de quatuor confectioibus</i> 16-Isaac Israeli, <i>De definitionibus</i> 17-Avicenna, <i>Logica, Isagoge (al-Šifāʿ)</i> 18-Avicenna, <i>Physica I–III (al-Šifāʿ)</i> 19-Avicenna, <i>De diluviis (al-Šifāʿ: Meteora II.6)</i> 20-Algazel, Prologue to <i>De philosophorum intentionibus (Maqāšid)</i>	ed. Nagy, pp. 41–64 ed. Gautier Dalché ed. Sannino ed. Muckle ed. 1508, transcr. Isépy/Sahr ed. Van Riet ed. Alonso ed. Salman, pp. 125–7
John of Seville	21-Ps.-Aristotle, <i>Secretum secretorum</i> 22-Costa ben Luca, <i>De differentia spiritus et animae</i> 23-Albumasar, <i>Liber introductorii maioris</i>	ed. Suchier, pp. 473–80 ed. Wilcox ed. Lemay
Hugo of Santalla	24-Ps.-Apollonius, <i>De secretis naturae</i> 25-Messahalāh, <i>Liber Aristotilis de 255 Indorum voluminibus</i>	ed. Hudry ed. Burnett/Pingree
Gerard of Cremona	26-Aristotle, <i>Analytica posteriora</i> 27-Aristotle, <i>Physica</i> 28-Aristotle, <i>De caelo</i> 29-Aristotle, <i>De generatione et corruptione</i> 30-Aristotle / Ibn al-Bitrīq, <i>Meteora I–III</i> 31-Ps.-Aristotle, <i>Liber de causis</i> 32-Alexander of Aphrodisias, <i>De tempore, De sensu, De eo quod augmentum</i> 33-Themistius, Comm. on <i>Analytica posteriora</i> 34-Alkindi, <i>De quinque essentiis</i> 35-Alkindi, <i>De somno et visione</i> 36-Alkindi, <i>De ratione</i> 37-Alfarabi, <i>De scientiis</i> 38-Isaac Israeli, <i>De elementis</i> 39-Isaac Israeli, <i>De definitionibus</i>	ed. Minio-Paluello mss. ed. Hossfeld mss. ed. Schoonheim ed. Pattin ed. Théry, pp. 86–100 ed. O’Donnell ed. Nagy, pp. 28–40 ed. Nagy, pp. 12–27 ed. Nagy, pp. 1–10 ed. Schupp ed. 1515 ed. Muckle
Avendauth and ?	40-Avicenna, <i>Prologus + Logica, Isagoge I.1 + I.12 (al-Šifāʿ)</i>	ed. Birkenmajer
Gundisalvi and Avendauth	41-Avicenna, <i>De anima (al-Šifāʿ)</i> 42-Avicenna, <i>De medicinis cordialibus</i>	ed. Van Riet ed. Van Riet 1968, pp. 187–210

Gundisalvi and Johannes Hispanus	43-Ibn Gabirol, <i>Fons vitae</i> 44-Algazel, <i>Summa theoricæ philosophiæ</i> (or: <i>De scientiis philosophorum</i>) (<i>Maqāṣid</i>)	ed. Baeumker ed. Lohr/Muckle
Gundisalvi	45-Avicenna, <i>Philosophia prima</i> (<i>al-Šifā'</i>) ⁴ 46-Avicenna, <i>De convenientia et differentia scientiarum</i> (<i>al-Šifā'</i> : <i>Analytica posteriora</i> II.7) 47-Ps.-Avicenna, <i>Liber celi et mundi</i>	ed. Van Riet ed. Baur, pp. 124–33 ed. Gutman
Alfred of Shareshill	48-Nicolaus Damascenus, <i>De vegetabilibus et plantis</i> 49-Avicenna, <i>De mineralibus</i> (<i>al-Šifā'</i> : <i>Meteora</i> I.1 + I.5)	ed. Drossaart Lulofs/ Poortman ed. Holmyard/Mandeville
Michael Scot (early thirteenth century)	50-Aristotle, <i>De animalibus</i> 11–19 51-Averroes, Long Commentary on <i>De caelo</i> 52-Avicenna, <i>Abbreviatio de animalibus</i> (<i>al-Šifā'</i>)	ed. van Oppenraaij ed. Carmody/Arnzen ed. ca. 1500

The table lists 20 anonymous translations and 29 translations by translators known to us, plus three translations explicitly attributed to Michael Scot, which were produced in the early thirteenth century. It is likely that in the future some texts will be added to this list, when titles such as the enigmatic *Distinctio Alfarabii super librum Aristotelis de naturali auditu*, which Gerard of Cremona's *socii* list among his translations, are properly identified with extant texts in Latin and Arabic. That the 20 anonymous translations were produced in the twelfth century and on the Iberian Peninsula, is not certain, but a surmise based on the observation that these translations became available in about the same period and in the same context as the 29 translations by known Iberian translators. Michael Scot is an exception, since he moved to southern Italy around 1220 after having been active in Spain. Hence, anonymous translations attributed to him would not be correctly described as being produced 'in twelfth-century Spain'.

For some texts in the list, which exist in manuscript and early prints only, I did not have access to electronic versions: Gerard of Cremona's translations of Isaac Israeli's *De elementis* and of Aristotle's *Physica* and *De generatione et corruptione*, as well as Michael Scot's translation of Avicenna's *Abbreviatio de animalibus*. These texts are therefore not part of the stylistic analysis below. It may surprise readers that I have included two works of predominantly astrolog-

4 Four of the 25 manuscripts attribute the translation of Avicenna's *Philosophia prima* to Dominicus Gundisalvi, one to Gerard of Cremona. See Bertolacci, *A Community of Translators*, p. 41, n. 8.

ical character: Messahalāh's *Liber Aristotelis de 255 Indorum voluminibus* and Albumasar's well-known *Liber introductorii maioris* (*The Great Introduction to Astrology*), which has a very philosophical first book. These texts were added in order to increase the statistical material for Hugo of Santalla and John of Seville, whose philosophical translations are few and rather short.

The shortness of texts is one problem for stylistic analysis. Revision and double translation is another. For example, John of Seville's translation of Albumasar's *Liber introductorii maioris* was systematically revised by one or several other translators, who have not yet been identified. Moreover, there are three double translations in our corpus. Alfarabi's *Enumeration of the Sciences* (*De scientiis*), texts 9 and 37, was translated by Gerard of Cremona and by an anonymous translator, whom many modern scholars identify with Dominicus Gundisalvi, on the grounds that Gundisalvi amply draws on this translation in his own treatise *De divisione philosophiae*. Isaac Israeli's *On Definitions*, texts 16 and 39, was also translated twice, by Gerard of Cremona and by an anonymous translator. The same is true of Alkindi's *On the Intellect*, texts 4 and 36. As I have shown elsewhere, Gerard's translation was the earlier one in all three cases.⁵ Even if we stay away from these double translations and focus on the rest, there remain enough problems for stylistic analysis. One problem is that further translations may be revised translations too, without us being aware of it. Another troubling question is whether the stylistic signal of the author, i.e. of Alkindi, Alfarabi or Avicenna, may turn out to be stronger than the stylistic signal of the translator—so that, for instance, Alfarabi translations will group together in Latin, even if the Latin versions stem from different translators. A stylistic identification of the translator would then be impossible.

The *status quaestionis* on anonymous translations in Toledo owes much to Manuel Alonso Alonso, who has analysed Dominicus Gundisalvi's translation style in several papers. In an impressive article of 1955, Alonso compared, on 59 densely written pages, the 'coincidencias verbales típicas' in the works and translations by Gundisalvi, comparing the Arabic and the Latin.⁶ This article is full of interesting material. For the present purpose it is most relevant that Alonso bases his ascriptions on 34 typical words and phrases:

aequidistantia, anitas, appendiciae, assolare, astrologia / astronomia, caelatura, con-comitari, credulitas / credere, dapsilis, designare / designatus / designatio, diversificare, elongatio, enim, et omnino, fortassis, habens, hylearis, imaginatio, in sensibilibus, intellectus, intentio, maneria, materiare, mediante, minus commune, multivocum,

5 In a paper read on 13 February 2016 at the Paris conference on *The Book of Causes and the Elements of Theology from the 5th to the 17th Century* organized by Dragos Calma and Marc Geoffroy. The paper will appear in the proceedings.

6 Alonso, *Coincidencias verbales típicas*, pp. 129–52 and 345–79.

numerus surdus, parificare, propalare, quadrivialia, si ... aut, solet, transumere / transumptive, vicissitudinantur.

On this basis, Alonso ascribes nine anonymous translations to Gundisalvi. The other anonymous translations in the present corpus are not discussed by Alonso:

Manuel Alonso: Anonymous Translations Ascribed to Gundisalvi

anonymous translation	Manuel Alonso
01-Aristotle, <i>Metaphysica</i> A, fragm.	
02-Alexander of Aphrodisias, <i>De intellectu</i>	Gundisalvi
03-Anonymous, <i>Turba philosophorum</i>	
04-Alkindi, <i>De intellectu</i>	Gundisalvi
05-Alkindi, <i>De mutatione temporum</i>	
06-Alkindi, <i>De radiis</i>	
07-Alfarabi, <i>De intellectu</i>	Gundisalvi
08-Alfarabi, <i>Liber excitationis ad viam felicitatis</i>	Gundisalvi
09-Alfarabi, <i>De scientiis</i>	Gundisalvi
10-Ps.-Alfarabi, <i>Flos</i>	Gundisalvi
11-Alfarabi, <i>Quintus liber</i>	
12-Ps.-Alfarabi, <i>De ortu scientiarum</i>	
13-Iḥwān al-Ṣafā', <i>In artem logicae demon.</i>	Gundisalvi
14-Iḥwān al-Ṣafā', <i>Cosmographia</i>	
15-Anonymous, <i>Liber de quatuor confectionibus</i>	
16-Isaac Israeli, <i>De definitionibus</i>	Gundisalvi
17-Avicenna, <i>Logica, Isagoge</i>	Gundisalvi
18-Avicenna, <i>Physica</i> I–III	Gundisalvi
19-Avicenna, <i>De diluviis</i>	
20-Algazel, Prologue to <i>De intentionibus</i>	

The evidence collected by Alonso is substantial. The degree to which we are convinced by it depends on the standards we demand from stylistic analysis. One drawback of Alonso's studies is that he does not compare Gundisalvi's style with that of any other translator on the Iberian Peninsula. Once you start comparing, the result is disillusioning. The rare Latin term *parificare*, for instance, one of the words picked out by Alonso, is used by Gundisalvi, but also by Gerard of Cremona and Hugo of Santalla, as the following table shows (which lists only those texts of the corpus in which the word appears):

parific-

anonymous	Alfarabi, <i>Quintus liber</i>	2
	Alfarabi, <i>De scientiis</i>	2
	Avicenna, <i>Physica</i> I–III	3
Hugo of Santalla	Ps.-Apollonius, <i>De secretis</i>	1
Gerard of Cremona	Ps.-Aristotle, <i>Liber de causis</i>	1
	Themistius, Comm. on <i>Analytica posteriora</i>	1
Gundisalvi and Avendauth	Avicenna, <i>De anima</i>	2
Gundisalvi and Johannes Hispanus	Ibn Gabirol, <i>Fons vitae</i>	1
Gundisalvi	Avicenna, <i>Philosophia prima</i>	13

To give further examples: *credulitas* appears eleven times in Gerard's translation of the *Analytica posteriora*; *designare* and its cognates is used by John of Seville and Hugo of Santalla; *fortassis* appears in John, Hugo and Alfred; *aequidistare* is used by Gerard in his Themistius translation; *mediante* appears in John, Hugo and Gerard; *elongatio* is used by Alfred and Gerard; *imaginatio* is used in various writings by Gerard; *et omnino*—which is a wonderfully stylistic term that appears often in Gundisalvi's writings—unfortunately is also used by John, Hugo and Gerard. And, a final example, which is exhibited in the table below: *diversificare* is a term that regularly appears in Gerard's translations.

diversifica-

anonymous	Alkindi, <i>De radiis</i>	1
	Avicenna, <i>Physica</i>	25
Gerard of Cremona	Aristotle, <i>Analytica posteriora</i>	7
	Aristotle, <i>De caelo</i>	45
	Aristotle, <i>Meteora</i>	5
	Ps.-Aristotle, <i>Liber de causis</i>	7
	Themistius, Comm. on <i>Analytica posteriora</i>	9
	Alkindi, <i>De somno</i>	2
	Alfarabi, <i>De scientiis</i>	2
Avendauth	Prologue to <i>De intentionibus</i>	1
Gundisalvi and Avendauth	Avicenna, <i>De anima</i>	2
Gundisalvi and Johannes Hispanus	Ibn Gabirol, <i>Fons vitae</i>	24
	Algazel, <i>Summa</i>	3
Gundisalvi	Avicenna, <i>Philosophia prima</i>	4
	Ps.-Avicenna, <i>Liber celi et mundi</i>	1

What these tables show, is that Alonso has successfully unearthed terms *preferred* by Gundisalvi, but not necessarily terms *typical* of Gundisalvi. Hence, Alonso made a great advance, because he was able to offer many indications buttressing his hypothesis that Gundisalvi was in fact responsible for a greater set of translations than we knew before. But these indications are of limited validity. Alonso's evidence for author attribution is not conclusive.

Charles Burnett has contributed many important studies on the translation movement in Spain: on the coherence of the translation programme and on many individual translators.⁷ The starting-point for the present study was Burnett's list of Arabic-Latin philosophical translations, which was published in 2005.⁸ These are his careful comments on the presumed translators:

Charles Burnett: Presumed Translators

anonymous translation	Charles Burnett
01-Aristotle, <i>Metaphysica</i> A, fragm.	perhaps the same translator as 06
02-Alexander of Aphrodisias, <i>De intellectu</i>	Gundisalvi (?)
03-Anonymous, <i>Turba philosophorum</i>	anonymous
04-Alkindi, <i>De intellectu</i>	Gundisalvi (?)
05-Alkindi, <i>De mutatione temporum</i>	anonymous
06-Alkindi, <i>De radiis</i>	perhaps the same translator as 01
07-Alfarabi, <i>De intellectu</i>	Gundisalvi (?)
08-Alfarabi, <i>Liber excitationis ad viam felicitatis</i>	Gundisalvi (?)
09-Alfarabi, <i>De scientiis</i>	Gundisalvi
10-Ps.-Alfarabi, <i>Flos</i>	anonymous
11-Alfarabi, <i>Quintus liber</i>	Gundisalvi (?)
12-Ps.-Alfarabi, <i>De ortu scientiarum</i>	Gundisalvi (?)
13-Iḥwān al-Ṣafā', <i>In artem logicae demon.</i>	anonymous
14-Iḥwān al-Ṣafā', <i>Cosmographia</i>	anonymous
15-Anonymous, <i>Liber de quatuor confectionibus</i>	anonymous
16-Isaac Israeli, <i>De definitionibus</i>	Gundisalvi (?)
17-Avicenna, <i>Logica, Isagoge</i>	unknown, not Gundisalvi
18-Avicenna, <i>Physica</i> I–III	unknown, Toledan (?)
19-Avicenna, <i>De diluviis</i>	Alfred of Sharesill (?)
20-Algazel, Prologue to <i>De intentionibus</i>	anonymous

7 The most important articles are easily accessible in Burnett, *Arabic into Latin in the Middle Ages*.

8 Burnett, *Arabic into Latin: the Reception of Arabic Philosophy*, pp. 391–400.

Burnett follows Alonso's suggestions on Gundisalvi being responsible for the translations of treatises on the intellect by Alexander of Aphrodisias, Alkindi and Alfarabi, of Alfarabi's *Liber excitationis* and *De scientiis*, of the Iḥwān al-Ṣafā' s *In artem logicae demonstrationis* and of Isaac Israeli's *De definitionibus*, but he adds cautious question marks.

Who were the translators of these twenty treatises? Most of these texts are pieces of Arabic philosophy proper; that is, they are mainly written by Arabic philosophers, such as Alkindi, Alfarabi and Avicenna, rather than by ancient Greek philosophers transmitted in Arabic. Hence, the identification of the translators is important also for determining who transported Arabic philosophy into Europe. Moreover, the anonymity of the translations prevents us from knowing more about the historical circumstances of the translation movement on the Iberian Peninsula.⁹ John of Seville was mainly active in the region of the Limia valley in northern Portugal. Hugo of Santalla, in all likelihood, was a canon of the cathedral of Tarazona. Gerard of Cremona, Dominic Gundisalvi and Michael Scot were canons of the cathedral of Toledo, and Alfred of Shreshill was probably active in Toledo towards the end of the twelfth century. Hence, the importance of Toledo, and possibly other Iberian cities, as a centre for Arabic-Latin translations depends upon whether we can make advances in identifying anonymous translators.

I shall approach this task in two steps. First, I provide philological evidence, based on a stylistic analysis of the usage of particles and short phrases. Second, I try to demonstrate that a good part of the results receives confirmation through a computational analysis of the most frequent words statistics of the texts.

1 Philological Analysis

The first hurdle to clear was to create a digital corpus of texts which allowed for the comparison of stylistic features. The texts had to be transcribed or scanned, and the Latin spelling had to be standardized in a way that would not seriously distort the stylistic preferences of the translators. In order to extinguish scanning mistakes and to standardize the Latin spelling, the texts were checked automatically against Morpheus, the Perseus Project's morphology parser, and against our own list of Latin words specific to the translation literature. To reduce the amount of errors, we gradually developed a set of substitution rules to smoothen the sometimes idiosyncratic orthography. After many of such

9 On this translation movement see Burnett, *The Coherence*, pp. 249–88, and Hasse, *The Social Conditions*, pp. 68–86; specifically on Avicenna translations see Bertolacci, *A Community of Translators*, pp. 37–54, and Hasse, *Die Überlieferung arabischer Philosophie*, pp. 377–400.

checking routines, the two datasets together recognized a high percentage of the text as correct Latin.

From previous studies, for instance on the Greek-Latin translations of Aristotle, it is known that the analysis of small words and phrases is a promising way towards identifying the translators. It has proved fruitful, in particular, to concentrate on words that are regular and specific at the same time, that is, words or small phrases which appear often in texts by one translator, but hardly ever in those of the other translators. The philological analysis of this paper is based on such a search for stylistic and specific terms. It was accomplished in two steps. First, with the help of a search programme written by Andreas Büttner, we generated six lists of words and phrases that appear only in one of the six known translators: John of Seville, Hugo of Santalla, Gerard of Cremona, Dominicus Gundisalvi, Alfred of Shareshill and Michael Scot respectively (Avendauth was omitted because his text is too short to be of any statistical relevance). The second step was to sieve out from these lists all content words like *substantia composita*, which are not stylistic, but specific to certain topics or sub-disciplines of medieval philosophy: logic, meteorology, zoology etc. ‘Stylistic words’ is understood in a broad sense and includes terms such as *comparatio*, *fingere* or *absurdus*, which are stylistic only in the sense that they could in principle appear in any scientific Latin text of the twelfth century. The focus on stylistic words is important because experience shows that content words have a tendency to travel from one translator to the other, while stylistic words are much more stable.

Some stylistic words are even highly characteristic of a translator. An example, at least on first sight, is the phrase *et deinde*:

et deinde (translating: *tumma*)

The other translators use: *deinde*, *et post*, *postea*, *et postea*, *post istud*, *post hoc*, *consequenter*, *ergo*, *et ideo*

anonymous	01-Aristotle, <i>Metaphysica</i> A, fragm.	0
	02-Alexander of Aphrodisias, <i>De intellectu</i>	1
	03-Anonymous, <i>Turba philosophorum</i>	0
	04-Alkindi, <i>De intellectu</i>	0
	05-Alkindi, <i>De mutatione temporum</i>	0
	06-Alkindi, <i>De radiis</i>	0
	07-Alfarabi, <i>De intellectu</i>	5
	08-Alfarabi, <i>Liber excitationis</i>	0
	09-Alfarabi, <i>De scientiis</i>	1
	10-Ps.-Alfarabi, <i>Flos</i>	0
	11-Alfarabi, <i>Quintus liber</i>	0

	12-Ps.-Alfarabi, <i>De ortu scientiarum</i>	0
	13-Iḥwān al-Ṣafā', <i>In artem logicae demon.</i>	2
	14-Iḥwān al-Ṣafā', <i>Cosmographia</i>	10
	15-Anonymous, <i>De 4 confectionibus</i>	0
	16-Isaac Israeli, <i>De definitionibus</i>	4
	17-Avicenna, <i>Logica, Isagoge</i>	21
	18-Avicenna, <i>Physica I–III</i>	6
	19-Avicenna, <i>De diluviis</i>	0
	20-Algazel, Prologue to <i>De intentionibus</i>	0
John of Seville	21-Ps.-Aristotle, <i>Secretum secretorum</i>	0
	22-Costa ben Luca, <i>De differentia</i>	0
	23-Albumasar, <i>Liber introductorii maioris</i>	0
Hugo of Santalla	24-Ps.-Apollonius, <i>De secretis naturae</i>	0
	25-Messahalāh, <i>Liber Aristotilis</i>	0
Gerard of Cremona	26-Aristotle, <i>Analytica posteriora</i>	0
	28-Aristotle, <i>De caelo</i>	0
	30-Aristotle / Ibn al-Biṭrīq, <i>Meteora I–III</i>	0
	31-Ps.-Aristotle, <i>Liber de causis</i>	0
	32-Alexander of Aphrodisias, <i>De tempore etc.</i>	0
	33-Themistius, Comm. on <i>Analytica posteriora</i>	0
	34-Alkindi, <i>De quinque essentiis</i>	0
	35-Alkindi, <i>De somno et visione</i>	0
	36-Alkindi, <i>De ratione</i>	0
	37-Alfarabi, <i>De scientiis</i>	0
	39-Isaac Israeli, <i>De definitionibus</i>	0
Avendauth (and ?)	40-Avicenna, <i>Prologus</i>	0
Gundisalvi + Avendauth	41-Avicenna, <i>De anima</i>	25
	42-Avicenna, <i>De medicinis cordialibus</i>	0
Gundisalvi + Johannes Hispanus	43-Ibn Gabirol, <i>Fons vitae</i>	3
	44-Algazel, <i>Summa</i>	23
Gundisalvi	45-Avicenna, <i>Philosophia prima</i>	54
	46-Avicenna, <i>De convenientia scientiarum</i>	1
	47-Ps.-Avicenna, <i>Liber celi et mundi</i>	2
Alfred of Shareshill	48-Nicolaus Damascenus, <i>De vegetabilibus</i>	0
	49-Avicenna, <i>De mineralibus</i>	0
Michael Scot	50-Aristotle, <i>De animalibus</i> 11–19	3
	51-Averroes, Long Comm. on <i>De caelo</i>	7

This phrase appears in almost all translations by Dominicus Gundisalvi (except for the very short *De medicinis cordialibus*)—regardless, in fact, of whether Gundisalvi was translating with another person or by himself. *Et deinde* never appears in the philosophical translations by John, Hugo, Gerard, Avendauth and Alfred.

In earlier versions of the present paper, the phrase *et deinde* was taken to be very indicative evidence. In the meantime, however, I realized that this evidence is not entirely reliable when the analysis is refined in two ways: by checking it against the corresponding corpus of astronomical/astrological translations and by including the translator Michael Scot. (1) The above-mentioned 2016 paper focusing on John of Seville is based on the corpus of twelfth-century astronomical and astrological translations, which not only contains very long texts, such as Gerard of Cremona's translation of Ptolemy's *Almagest*, but also covers the translators Adelard of Bath, Hermann of Carinthia and Plato of Tivoli, who are potential translators also of the philosophical texts discussed here. (2) As the above table for *et deinde* illustrates, it is sensible to include Michael Scot's translations in the analysis, even though his translations date from the early thirteenth century. As a Toledan translator, who left Spain for Italy around 1220, he prolonged the Spanish translation movement into the thirteenth century. Also, it was revealing that one text of the astronomical and astrological corpus of twelfth-century translations in fact turned out to be the product of Michael Scot, namely Alhazen's *Liber Aboali*.

The problem with the phrase *et deinde* is not the astronomical and astrological corpus: Adelard, Hermann and Plato do not employ the phrase either. But *et deinde* is used several times by the translator Michael Scot, as the above table exhibits: the phrase appears seven times in his translation of Aristotle's *De animalibus* 11–19 and five times in his translation of Averroes' Long Commentary on *De caelo*. Hence, *et deinde* remains a phrase typical of Gundisalvi, but not of him only. Gundisalvi shares this stylistic predilection with Michael Scot. As a consequence, this paper is now based on firmer evidence. It makes sure that the vocabulary identified as highly indicative of a translator is not, by chance, typical of Michael Scot or of the astronomical/astrological translators Adelard of Bath, Hermann of Carinthia, and Plato of Tivoli.

When I had arrived at the six lists of purely stylistic terms, I further shortened these lists by concentrating on terms that appear *regularly* in the texts of a known translator. This I did by selecting all those terms that appear more than 10 times and in at least 50% of the translations of a person. This rule had to be modified for John of Seville and Alfred of Shareshill, whose corpus of philosophical translations is very small. In their case, I also included terms that appear only 5 to 10 times or that appear in only 40% of the translations. I shall now present, in chronological sequence, the six translators and the tables with

words and phrases specific to them, showing which of these appear also in the anonymous translations.

1.1 John of Seville

The first translator is John of Seville, who is well known especially for his many astrological and astronomical translations produced in the 1120s and 1130s. The table below contains words and phrases specific to John of Seville which appear in at least 1 of his 3 translations and more than 4 times.¹⁰ Note that I have added the catchwords, i.e. the stylistically characteristic words, isolated in the 2016 study on the astronomical/astrological corpus; these words are marked with underlining. Terms marked with italics appear once (or more often, as indicated in brackets) in texts by other translators in this corpus.

words and phrases specific to John of Seville
repente, iussu, invenient, dicamusque, significaverit, participatur, nutu dei, eorum atque, opera autem, oporteret eum, dixerunt philosophi, a semet ipso, fuerit cum hoc, et quicquid in, accidunt/accidit in hoc, secundum quod putaverunt, in contradictione eorum, nunc autem narremus, eorum in quibusdam, ut dicerent quod, et quicquid accidit, quicquid accidit in, quoque et in, narravimus in praecedentibus, dixerunt philosophi quod
<u>catchwords of the astronomical/astrological corpus:</u>
aspicies, nominabis, et scito, boni esse, quoque eius, sint inter, et volueris, quam volueris, cumque volueris, accipe a, finitus fuerit, nutu dei, quamdiu duraverit, qua fuerit, plus erit, serva eum, quod fuerit inter, et volueris scire, cum volueris hoc, qui si fuerit, in quo fuerit et, et cetera similia, post hoc aspice, <i>annullare, et aspice, et pones, quoque ac</i> (3)

anonymous translation	words and phrases shared with John of Seville
01-Aristotle, <i>Metaphysica A</i> , fragm.	
02-Alexander of Aphrodisias, <i>De intellectu</i>	
03-Anonymous, <i>Turba philosophorum</i>	nutu dei (5), dixerunt philosophi (1), invenient (1)
04-Alkindi, <i>De intellectu</i>	
05-Alkindi, <i>De mutatione temporum</i>	sint inter (1), accipe a (4), plus erit (1)
06-Alkindi, <i>De radiis</i>	
07-Alfarabi, <i>De intellectu</i>	

¹⁰ The words and phrases are listed according to frequency: *repente* is the most frequent characteristic single word, *nutu dei* the most frequent two-word phrase etc.

08-Alfarabi, <i>Liber excitationis</i>	
09-Alfarabi, <i>De scientiis</i>	
10-Ps.-Alfarabi, <i>Flos</i>	
11-Alfarabi, <i>Quintus liber</i>	
12-Ps.-Alfarabi, <i>De ortu scientiarum</i>	
13-Iḥwān al-Ṣafā', <i>In artem logicae demon.</i>	et volueris scire (1)
14-Iḥwān al-Ṣafā', <i>Cosmographia</i>	
15-Anonymous, <i>De 4 confectionibus</i>	nominabis (1), cumque volueris (3), serva eum (1), et pones (3), quoque ac (1)
16-Isaac Israeli, <i>De definitionibus</i>	
17-Avicenna, <i>Logica, Isagoge</i>	significaverit (2), participatur (1), plus erit (1)
18-Avicenna, <i>Physica I–III</i>	participatur (1), sint inter (3), et quic- quid accidit (2), accidit in hoc (1), et cetera similia (1)
19-Avicenna, <i>De diluviis</i>	
20-Algazel, Prologue to <i>De intentionibus</i>	

The evidence presented in this table is not substantial enough to allow for the safe attribution of any of these anonymous translations to John of Seville. Some terms specific to John of Seville appear in the translations of Avicenna's *Logica* and *Physica*, but, as we will see below, there is overwhelming stylistic evidence that Dominicus Gundisalvi was the translator of these two Avicennian texts. This is a reminder that a few stylistic predilections shared with a known translator are not enough to justify an attribution, especially not in the case of long texts such as these, which comprise 24.673 words (*Logica*) and 59.724 words (*Physica*) respectively. It is much more significant that the rather short treatise *De quatuor confectionibus*, which is 1.891 words long, contains five John of Seville catchwords. *De quatuor confectionibus* is a treatise on magic and natural philosophy by an anonymous Arabic author, who discusses, among other things, how to catch animals without hunting. It served as a source for the final letter of *The Epistles* of the so-called 'Brethren of Purity' (Iḥwān al-Ṣafā'). There is an interesting fact about this treatise which helps to identify its translator: Its field is blank in the other five translator tables of this study, as we shall see. There are no catchwords of Hugo of Santalla, Gerard of Cremona, Dominicus Gundisalvi, Alfred of Sharesill or Michael Scot in *De quatuor confectionibus*. The negative evidence squares well with the positive evidence of the five catchwords of the above table.

Because *De quatuor confectionibus* is short, it is difficult to isolate a sufficient number of catchwords that are both regular and exclusive to a translator

in the philosophical corpus. I have therefore started to search systematically for rarer terms that appear exclusively in one translator, but less than 10 (and more than 2) times, counting also occurrences in the astronomical/astrological corpus.¹¹ This is the resulting table, in which I list also the translators Adelard of Bath, Plato of Tivoli and Hermann of Carinthia, who are part of the astronomical/astrological corpus¹² (the first figure in brackets gives the occurrences in the combined two corpora, the second figure in *De quatuor confectioibus*):

	Anonymous, <i>De quatuor confectioibus</i>: rare stylistic terms shared with known translators
Adelard of Bath	–
John of Seville	accipiesque (3 occ. in translations by John / 1 occ. in this text), proicies (3/7), cumque volueris (9/3), et nominabis (9/1), quod volueris (9/2), cumque fuerint (8/1), voluerit ex (6/1), serva eum (6/1), eum super (6/1), pones super (4/1), eo cumque (3/1), et operare (3/1), magisteriorum et (3/1), aliquod ingenium (3/1), post haec accipe (5/2)
Plato of Tivoli	–
Hermann of Carinthia	–
Hugo of Santalla	nihilque (6/1), adhibere (4/1)
Gerard of Cremona	et dicatur (9/1), scientiam non (3/1)

11 Also, I have added the Latin translation of Averroes' Long Commentary on *De anima* to the two corpora, a translation which can safely be attributed to Michael Scot, with the purpose of broadening the textual material for Michael Scot. This I have done for all tables on 'stylistic, but rare terms' of this study.

12 To be precise, the following translations are considered in addition to the philosophical corpus: Adelard of Bath, Albumasar's *Ysagoga minor*; Adelard of Bath, Algorismi's *Tabulae*; John of Seville, Alcabitius' *Introductorius*; John of Seville, Thebit's *De imaginibus* (versions I and J); John of Seville, anonymous *Astrologicae speculationis exercitium*; John of Seville, Ibn al-Šaffār's *De opere astrolabii*; Plato of Tivoli, Ptolemy's *Tetrabiblos I–II*; Plato of Tivoli, Haly Embrani's *De electionibus horarum*; Plato of Tivoli, Archimedes' *De mensura circuli*; Plato of Tivoli, Savasorda's *Liber embadorum*; Hugo of Santalla, Jafar's *Liber imbrium*; Hugo of Santalla, Ps.-Aristotle's *De ducentis quinquaginta quinque Indorum voluminibus*; Hugo of Santalla, Hermes' *De spatula*; Hugo of Santalla, Ibn al-Muṭannā's Commentary on al-Ḥwārizmī's *Tables*; Hermann of Carinthia, Ptolemy's *Planisphaerium*; Hermann of Carinthia, Albumasar's *Liber introductorius in astrologiam*; Gerard of Cremona, Ptolemy's *Almagest*; Gerard of Cremona, Theodosius' *De habitationibus*; Gerard of Cremona, Thebit's *De his que indigent*; Gerard of Cremona, Ps.-Thebit's *De motu octavae sphaerae*; Gerard of Cremona, Archimedes' *De mensura circuli*; Gerard of Cremona, Banu Musa's *Verba*; Michael Scot, Averroes' Long Commentary on *De anima*. Note that this additional corpus includes astronomical and astrological translations for the most part, but also some that border on mathematics or magic. The corpus does not include the various translations of Ps.-Ptolemy's *Centiloquium*, in order to avoid the problem of identical content.

Dominicus Gundisalvi	numquid (6/2), interroga (5/1), cadendi (3/1), nec sicut (7/1), formatum et (3/1)
Alfred of Shareshill	–
Michael Scot	dixit ita (9/1), dixit erunt (3/1), apud me est (3/1)

It is indicative that when we turn to rarer stylistic terms exclusive to the known translators, the evidence clearly speaks in favour of John of Seville as the translator. In sum, the combined positive and negative evidence of the translator tables together with the evidence of the rarer stylistic terms makes it probable that John of Seville was the translator of the anonymous treatise *De quatuor confectionibus*. This is only ‘probable’ and not yet certain because the text has many similarities in content and style with texts of magic, so that the final word on this issue has to wait until a comparison is made with other Arabic-Latin translations of magic.

1.2 Hugo of Santalla

The next translator in chronological sequence is Hugo of Santalla, who is known as the translator of about seven texts in astrology, astronomy and the divinatory sciences. Hugo, in principle, would have been a good candidate for the translation of *De quatuor confectionibus*. But the translator was not Hugo of Santalla, as the following table shows, which contains words and phrases that appear in both translations by Hugo and more than 10 times:

words and phrases specific to Hugo of Santalla ¹³
tandemque, agnitio, licebit, arbitror, ulterius, deinceps quoque, nihilominus quoque, ut videlicet, sive potius, dum videlicet, cuiusmodi sunt, plerumque etiam, vel medio, aliter quoque, rursum in, nam sub, vel potius, eo item, quae videlicet, praecipue dum, videlicet aut, ad hunc quoque modum, <i>potissimum</i> , <i>denuo</i> , <i>atque huiusmodi</i> catchwords of the astronomical/astrological corpus: agnitio, digressio, ut videlicet, deinceps quoque, nihilominus quoque, sive potius, dum videlicet, plerumque etiam, cuiusmodi sunt, rursum in, nisi inquam, dum tamen, quia item, vel potius, aliter quoque, ut inde, ut tandem, ubi videlicet, prout videlicet, si videlicet, praecipue dum, ante cetera, que quidem omnia, ad hunc quoque modum

13 In earlier versions of this paper (before the inclusion of the astronomical/astrological corpus and of Michael Scot), the following terms and phrases now omitted were listed as specific to Hugo of Santalla: *pariter* (61 occurrences in Hermann, 4 in Plato, 1 in Adelard), *aut saltem* (2 Hermann, 1 Adelard, 1 Michael Scot), *itidem* (3 Plato, 1 Hermann, 1 Adelard).

anonymous translation	words and phrases shared with Hugo of Santalla
01-Aristotle, <i>Metaphysica</i> A, fragm.	
02-Alexander of Aphrodisias, <i>De intellectu</i>	
03-Anonymous, <i>Turba philosophorum</i>	
04-Alkindi, <i>De intellectu</i>	
05-Alkindi, <i>De mutatione temporum</i>	
06-Alkindi, <i>De radiis</i>	
07-Alfarabi, <i>De intellectu</i>	
08-Alfarabi, <i>Liber excitationis</i>	vel medio (1)
09-Alfarabi, <i>De scientiis</i>	
10-Ps.-Alfarabi, <i>Flos</i>	
11-Alfarabi, <i>Quintus liber</i>	
12-Ps.-Alfarabi, <i>De ortu scientiarum</i>	
13-Iḥwān al-Ṣafā', <i>In artem logicae demon.</i>	
14-Iḥwān al-Ṣafā', <i>Cosmographia</i>	ut inde (1)
15-Anonymous, <i>De 4 confectionibus</i>	
16-Isaac Israeli, <i>De definitionibus</i>	
17-Avicenna, <i>Logica, Isagoge</i>	agnitio (1), ulterius (1), nam sub (1)
18-Avicenna, <i>Physica</i> I–III	ulterius (2)
19-Avicenna, <i>De diluviis</i>	
20-Algazel, Prologue to <i>De intentionibus</i>	

Hugo of Santalla has long been known as an idiosyncratic stylist, whose style is easy to recognize. This is confirmed by the present analysis of stylistic particles and phrases. Hugo has many and obvious stylistic preferences which are not shared by any of the anonymous texts discussed here.

1.3 Gerard of Cremona

The third translator in our corpus is Gerard of Cremona (1114–87), the canon of Toledo cathedral and most productive Arabic-Latin translator of the Middle Ages. From the list of translations produced by his *socii*, i.e., his students and colleagues, after his death, we know that he was the translator of at least 70 Arabic texts in philosophy, astronomy, mathematics, medicine, alchemy and divination. The following list contains those words and phrases that appear in at least 4 of the 11 translations by Gerard and more than 10 times:

words and phrases specific to Gerard of Cremona ¹⁴
significo, imprimis, reliquarum, sufficiente, iterum quia, absque medio, nos quidem, significo per, verumtamen non, et ipsorum, propterea quia, rem aliam, illud iterum, quo fuimus, reliquis rebus, nam quando, quare fit, modum unum, planum quod, similiter iterum, iterum super, secundum semitam, ¹⁵ et dico iterum, quod est quoniam, ut sit res, et nos quidem, et illud quidem, eius et ipsius, quando non est, in quo fuimus, est secundum duos, illud est quoniam, propter illud ergo, propterea quod est, iterum quod est, sunt res una, et planum quod, propterea quod non, et scientia quidem, et de eis, et dico iterum quod, est secundum duos modos, illud in quo fuimus, et causa in illo, dico ergo quod si, <i>et neque, nisi quoniam, similiter quando, quod est quia, secundum duos modos</i>
<u>catchwords of the astronomical/astrological corpus:</u>
describam, ponam ut, demonstrare volumus, vero fuit, quod volumus, ponam autem, et neque, illud est quoniam, iam vero fuit, tunc propter illud, in eo quod sequitur ¹⁶

anonymous translation	words and phrases shared with Gerard of Cremona
01-Aristotle, <i>Metaphysica</i> A, fragm.	
02-Alexander of Aphrodisias, <i>De intellectu</i>	
03-Anonymous, <i>Turba philosophorum</i>	significo (10), <u>describam</u> (1)
04-Alkindi, <i>De intellectu</i>	sunt res una (3)
05-Alkindi, <i>De mutatione temporum</i>	<u>in eo quod sequitur</u> (1), <i>similiter quando</i> (2)
06-Alkindi, <i>De radiis</i>	
07-Alfarabi, <i>De intellectu</i>	ut sit res (1)
08-Alfarabi, <i>Liber excitationis</i>	nos quidem (1), et de eis (1)
09-Alfarabi, <i>De scientiis</i>	
10-Ps.-Alfarabi, <i>Flos</i>	et scientia quidem (1), secundum semitam (2), <i>secundum duos modos</i> (1)
11-Alfarabi, <i>Quintus liber</i>	

14 In earlier versions of the paper, the following terms and phrases now omitted were listed as specific to Gerard of Cremona: *praeter quod* (11 Plato, 3 Hermann, 1 Michael Scot); *et propter illud* (3 Michael Scot); *per sermonem* (5 Michael Scot); *demonstratio super* (10 Michael Scot, 1 Plato); *quoniam quando* (53 Michael Scot); *neque est* (69 Michael Scot, 1 Gundisalvi). The figures count the occurrences in both corpora: philosophical and astronomical/astrological.

15 The phrase *secundum semitam* appears only in 3 of the 11 translations by Gerard.

16 In Hasse, *Stylistic Evidence*, p. 37, further phrases are listed as specific to Gerard of Cremona, which are excluded here because they also appear in Michael Scot's translations of the long commentaries on *De caelo* and *De anima* and of *De animalibus* 11–19 with the following frequencies: *declaratur quod* (9), *neque est* (69), *quod narrabo* (7), *illud est quod* (1), *qui est inter* (2), *propter hoc erit* (31), *et propter illud* (3), *et propter hoc erit* (30).

12-Ps.-Alfarabi, <i>De ortu scientiarum</i>	
13-Iḥwān al-Ṣafā', <i>In artem logicae demon.</i>	sufficiente (1)
14-Iḥwān al-Ṣafā', <i>Cosmographia</i>	nam quando (1)
15-Anonymous, <i>De 4 confectionibus</i>	
16-Isaac Israeli, <i>De definitionibus</i>	reliquarum (1), absque medio (1), eius et ipsius (1)
17-Avicenna, <i>Logica, Isagoge</i>	vero fuit (1)
18-Avicenna, <i>Physica I–III</i>	iterum quia (1), ut sit res (5)
19-Avicenna, <i>De diluviis</i>	
20-Algazel, Prologue to <i>De intentionibus</i>	ipsorum (1)

It is possible to isolate many words and phrases as specific to Gerard of Cremona, but only few of them are used in our anonymous translations. Three Gerardian phrases can be found in the anonymous translation of Isaac Israeli's *De definitionibus*, which is not surprising given that the three passages are identical in wording with Gerard of Cremona's own translation of Isaac Israeli's *De definitionibus*, of which the anonymous text here is a revision, as has been shown elsewhere.¹⁷

The second interesting item on the table is Ps.-Alfarabi's *Flos*, which is also titled *Fontes quaestionum* in Latin. This brief text of only 822 words is a translation of the first part of the Arabic text 'Uyūn al-masā'il (*The Principal Questions*), a succinct summa of Avicennian philosophy, which treats first concepts, the necessary and possible being, emanation, the active intellect, the physics of the sublunar world, the human intellect and the soul's afterlife. Among the three catchwords in this translation which are specific to Gerard of Cremona, the phrase *secundum semitam* is particularly interesting. It translates the ordinary Arabic phrase 'alā sabīl, which means 'in the way of', 'according to'. I have not found this Latin phrase in any other translation of the corpus outside Gerard's translations:

secundum semitam (translating: 'alā sabīl)

The other translators use *ad modum*, *secundum*, *secundum quod*, *secundum viam*.

anonymous	...	0
	10-Ps.-Alfarabi, <i>Flos</i>	2
	...	0
John of Seville	...	0
Hugo of Santalla	...	0

¹⁷ See n. 5 above.

Gerard of Cremona	26-Aristotle, <i>Analytica posteriora</i>	31
	...	0
	33-Themistius, Comm. on <i>Analytica posteriora</i>	25
	...	0
	35-Alkindi, <i>De somno et visione</i>	1
	...	0
Avendauth (and ?)	...	0
Gundisalvi + Avendauth	...	0
Gundisalvi + Johannes Hispanus	...	0
Gundisalvi	...	0
Alfred of Shareshill	...	0
Michael Scot	...	0

This picture is completed by the astronomical/astrological corpus, where again the phrase *secundum semitam* appears only in translations by Gerard: twice in Ptolemy's *Almagest* and once in Ps.-Thebit ben Corat's *De motu octavae sphaerae*. Related phrases like *per semitam* and *secundum hanc semitam* also appear exclusively in Gerard's translations (4 and 6 times), while the term *semita* as such is also used by other translators such as Adelard (10), Hugo (2) and John of Seville (2).

A closer textual study of Ps.-Alfarabi's *Flos* reveals further evidence that this is a translation by Gerard of Cremona. The text contains phrases like *per sermonem*, *neque est* and *secundum quod oportet* which are very typical of Gerard of Cremona and shared by only one translator (namely Michael Scot).¹⁸ More significantly, the text contains rarer stylistic phrases that appear exclusively in translations by Gerard of Cremona, but less often. I shall again present a table, as above for *De quatuor confectionibus*, with the results of a systematic search for rarer stylistic terms in Ps.-Alfarabi's *Flos* which are exclusive to the translators, but which appear less than 10 times, counting both the philosophical and the astronomical/astrological corpus:

	Ps.-Alfarabi, <i>Flos</i>: rare stylistic terms shared with known translators
Adelard of Bath	–
John of Seville	–
Plato of Tivoli	–
Hermann of Carinthia	–
Hugo of Santalla	–

¹⁸ See n. 14 above.

Gerard of Cremona	modos unus (7 occ. in translations by Gerard / 1 occ. in this text), dialecticae et (7/1), res quidem (6/1), scientia dialecticae (6/1), quando invenitur (4/1), non tollitur (4/1), cuius comprehensio (3/1), ex esse eius (6/1), et res quidem (5/1), est demonstratio et (4/1), in primis ut (3/1), super ipsum ex (3/1), eius intentio est (3/1), non licet ut (3/1), aliud et est (3/1), secundum duos modos unus (6/1), non est ex rebus (4/1), sunt secundum duos modos (4/1), modos unus eorum est (3/1)
Dominicus Gundisalvi	et dominantem (3/1), non formatur (3/1), sunt secundum ordinem (4/1), genere et differentia (4/1), ipsum est necesse (3/1), et ea quae sunt (4/1)
Alfred of Shareshill	–
Michael Scot	possibile aut (4/1), opinioni et (4/1), quod veritas (4/1), facere eas (3/1), iste enim non (3/1), et hoc possibile (3/1)

As this table shows, the translator of Ps.-Alfarabi's *Flos* shares some of these rarer stylistic phrases with Gundisalvi and Michael Scot, but many more phrases with Gerard of Cremona. When we add the negative evidence of the other five translator tables of this study, where the field with Ps.-Alfarabi's *Flos* is always blank, it is safe to conclude that Gerard of Cremona was the translator of Ps.-Alfarabi's *Flos*. We will see below that the computational analysis of the most frequent words underlines this philological conclusion.

1.4 Dominicus Gundisalvi

The fourth translator in sequence is Dominicus Gundisalvi, who was also a canon of the cathedral of Toledo, contemporary with Gerard of Cremona. Gerard died in 1187, while Gundisalvi was still alive in 1190. Gundisalvi's focus, as far as we can see today, was on philosophical translations, which is why the table does not contain any catchwords from the astronomical/astrological corpus. The table lists specific words and phrases that appear in at least 3 of the 7 translations by Gundisalvi (including the translations produced together with Avendauth or Johannes Hispanus) and more than 10 times.

words and phrases specific to Dominicus Gundisalvi ¹⁹
nosci, quandoquidem, nonne, ipsamet, quomodocumque, sic ut, facit debere, debere esse, vel est, sicut postea, est absurdum, restat ergo, interim dum, per differentiam, verbum de, in plerisque, nec esset, sed adhuc, posset esse, aliquando vero, cuius comparatio, fuerit ibi, opus fuit, tractat de, eo nec, quam id, alio a se, unde oportet ut, ex his quae, non potest autem, non si autem, ullo modo sed, id per quod, haec est scilicet, id autem quod, est scilicet quia, ullo modo si, ideo oportet ut, haec est quia, causa autem huius, modo si autem, habet comparisonem ad, sine dubio est, esse nisi propter, omnis quod est, si quis autem dixerit, ut id quod est, <i>ullo modo, modo si, sequitur post, hoc fieri, quis dixerit, dictio de, est quiddam quod, sine dubio et</i> , ²⁰ <i>id quod habet, esse nisi cum, in tantum quod, hoc est scilicet, si quis autem, si autem non fuerit</i>

anonymous translation	words and phrases shared with Dominicus Gundisalvi
01-Aristotle, <i>Metaphysica</i> A, fragm.	
02-Alexander of Aphrodisias, <i>De intellectu</i>	sic ut (1), vel est (2), cuius comparatio (1), opus fuit (1), id per quod (1), id autem quod (1), omnis quod est (1), <i>est quiddam quod</i> (1)
03-Anonymous, <i>Turba philosophorum</i>	nonne (16)
04-Alkindi, <i>De intellectu</i>	vel est (2), interim dum (1), alio a se (1)
05-Alkindi, <i>De mutatione temporum</i>	quandoquidem (3), <i>in tantum quod</i> (2)
06-Alkindi, <i>De radiis</i>	sic ut (1), in plerisque (1)
07-Alfarabi, <i>De intellectu</i>	vel est (2), cuius comparatio (2), opus fuit (1), eo nec (1), alio a se (1), id per quod (1)

19 In earlier versions of the paper, the following terms and phrases now omitted were listed as specific to Dominicus Gundisalvi: *et deinde* (Gerard 3, Michael Scot 10), *postquam autem* (Plato 1, Gerard 1), *inter se* (3 Adelard, 1 John, 2 Plato, 3 Gerard, 4 Michael Scot), *idcirco* (1 Plato, 2 Hermann), *cur non* (2 Hermann, 1 Gerard), *probatum* (6 Plato, 1 Michael Scot), *tunc esset* (17 Michael Scot), *est hoc quod* (19 Michael Scot), *non est necesse* (4 Gerard, 28 Michael Scot), *id cuius* (6 Gerard), *potest autem* (5 Gerard), *et etiam quia* (64 Gerard, 6 Michael Scot), *praedictum est* (1 Adelard, 5 John, 1 Plato, 7 Michael Scot), *habet esse* (1 Gerard, 9 Michael Scot), *nullo modo* (1 Hugo, 3 Gerard, 9 Michael Scot), *est eo quod* (7 Plato, 2 Gerard, 1 Michael Scot), *secundum hoc quod* (2 Adelard, 1 John, 2 Plato, 8 Gerard, 5 Michael Scot), *non est autem* (3 Gerard), *sine dubio* (1 Hugo, 1 Gerard, 4 Michael Scot), *in actu* (1 Gerard, 516 Michael Scot), *opus est* (3 John, 3 Plato, 1 Hermann, 1 Gerard), *id in quo* (6 Plato, 1 Hugo, 2 Gerard).

20 The phrases *modo si*, *est quiddam quod* and *sine dubio et* do not appear elsewhere in the present corpus, but one time each in Michael Scot's translation of Averroes' Long Commentary on *De anima*.

08-Alfarabi, <i>Liber excit. ad viam felicitatis</i>	quomodocumque (1), id per quod (1)
09-Alfarabi, <i>De scientiis</i>	cuius comparatio (1), <i>hoc fieri</i> (1)
10-Ps.-Alfarabi, <i>Flos</i>	
11-Alfarabi, <i>Quintus liber</i>	vel est (1), <i>ullo modo</i> (1)
12-Ps.-Alfarabi, <i>De ortu scientiarum</i>	opus fuit (4), haec est quia (1), <i>dictio de</i> (6)
13-Iḥwān al-Ṣafā', <i>In artem logicae demon.</i>	sic ut (1), vel est (5), sicut postea (1), ex his quae (3), id per quod (2), haec est scilicet (2), <i>hoc est scilicet</i> (1)
14-Iḥwān al-Ṣafā', <i>Cosmographia</i>	
15-Anonymous, <i>De 4 confectionibus</i>	
16-Isaac Israeli, <i>De definitionibus</i>	<i>in tantum quod</i> (1), <i>si quis autem</i> (1)
17-Avicenna, <i>Logica, Isagoge</i>	nosci (13), quandoquidem (2), sic ut (3), sicut postea (10), per differentiam (1), in plerisque (1), fuerit ibi (1), aliquando vero (2), cuius comparatio (4), non si autem (1), id per quod (2), id autem quod (3), ullo modo si (1), haec est quia (1), modo si autem (1), habet comparisonem ad (2), sine dubio est (1), si quis autem dixerit (2), ut id quod est (1), <i>ullo modo</i> (15), <i>modo si</i> (3), <i>hoc fieri</i> (1), <i>quis dixerit</i> (1), <i>id quod habet</i> (2), <i>esse nisi cum</i> (1), <i>hoc est scilicet</i> (3), <i>si quis autem</i> (4), <i>si autem non fuerit</i> (1)
18-Avicenna, <i>Physica I-III</i>	nosci (2), quandoquidem (23), nonne (6), ipsamet (4), sic ut (9), facit debere (2), debere esse (2), sicut postea (16), restat ergo (6), interim dum (2), per differentiam (1), verbum de (2), nec esset (1), posset esse (1), fuerit ibi (5), aliquando vero (2), cuius comparatio (1), opus fuit (1), eo nec (3), alio a se (1), unde oportet ut (2), ex his quae (2), non si autem (4), ullo modo sed (8), haec est scilicet (5), id autem quod (1), est scilicet quia (1), ullo modo si (3), ideo oportet ut (2), haec est quia (4), modo si autem (3), habet comparisonem ad (2), sine dubio est (5), si quis autem dixerit (1), <i>ullo modo</i> (45), <i>modo si</i> (5), <i>sequitur post</i> (2), <i>hoc fieri</i> (1), <i>dictio de</i> (7), <i>est quiddam quod</i> (1), <i>sine dubio et</i> (2), <i>id quod habet</i> (3), <i>in tantum quod</i> (1), <i>hoc est scilicet</i> (16), <i>si autem non fuerit</i> (2)

19-Avicenna, <i>De diluviis</i>	<i>quis dixerit</i> (1, Michael Scot), <i>in tantum quod</i> (2, Michael Scot)
20-Algazel, Prologue to <i>De intentionibus</i>	<i>hoc est scilicet</i> (1)

This is the richest table of this article. Remember that the words in upright never appear in any other translator of the corpus and that those in italics appear only once outside Gundisalvi's translations. Together the terms pile up much evidence. The evidence for Avicenna's *Isagoge* and Avicenna's *Physica* is overwhelming. It has been a long-standing surmise that Dominicus Gundisalvi was the translator not only of Avicenna's *De anima*, *Philosophia prima* and *De convenientia et differentia scientiarum*, but also of two other major parts of Avicenna's summa *al-Šifā'*: the *Isagoge* and the *Physica*. The stylistic analysis of small words does not leave any doubt that this is indeed the case.

The evidence of the above table is also convincing for three other texts that are considerably shorter (as compared with the 24.673 words of Avicenna's *Isagoge* and the 59.724 words of his *Physica*): Alexander of Aphrodisias' *De intellectu* (3.345 words), Alfarabi's *De intellectu* (4.074 words) and the Iḥwān al-Šafā' 's *Liber introductorius in artem logicae demonstrationis* (6.008 words). It is true that the lists of Gundisalvian catchwords in these three shorter texts are not particularly long: The Alexander translation contains 8 such terms, the Alfarabi translation 5 and the Iḥwān al-Šafā' translation 7. But one should keep in mind that these terms do not appear outside Gundisalvi's translations, neither in the present corpus, which includes Michael Scot, nor in the astronomical/astrological corpus. There may always be some stray appearances of unusual stylistic terms in a translation, such as Hugo of Santalla's and John of Seville's terms in Gundisalvi's long translations of *Isagoge* and *Physica*. But in the case of these three shorter texts, sets of 6–8 Gundisalvian phrases are a significant indication of Gundisalvi's involvement, especially since the negative evidence for the other translators is very stable: There are blank fields for these three texts in the tables for the other translators John, Hugo, Gerard, Alfred and Michael Scot, except for four single terms.²¹ The stylistic analysis of small words therefore points clearly to Dominicus Gundisalvi as the translator of Alexander's *De intellectu*, Alfarabi's *De intellectu* and the Iḥwān al-Šafā' 's *Liber introductorius in artem logicae demonstrationis*.

To underline the above attributions to Gundisalvi, it is worthwhile to have a look at an occurrences table for a phrase specific to Gundisalvi: *opus fuit*. This term translates forms of the verbs *aḥwaḡa* and *iḥtāḡa* ('to need'):

21 Michael's phrase *quoniam si ita esset* appears once in Alexander; Gerard's phrase *ut sit res* once in Alfarabi's *De intellectu*; Gerard's phrase *sufficiente* once in the Iḥwān al-Šafā' 's *Liber*; and John's phrase *et volueris scire* also once in the Iḥwān al-Šafā' 's *Liber*.

opus fuit (translating: *aḥwaḡa*, *iḥtāḡa*)

The other translators use: *indiget*, *necessarius est*, *oportet*, *necesse est*

anonymous	...	0
	02-Alexander of Aphrodisias, <i>De intellectu</i>	1
	...	0
	07-Alfarabi, <i>De intellectu</i>	1
	...	0
	12-Ps.-Alfarabi, <i>De ortu scientiarum</i>	4
	...	0
	18-Avicenna, <i>Physica I–III</i>	1
	...	0
John of Seville	...	0
Hugo of Santalla	...	0
Gerard of Cremona	...	0
Gundisalvi + Avendauth	41-Avicenna, <i>De anima</i>	1
	...	0
Gundisalvi + Johannes Hispanus	...	0
	44-Algazel, <i>Summa</i>	2
Gundisalvi	45-Avicenna, <i>Philosophia prima</i>	2
	...	0
	47-Ps.-Avicenna, <i>Liber celi et mundi</i>	6
Alfred of Shareshill	...	0
Michael Scot	...	0

Opus fuit is a good example of a phrase which is regular and specific at the same time. In addition, it also illustrates why the present study does not differentiate between translations attributed to Gundisalvi, to Gundisalvi and Avendauth, and to Gundisalvi and Johannes Hispanus: the Latin style remains very similar, at least when studied with regard to catchwords. In the future, however, with a finer-grained stylistic analysis, it may well be possible to isolate the stylistic input of Gundisalvi's companion translators. In sum, then, on the basis of the evidence provided by *opus fuit* and by the other Gundisalvian catchwords listed at the beginning of this section, five translations can be firmly attributed to Gundisalvi: Avicenna's *Logica* and *Physica*, Alexander's and Alfarabi's *De intellectu* and the Iḥwān al-Ṣafā's *Liber introductorius*.

Can anything be said about other texts that bear traces of Gundisalvi's style, as exhibited on the table with Gundisalvi catchwords? This is possible if we turn our attention to rarer stylistic terms, as we did above with the translations of *De quatuor confectionibus* and *Flos*. A systematic analysis of such terms in

both the philosophical and the astronomical/astrological corpus makes it probable that Gundisalvi was the translator also of the following four texts, as we shall see: Alkindi's *De intellectu* (805 words), Alfarabi's *De scientiis* (6.900 words), Isaac Israeli's *De definitionibus* (4.452 words) and Ps.-Alfarabi's *De ortu scientiarum* (2.207 words). The first three of these have in common that there also exists a translation by Gerard of Cremona of the same text. As was mentioned above, Gerard's translation was produced first and then substantially revised by an anonymous translator, in all three cases. It has long been assumed that Dominicus Gundisalvi was this anonymous reviser, since he draws on the three anonymous translations in his own works. The tables below buttress this assumption with stylistic evidence.

The first of these texts, Alkindi's *De intellectu*, which Gerard had translated as *De ratione*, has very few resonances in the translator tables, which exhibit two Gundisalvian and one Gerardian phrase and nothing with the other translators. Here comes the table with rarer stylistic terms, which appear only 10 times or less in a known translator:

	Alkindi, <i>De intellectu</i>: rare stylistic terms shared with known translators
Adelard of Bath	–
John of Seville	–
Plato of Tivoli	–
Hermann of Carinthia	–
Hugo of Santalla	–
Gerard of Cremona (without considering Gerard's translation of <i>Alkindi's De ratione</i>)	est apparens (6 occ. in translations by Gerard / 1 occ. in this text), species prima (3/1)
Dominicus Gundisalvi	attribuens (7/1), aliud vel (10/1), nec sicut (7/1), quae praecedit (4/1), quae non erat (9/1), in alio a (5/2), ut cum voluerit (5/1), a se sicut (4/1), esset per se (4/1), quantum vero ad (3/1), hae igitur sunt (3/1)
Alfred of Shareshill	–
Michael Scot	assimilavit (4/1), actu quoniam (7/1), secundum igitur quod (6/1), in actu quoniam (5/1)

This table points to Gundisalvi as a translator, as do the many phrases with the content term *effectus*, such as *exit ad effectum* (6/3), which are exclusive to

Gundisalvi.²² The two Gerardian phrases *est apparens* and *species prima* appear in those passages of Gerard's translation that Gundisalvi has left untouched.

The second text is Alfarabi's famous *Enumeration of the Sciences* (*Iḥṣā' al-ʿulūm*). The anonymous revision of Gerard's translation was edited by Manuel Alonso and Jakob Schneider under the translator name of Dominicus Gundisalvi, but in fact the manuscripts of the translation do not contain any attribution to Gundisalvi. The regular translator tables offer hardly any catch-words for this text: only two for Gundisalvi. The rarer stylistic terms table, however, provides more evidence:

	Alfarabi, <i>De scientiis</i>: rare stylistic terms shared with known translators
Adelard of Bath	ducendum (5 occ. in translations by Adelard / 1 occ. in this text)
John of Seville	scientiae esse (3/1), unumquodque istorum per (3/1)
Plato of Tivoli	observemus (5/1), esse dicuntur (6/1)
Hermann of Carinthia	–
Hugo of Santalla	credatur (9/1), plenissime (4/1), qui omnium (5/1)
Gerard of Cremona (without considering Gerard's translation of Alfarabi's <i>De scientiis</i>)	experiendi (4/1), redeutes (3/1), verumtamen in (6/1), in summa (5/3), inveniuntur res (4/2), fixi in (4/1), hae ergo (4/1), minore ad (4/1), declaratur per (3/1), egent ut (3/1), sunt auctores (3/1), qualiter oportet (3/2), libri huius (3/1), supra omnia (3/1), alia sunt quae (9/2), et primum et (4/1), absolute et secundum (4/1), est in mente (3/1), in mente et (3/1), quia demonstratio non (3/1), et medium quidem (3/1), est summa quam (3/1), est in unaquaque (3/1), super illud quod est (7/1), et alia sunt quae (7/1), in libro qui dicitur (5/2), eo quod futurum est (4/1), quae sunt inter utraque (3/1)

22 In addition, Alkindi's *De intellectu* contains many exclusively Gundisalvian phrases with the content term *effectus*: *effectu sed* (30/1), *effectu non* (20/1), *effectu est* (14/1), *effectum nisi* (9/1), *effectu quae* (4/1), *est in effectu* (45/1), *in effectu sed* (30/1), *in effectu non* (20/1), *in effectu est* (14/1), *exit ad effectum* (6/3), *ad effectum nisi* (5/1), *effectu sed in* (4/1), *effectu non est* (4/1), *in effectu quae* (4/1), *effectum nisi per* (3/1), *non in effectu* (3/1).

Dominicus Gundisalvi	separatas (8/1), practicae (4/2), putativa (4/1), activae (3/2), perveniri (3/1), actiones quae (8/1), vel quae (8/3), quocumque autem (7/1), unaquaeque istarum (6/1), illa esse (5/1), provenit esse (5/1), ipsum vel (5/1), in promptu (4/1), eius qua (4/1), nec provenit (4/1), quia vel (4/1), quod aliae (3/1), partes unam (3/1), quamvis id (3/1), sumpta est (3/1), earum habet (3/1), comparatione quae (3/1), esse separatas (3/1), positae in (3/1), probatione non (3/1), appareat et (3/1), aliis huiusmodi (3/1), autem modo (3/1), quae est una (8/1), cuius comparatio ad (7/1), vel quod est (6/1), cum aliis et (6/1), aliquo modo in (6/1), et multa alia (5/3), ea quae fiunt (4/1), per hoc etiam (4/1), quae dicitur de (4/1), ea quae accidunt (3/2), ea inter se (3/1), de his est (3/2), quae accidunt eis (3/5), secundum hoc quod sunt (5/1), sunt ea quae sunt (5/1), et ex his est (4/1), quae est una ex (3/1), et per hoc etiam (3/1)
Alfred of Shareshill	–
Michael Scot	non omnia (10/1), quasi instrumentum (7/1), est activa (5/1), rectius est (5/1), istud quod (4/1), quia propositio (3/1), pluribus eorum (3/2), quousque compleat (3/1), probando quod (3/1), errorem et (3/1), sicut ea (3/1), eo aliquod (3/1), sunt positae (3/1), non est eadem (5/1), et ex iis (4/2), non et hoc (4/1), eorum nisi secundum (3/1), partium et hoc (3/2), eorum in actu (3/1), ergo sunt causae (3/1), in eo secundum quod (5/1)

The anonymous translation of Alfarabi's *De scientiis* is replete with Gundisalvian terms. Again, most of the Gerardian catchwords appear in that part of Gerard's translation which the anonymous translator had left unchanged in his own version. Michael Scot, in turn, cannot be the translator for chronological reasons: since large parts of the anonymous version of *De scientiis* are adopted by Gundisalvi, who flourished 1162–90, into his own treatise *De divisione philosophiae*, the translation predates the lifetime of Michael Scot, who is attested 1215–28. As I observed above, Michael Scot's vocabulary bears many similarities with Gerard's and Gundisalvi's, which may explain the resonances with Michael Scot's style in the above table. In view of all this, it is probable that Dominicus Gundisalvi was the anonymous translator and reviser of Alfarabi's *De scientiis*.

The third text, Isaac Israeli's *De definitionibus*, again is a revision of a translation by Gerard. The translator tables do not yield conclusive results: there are three phrases by Gerard, two by Gundisalvi and one by Michael Scot in this text. The below table for rarer stylistic terms provides better evidence:

	Isaac Israeli, <i>De definitionibus</i> : rare stylistic terms shared with known translators
Adelard of Bath	sic a (3 occ. in translations by Adelard / 1 occ. in this text)
John of Seville	qua diximus (8/1), ex receptione (3/1), qua diximus quod (4/1), est ex proprietate (4/2)
Plato of Tivoli	–
Hermann of Carinthia	–
Hugo of Santalla	–
Gerard of Cremona (without considering Gerard's translation of Isaac Israeli's <i>De definitionibus</i>)	incederent (5/1), utens (3/2), rebus ut (6/1), et reliquae (4/1), quid ipsa (4/1), rerum una (3/1), ostendamus quid (3/1), sursum ad (3/1), ipso de (3/1), scit eas (3/1), et demonstratio non (7/1), de esse rei (5/1), est res secundum (4/1), cognitione eius quod (3/1), et cadit sub (3/1), est in ipso de (3/1), sit an non sit (3/1)
Dominicus Gundisalvi	manifestetur (8/1), discit (4/1), revera (3/1), nullus autem (9/1), est certa (8/1), perfectior est (7/1), eget aliquo (6/1), naturalibus quae (5/1), differentia vel (5/1), sua quae (5/1), dubio sed (5/1), mediante et (4/1), non afficitur (4/1), discedit a (4/1), eius qua (5/1), variatur nec (3/1), causatum secundum (3/1), discedens ab (3/1), et profundum (3/2), propter amissionem (3/1), ad seipsam (3/1), tunc ipsae (3/1), sumpta est (4/3), imperfecta est (3/1), postea non (3/1), id enim quod (9/1), et alia huiusmodi (9/1), si autem esset (6/1), constat autem quod (5/1), vel non est (5/2), sine dubio sed (5/1), ut non egeat (5/1), ut cum voluerit (5/1), a se sed (4/1), sic est ut (4/1), est vel non (3/2), sine medio quod (3/1), et deinde ab (3/1), non esse sicut (3/1), si autem quis (3/1), non variatur nec (3/1), esse et postea (3/1), scilicet an sit (3/1)
Alfred of Shareshill	–
Michael Scot	attributas (6/1), carentes (4/1), declaraverit (3/1), sed faciunt (4/1), perscrutari et (3/1), ita quod cum (7/1), dicitur enim de (7/1), et falsum in (4/1), cum nihil sit (3/1), enim agit in (3/1), in hoc quod dicunt (3/1)

Again, the overwhelming majority of Gerard's terms comes from Gerard's earlier translation, that is, from passages that have been left untouched in the revision. It is probable therefore that Gundisalvi was the reviser.

The fourth text is Ps.-Alfarabi's *De ortu scientiarum*, which does not resonate with any regular terms specific to the known translators, with the import-

ant exception of the Gundisalvian phrases *opus fuit*, *haec est quia* and *dictio de*. This evidence is supported by the table with rarer stylistic terms:

	Ps.-Alfarabi, <i>De ortu scientiarum</i> : rare stylistic terms shared with known translators
Adelard of Bath	–
John of Seville	scilicet eorum (5 occ. in translations by John / 2 occ. in this text)
Plato of Tivoli	–
Hermann of Carinthia	–
Hugo of Santalla	ascribit (5/1), multiplicatus (5/1), multiplicem (4/1), praeter quem non est (4/1)
Gerard of Cremona	abbreviatur (3/1), non pervenimus (8/1), dictionum et (5/1), pervenerunt ad (4/1), scimus eam (4/1), quae cadit sub (6/1), non pervenimus ad (6/1), eorum est praeter (3/1), eorum qui sunt in (3/2)
Dominicus Gundisalvi	comparationibus (6/1), praecipuis (3/1), esse hanc (8/1), probatio autem (8/1), tantum nec (7/1), non restat (7/1), illam non (7/1), et comparisonem (5/2), sed quantum (5/1), eam quae (4/1), probatio haec (3/1), est ordinatio (3/1), quae postea (3/1), possibile eam (3/1), comparisonem eorum (3/1), ergo opus (3/1), hoc probatur (3/1), quae hoc (3/1), probatio in (3/1), quibus quaedam (3/1), vocatur scientia (3/1), constat ergo quod (6/1), est ab hoc (5/1), et ad sciendum (4/1), sed quantum ad (4/1), est dictio de (4/1), eius est praeter (3/1), probatio haec est (3/1), in illa non (3/1), quia quicquid est (3/1), ex quibus quaedam (3/1), probatio autem quod (3/1), et de eius (3/1), hoc et illud (3/1), id quod vocatur (3/1), illarum non est (3/1) ²³
Alfred of Shareshill	–
Michael Scot	illorum quae (3/1), enim est finis (6/1), induxit nos ad (4/1), in multas partes (3/1), et huiusmodi et (3/1)

Hence, for these four texts by Alkindi, Alfarabi, Isaac Israeli and Ps.-Alfarabi it is not certain, but probable that Gundisalvi was the translator—or, in three cases, the reviser.

23 To these Gundisalvian phrases in Ps.-Alfarabi's *De ortu* one can add three phrases which appear regularly, but in less than 3 of the 7 translations by Gundisalvi, which is why they are not listed in the translator table above: *subsistit in* (16/1), *sed quomodo* (14/1), *ergo quomodo* (12/1).

A peculiar case is the very short text *De diluviis* (838 words) by Avicenna. The two Gundisalvian phrases that appear in this treatise are set in italics on Gundisalvi's translator table, because they appear once outside Gundisalvi's corpus, namely in translations by Michael Scot. It is therefore necessary to check whether Michael Scot may have been the translator. Another possible candidate, as suggested by Charles Burnett, is Alfred of Shareshill, who was active as a translator in Toledo at the end of the twelfth century. Alfred's meteorological, mineralogical and botanical interests fit well with the content of *De diluviis* (*On Floods*), which is chapter II.6 of the meteorological part of *al-Šifā'* on *Great Events which Happen in this World*, in which Avicenna discusses spontaneous generation after catastrophic floods. Let us then turn to the last two translator tables of this study, those for Alfred of Shareshill and Michael Scot.

1.5 Alfred of Shareshill

It proved very difficult to extract stylistic terms specific to Alfred of Shareshill from the two translations that are explicitly attributed to him: Nicolaus Damascenus' *De vegetabilibus* and Avicenna's *De mineralibus*. The following table contains those words and phrases that appear in one of the two translations by Alfred (but nowhere else) and more often than three times:

words and phrases specific to Alfred of Shareshill ²⁴
ut plurimum, <i>fietque</i> (1 Plato, 1 Hugo), <i>ceterum</i> (1 Hugo), <i>huius signum</i> (3 Gundisalvi), <i>ut multum</i> (4 Gerard, 1 Gundisalvi, 1 Michael Scot)

anonymous translation	words and phrases shared with Alfred of Shareshill
01-Aristotle, <i>Metaphysica</i> A, fragm.	
02-Alexander of Aphrodisias, <i>De intellectu</i>	
03-Anonymous, <i>Turba philosophorum</i>	<i>ceterum</i> (1)
04-Alkindi, <i>De intellectu</i>	
05-Alkindi, <i>De mutatione temporum</i>	
06-Alkindi, <i>De radiis</i>	
07-Alfarabi, <i>De intellectu</i>	
08-Alfarabi, <i>Liber excitationis</i>	

24 The following terms which had been listed in earlier versions of the present study are now excluded: *simulque* (13 Hermann, only 1 Alfred), *aliquotiens* (only 3 Alfred, 1 Gerard), *per multa* (only 2 Alfred, 1 Gundisalvi, 1 Michael Scot).

09-Alfarabi, <i>De scientiis</i>	
10-Ps.-Alfarabi, <i>Flos</i>	
11-Alfarabi, <i>Quintus liber</i>	
12-Ps.-Alfarabi, <i>De ortu scientiarum</i>	
13-Iḥwān al-Ṣafā', <i>In artem logicae demon.</i>	
14-Iḥwān al-Ṣafā', <i>Cosmographia</i>	ut plurimum (6)
15-Anonymous, <i>De 4 confectionibus</i>	
16-Isaac Israeli, <i>De definitionibus</i>	
17-Avicenna, <i>Logica, Isagoge</i>	
18-Avicenna, <i>Physica I–III</i>	
19-Avicenna, <i>De diluviis</i>	
20-Algazel, Prologue to <i>De intentionibus</i>	

The tableau of stylistic phrases specific to Alfred of Shareshill is too small to be informative. Unfortunately, since the two translations of Nicolaus Damascenus and Avicenna are the only translations of Alfred extant, it is unlikely that the set of stylistic terms can be broadened in the future.

1.6 Michael Scot

The final translator table concerns Michael Scot. Michael Scot was responsible not only for the four translations explicitly attributed to him in the manuscripts—Alpetragius' *De motibus caelorum*, Aristotle's *De animalibus*, Averroes' Long Commentary on *De caelo* and Avicenna's *Abbreviatio de animalibus*—but also for several other commentaries by Averroes, as particle analysis of the corpus of medieval Latin Averroes translations shows.²⁵ It is possible to isolate a significant number of stylistic terms and phrases specific to Michael Scot, if studied with respect to our two corpora. The following table lists all those words that appear in both of the two translations by Michael Scot which are in our corpus

25 Hasse, *Latin Averroes Translations*. Note that the catchwords isolated for Michael Scot in this 2010 study (*quapropter, facere rememorationem, declaratum est, ex hoc sermone, et forte, sed tamen, cum ita sit, si ita esset, cum declaratum est*) are exclusive of Michael Scot only if compared to the other Averroes translators of the thirteenth century: William of Luna and Hermannus Alemannus. Remarkably enough, the phrases *facere rememorationem* and *cum declaratum est* are specific to Michael Scot also when compared to the 12th-century translators of our present corpus.

(Aristotle's *De animalibus* 11–19 and the Long Commentary on *De caelo*)²⁶ and more than 10 times:

words and phrases specific to Michael Scot ²⁷
diversatur, fingere, carentibus, ingeniata, inopinabile, semper fuit, diximus superius, dare causam, fingere quod, dicendo quod, dignum est, hoc apparet, hanc opinionem, talis dispositionis, simpliciter aut, diversantur in, diversantur secundum, quod quodlibet, quod recte, sibi similibus, sit eadem, non diversantur, ideo si, communicationem cum, multi homines, perscrutari utrum, inter alia, quoniam forte, istius sermonis, causa istius, sunt eadem, locutus fuit, quaedam istorum, habet communicationem, dedit eis, non indiget, quodlibet istorum, iam diximus superius, super hoc est, est idem cum, nos videmus quod, et est dicere, quod est impossibile et, quoniam si ita esset, quod impossibile est quod, hoc manifestum est ex, manifestum ergo est quod, <i>non est rectum</i>

anonymous translation	words and phrases shared with Michael Scot
01-Aristotle, <i>Metaphysica</i> A, fragm.	ideo si (1), manifestum ergo est quod (1)
02-Alexander of Aphrodisias, <i>De intellectu</i>	quoniam si ita esset (1)
03-Anonymous, <i>Turba philosophorum</i>	
04-Alkindi, <i>De intellectu</i>	
05-Alkindi, <i>De mutatione temporum</i>	carentibus (1)
06-Alkindi, <i>De radiis</i>	
07-Alfarabi, <i>De intellectu</i>	
08-Alfarabi, <i>Liber excitationis</i>	hoc apparet (1), multi homines (1)
09-Alfarabi, <i>De scientiis</i>	
10-Ps.-Alfarabi, <i>Flos</i>	
11-Alfarabi, <i>Quintus liber</i>	
12-Ps.-Alfarabi, <i>De ortu scientiarum</i>	
13-Iḥwān al-Ṣafā', <i>In artem logicae demon.</i>	
14-Iḥwān al-Ṣafā', <i>Cosmographia</i>	quodlibet istorum (2)
15-Anonymous, <i>De 4 confectionibus</i>	
16-Isaac Israeli, <i>De definitionibus</i>	

26 With the exception of the words and phrases *inopinabile*, *semper fuit* and *manifestum ergo est quod*, which appear only in one of the two translations by Michael Scot.

27 See Hasse, *Stylistic Evidence*, pp. 36–9, for the attribution of the translation of Alhazen's *Liber Aboali* to Michael Scot. This attribution finds further support in the Michael Scot catchwords of the philosophical corpus, of which the *Liber Aboali* contains the following: *diversatur* (7), *diximus superius* (1), *non diversantur* (2), *et est dicere* (1).

17-Avicenna, <i>Logica, Isagoge</i>	dicendo quod (1), inter alia (1), est idem cum (2)
18-Avicenna, <i>Physica</i> I–III	dignum est (2), hanc opinionem (1), simpliciter aut (2), multi homines (2)
19-Avicenna, <i>De diluviis</i>	inopinabile (2), semper fuit (1), <i>non est rectum</i> (1)
20-Algazel, Prologue to <i>De intentionibus</i>	

As was shown in the paper on the astronomical/astrological corpus, Michael Scot's technical and non-technical vocabulary is to a certain degree similar to that of Gerard of Cremona, and perhaps influenced by him. This is confirmed in the present paper by the fact that some Gerardian catchwords had to be sorted out because they turned out to be stylistic preferences also of Michael Scot: *et propter illud, per sermonem, demonstratio super, quoniam quando* and *neque est*.²⁸ Moreover, I found that the same holds for some Gundisalvian catchwords that could not be used for the analysis because they are typical also of Michael Scot: *et deinde, tunc esset, est hoc quod, non est necesse* and *in actu*.²⁹ It seems that Michael Scot knew the vocabulary of Gerard and Gundisalvi very well, who were his predecessors not only as Arabic-Latin translators, but also as canons of Toledo cathedral. This may help to explain the occasional 'Michael Scotian' terms in the translations of Avicenna's *Isagoge* and *Physica*, two texts which are otherwise replete with truly Gundisalvian catchwords.

Let us return to *De diluviis*. It is remarkable that the term *inopinabile* appears twice in this text, since it is never used by any other translator in the two corpora and since it is a very regular term of Michael Scot's Averroes translations: *inopinabile* or *inopinabilitas* appear 17 times in the Long Commentary on *De caelo*, 18 times in the Long Commentary on *De anima*, 80 times in the Long Commentary on the *Physics*, 24 times in the Long Commentary on the *Metaphysics*, and once in the Compendium on the *Parva naturalia*. Michael Scot here renders the Arabic adjectives *šani* 'or *mustašna* ('absurd', 'nonsensical'), or the noun *šanā'a* ('absurdity'), or the adjective *nakīr* ('reprehensible'). In *De diluviis*, the Arabic term in both passages is *mustankar* ('objectionable'). Other translators of these Arabic phrases prefer other terms like *absurdus*, *absurditas*, *abominabilis* (Gundisalvi) or *repugnans* (William of Luna) instead.³⁰

There is more evidence that Michael Scot was the translator of *De diluviis* when we turn to rarer stylistic phrases of known translators that appear less

28 See n. 14 above.

29 See n. 19 above.

30 See the *Arabic and Latin Glossary*, s.v.

than 10 times, counting both corpora. To increase the textual basis, I have added Michael Scot's translation of the Long Commentary on *De anima* to the corpus:

	Avicenna, <i>De diluviis</i> : rare stylistic terms shared with known translators
Adelard of Bath	–
John of Seville	–
Plato of Tivoli	–
Hermann of Carinthia	–
Hugo of Santalla	et omnia huiusmodi (3 occ. in translations by Hugo / 1 occ. in this text)
Gerard of Cremona	particulare et (3/1), ut eveniat (3/1), fuit in primis (4/1)
Dominicus Gundisalvi	retinente (3/1), illa proprietates (6/2), sunt tales (4/1), quod omnes sunt (7/2), si quis dixerit (7/1), quis dixerit quod (6/1), est fortius et (4/1), si quis dixerit quod (5/1)
Alfred of Shareshill	–
Michael Scot	quoniam multa (4/1), ista igitur (8/1), cum causis (3/1), et congregatio (3/1), quoniam quemadmodum ³¹ (11/1), rectum dicere (6/1), forte igitur (5/1), aut duo (4/1), semper fuit in (7/1), bene scimus quod (6/1), et si quis (6/1), et maxime quia (5/1), non est inopinabile (8/2), est rectum dicere (4/1), enim est necesse (4/1), et si verum (3/1), quod dicunt de (4/1), omnia enim ista (3/1), dixerit quod est (3/1), si igitur est (4/1), et non est rectum (5/1), non est rectum dicere (4/1), non enim est necesse (3/1), in hoc quod dicunt (3/1), hoc quod dicunt de (3/1), et non est inopinabile (4/1), et nos bene scimus quod (3/1)

The usage of rarer stylistic terms again points clearly to Michael Scot as translator of *De diluviis*. Note that I was not able to isolate textual parallels with Alfred of Shareshill's two translations even with this fine-grained method of analysis. If we put all the evidence together, including the negative evidence from the other translator tables, it can safely be concluded that *De diluviis* was a translation by Michael Scot.

A related case is the first anonymous text on the list: the anonymous translation of the beginning of Aristotle's *Metaphysics*, book Alpha Meizon, a very brief text of 562 words (which is also called *Metaphysica Vaticana* by modern scholars, because it survives in a single manuscript which is now in the Vatican

31 The phrase *quoniam quemadmodum* does not appear in Michael Scot's translator table above because 9 of its 11 occurrences come from the Long Commentary on *De anima*, which is considered only in tables on rare terms.

library). Perhaps because of its brevity, it has left blank fields in all translator tables discussed in this paper, save for the one phrase *manifestum ergo est quod*, which only appears in Michael Scot. A systematic search for rare stylistic terms in both corpora yields the following result:

	Aristotle, <i>Metaphysica</i> A: rare stylistic terms shared with known translators
Adelard of Bath	–
John of Seville	–
Plato of Tivoli	–
Hermann of Carinthia	–
Hugo of Santalla	–
Gerard of Cremona	nam ipse (7 occ. in translations by Gerard / 1 occ. in this text), quando volumus (5/1), tunc dicimus (4/1), experimentum et (4/3), et per causam (3/1), est quod ille (3/1)
Dominicus Gundisalvi	est ordinatio (3/1), significatio huius (3/1)
Alfred of Shareshill	–
Michael Scot	experimentatur (3/1), bene dixit (9/1), est innatum ³² (14/1), accidit quia (3/1), et ideo si ³³ (16/1), sed tantum in (5/1), tantum et causa (4/1)

At first sight, it may seem as if both Gerard of Cremona and Michael Scot are likely candidates for being translators of *Metaphysics* Alpha Meizon. At closer inspection, the evidence favours Michael Scot. For there are three phrases in this very short text that are exclusive to Michael Scot and that appear very often in his translations (counting his translations of Aristotle's *De animalibus* 11–19 and of Averroes' four long commentaries): *manifestum ergo est quod* (12 occurrences), *est innatum* (54) and *et ideo si* (45).³⁴ I have not been able to isolate such very regular, typical and exclusive terms of Gerard of Cremona in *Metaphysics* Alpha Meizon, in spite of the fact that there is extensive Gerardian

32 Just as the phrase *quoniam quemadmodum* in *De diluviis*, the phrase *est innatum* does not appear in the translator table for Michael Scot because 9 of these 14 occurrences come from the Long Commentary on *De anima*, which is not considered in the translators' tables. The same applies to *et ideo si* (6 times in the Long Commentary on *De anima*).

33 See preceding note.

34 It is true that *innatum* once appears also in *De radiis* ('innatum sciendi desiderium') and in a passage with similar content as in *Metaphysics* Alpha Meizon ('desiderium sciendi est innatum'), as C. Martini has pointed out (Martini, *The Arabic Version*, p. 189), but *innatus* as such is not exclusive to *De radiis*, but also appears in translations by Hugo of Santalla and Michael Scot. The same is true of another term shared by *De radiis* and *Metaphysics* Alpha Meizon: *ex defectu*, which is also found in translations by Hugo of Santalla and Dominicus Gundisalvi.

material in the two corpora. The most regular Gerardian phrase in *Metaphysics* Alpha Meizon is *nam ipse* with 7 occurrences in Gerard's translations.

It is more probable, therefore, that Michael Scot was the translator of *Metaphysics* Alpha Meizon. Note that Michael Scot was the translator also of Averroes' Long Commentary of the *Metaphysics*, which includes Aristotle's text. But the *Metaphysics* text of Averroes' commentary misses out most of book Alpha Meizon, which is badly transmitted in Arabic. It is probable that Michael Scot was aware of this lacuna, that he looked out for an Arabic manuscript with Alpha Meizon and started to produce a translation when he got access to it.

1.7 Uncertain Translators

At the end of this philological analysis let us turn to those anonymous texts for which no translator has as yet been suggested in this study: Anonymous, *Turba philosophorum* (18.681 words), Alkindi's *De mutatione temporum* (9.988), Alkindi's *De radiis* (9.150), Alfarabi's *Liber excitationis ad viam felicitatis* (6.567), Alfarabi's *Quintus liber* (2.257), Iḥwān al-Ṣafā's *Cosmographia* (4.720) and Algazel's Prologue to *De philosophorum intentionibus* (414). In all these cases the regular terms specific to the translators do not yield conclusive results. Nor do the rarer stylistic terms, as the following tables show:

	Anonymous, <i>Turba philosophorum</i>: rare stylistic terms shared with known translators
Adelard of Bath	tabulae (9 occ. in translations by Adelard / 1 occ. in this text)
John of Seville	in perfectionem (10/1), dixerunt philosophi (6/1), hoc pone (6/1), omnes sapientes (5/2), propior quam (4/1), deinde fiunt (3/1), quousque non (3/1), non iungitur (3/1), residuum quod (3/1), his esse (3/1), quod ascendit ab (3/1)
Plato of Tivoli	coadunati (3/1), hoc igitur in (3/1)
Hermann of Carinthia	resque (4/1)
Hugo of Santalla	nuncupant (9/1), introduxit (7/2), easque (6/1), protulit (6/2), obviante (5/1), introducit (5/1), praescriptam (5/1), largiuntur (4/2), describe (4/1), ablato (3/1), extrahi (3/1), agnoscatur (3/1), imminet (3/2), reduxit (3/1), multiplicat et (6/1), ad unius (5/1), proprio in (4/1), hac enim (3/1), ea namque (3/2), his namque (3/1)

Gerard of Cremona	reiterabo (3/2), partem unam (45/4), operatus est (8/2), qualiter fit (6/1), rei unius (5/1), in ratione (4/1), age et (4/2), non moritur (4/1), dicam in (4/3), sursum ad (4/2), ipsum semper (3/1), inquit philosophus (3/1), quod vos (3/1), nostrum in (3/1), multiplicatur illud (3/1), non ingreditur (3/1), partem unam et (31/3), est et facta (3/1), hoc autem est quod (7/1), quid est quod est (3/1)
Dominicus Gundisalvi	occupatur (10/1), prosunt (8/1), miror (7/2), numquid (6/4), consecutus (5/1), intendi (4/1), tuis (4/3), praedixisti (3/1), dicam igitur (10/3), non coniunguntur (9/1), sed id (8/1), enim una (7/1), cur ergo (6/2), fiat hoc (6/4), autem ipsum (5/1), non video (5/2), fiunt unum (5/1), quae omnia (5/1), cum tamen (5/2), est ego (4/1), ipsum totum (4/2), quod dicis (4/1), non prodest (4/1), omnibus praemissis (3/1), eo tantum (3/1), dixisti et (3/4), ideo dico (3/1), dictis quod (3/1), ponatur illa (3/1), perficiuntur nisi (3/1), hoc te (3/1), putat se (3/1), coniuncta sunt (3/1), iam aliquid (3/1), ipso si (3/1), quod non erat (10/1), et inter se (4/1), eo quod id (4/2), est quam quod (4/2), quod una res (4/1), non enim oportet (4/1), omnia et in (3/1), unum sunt et (3/1), ex quibus quaedam (3/1), se eo quod (3/1), autem haec omnia (3/1), his quae diximus (3/1), non variatur nec (3/1), et fit hoc (3/1), eo est et (3/1), est a se (3/1)
Alfred of Shareshill	–
Michael Scot	congregavit (4/1), carentes (4/2), perpetuam (3/1), in hac dispositione (7/2), non exit ex (6/1), cum dixit in (6/1), et quemadmodum in (4/1), et quod nullum (4/1), non fit absque (3/2)

The translator of *Turba philosophorum* may be Gundisalvi, but it is also possible that the translator is not identical with any known translator of the corpus. The rather long text of the *Turba* (18.681 words) shares terms and phrases with many known translators. Since the *Turba* is a treatise on alchemy in the first place, which incorporates much philosophical material, it is to be expected that more can be said on the translator by way of a comparison with a corpus of alchemical translations.

	Alkindi, <i>De mutatione temporum</i> : rare stylistic terms shared with known translators
Adelard of Bath	adde supra (3 occ. in translations by Adelard / 2 occ. in this text)

John of Seville	duraverint (4/1), minuentur (4/1), duratio (3/1), dirigantur (3/1), accipe a (9/4), plus erit (7/1), iunctus fuerit (6/1), et aspexerit (6/1), quantum plus (5/1), non ceciderit (5/1), deinde aspice (5/1), et divide (5/1), accipe in (4/1), succedit in (4/1), proice ab (4/1), praecedentibus et (3/1), suo erit (3/1), pone eum (3/1), fuerint directi (3/4), et operare (3/2), voluerit de (3/1), fuerint in uno (8/1), in hac differentia (4/1), et proice ab (4/1), et quantum plus (4/1), suo et in (3/1), ibi erit pars (3/1), si fuerit de (3/4), quando erit in (3/1), et cum volueris scire (5/2), et si fuerit haec (3/1), et si fuerit cum (3/1)
Plato of Tivoli	in istarum (3/1), cum multiplicatione (3/1)
Hermann of Carinthia	–
Hugo of Santalla	quoslibet (4/1), consummationis (3/1), enim sub (6/1), terminabitur numerus (4/3), si itaque (3/2), ubi terminabitur (3/4), applicans aut (3/1), applicet et (3/1), cui applicat (3/1)
Gerard of Cremona	praemittam (7/1), expansi (7/1), approximatus (6/1), credulitatis (6/1), antecedentibus (4/1), perscrutabor (3/1), sermone aggregato (10/1), scit eam (9/1), ante nos (7/1), praecessit scientia (6/1), addens in (5/3), perscrutationis et (5/1), suam a (5/1), secundum communitatem (5/1), indigemus in (4/1), quo indigemus (3/1), suas ex (3/1), deinde ponam (3/1), dixi in (3/1), sua tunc (3/1), si inveniimus (3/1), et applicetur (3/1), plus quam sit (8/1), in qua erit (5/1), et quando erit (3/4), est quando sunt (3/1), iam praecessit scientia (3/1), ordine suo et (3/1), plus quam sit in (3/1)
Dominicus Gundisalvi	inspice (5/17), imposuerunt (3/1), generalitate (3/1), variabilis (3/1), sicut dixisti (9/1), et constat (7/1), scias etiam (5/2), illa nec (4/1), et debilius (4/1), illi simile (3/1), quandoquidem ita (3/1), sciatur quod (3/1), erit sibi (3/1), dixi de (3/1), quo posuerunt (3/1), ab illa et (8/1), in illis et (8/1), est quam quod (4/1), scias etiam quod (4/2), fuerit in se (3/1), et quandoquidem ita est (3/1)
Alfred of Shareshill	–
Michael Scot	figurantes (3/1), apparentiam (3/1), et quilibet (8/1), aut ambo (7/2), istius partis (6/1), poneretur in (5/1), secundum istam (5/1), dico in (4/3), manet in (4/1), ista parte (4/1), alia via (3/1), istam naturam (3/1), simplicibus non (3/1), multitudo et paucitas (7/1), etiam et si (4/1), sed in aliis (3/1), in rei veritate et (4/1), in se et cum (3/1)

Alkindi's *De mutatione temporum* is a text on weather forecasting with much meteorological and astrological vocabulary. It contains many astrological content terms and phrases (that do not appear in this table with stylistic phrases), most of which are highly specific to John of Seville. This is noteworthy since with Adelard of Bath, Plato of Tivoli, Hermann of Carinthia and Hugo of Santalla there are other translators of astrology in the corpus. Apart from this link to John of Seville, however, there is not much that can be said about the translator, since both the regular and the rare stylistic terms show similarities with John of Seville's, Gerard's, Gundisalvi's and Michael Scot's translations.

	Alkindi, <i>De radiis</i>: rare stylistic terms shared with known translators
Adelard of Bath	–
John of Seville	scrutati (5 occ. in translations by John / 2 occ. in this text), inventas (5/1), significat quoque (6/1), concordant cum (5/4), ratione usi (4/1), significacione et (4/1), sapientibus et (3/1), per opus (3/2), ut fiat et (3/1)
Plato of Tivoli	in se continet (9/1)
Hermann of Carinthia	adicit (7/1), indagine (5/1), crebris (4/2), causas existere (3/1), ut nunc (3/1), omnes alias (3/1)
Hugo of Santalla	expressius (10/2), carebit (8/1), efficaciae (6/4), proferatur (6/1), evidenter (6/3), deficiente (6/1), produci (5/1), mundanam (4/1), quoque de (10/1), supra de (9/2), ex propria (6/1), de ipsius (6/1), alia item (4/1), unde quaedam (4/1), hac enim (3/1), et ubique (3/1), omni aspectu (3/1), necesse est ad (3/1)
Gerard of Cremona	per artem (8/2), in ratione (4/1), nunc existens (4/1), rebus pluribus (3/1), reperiuntur per (3/1), factum est quod (5/1), in rebus aliis (4/2), quare non est (4/1), possibile ut fiat (4/1), ad res alias (3/1), in virtute sua (3/1)
Dominicus Gundisalvi	prosunt (8/1), manifestetur (8/1), causalitas (6/1), putativa (5/1), distans (4/1), audiuntur (4/1), habilior (4/2), aliud vel (10/1), praeter naturam (9/1), ad habendum (8/1), sciendum quod (7/1), est condicio (7/1), fuerunt autem (6/1), coniungi in (6/1), tali conditione (6/1), aliquibus et (6/1), recipit quam (6/1), naturale vel (5/1), est impressa (5/1), una species (5/1), respectum ad (5/1), cum tamen (5/4), singularibus non (4/2), speciei sed (4/1), apta est (4/1), sunt adeo (4/1), probatur in (3/1), non impeditur (3/1), putant esse (3/1), alio item (3/2), vel utrumque (3/1), respectus autem (3/1), intenditur non (3/1), provenit necessario (3/1), causatum per (3/1), quem intendit (3/2), quibus quaedam (3/1), sit exemplum

	quem intendit (3/2), quibus quaedam (3/1), sit exemplum (3/2), non quicquid (3/1), id quod intenditur (11/2), et alia huiusmodi (9/1), alia a se (6/1), differt ab alia (5/1), in aliquibus et (4/1), quod una res (4/2), non est impressa (3/1), est quod per (3/2), non per causam (3/1), illud cum autem (3/1), habilior est ad (3/1), in aliquo alio (3/1), non est autem hoc (4/1)
Alfred of Shareshill	–
Michael Scot	perscrutantes (5/1), iuvans (4/1), vulgariter (3/1), diversimode (3/2), generaretur (3/1), ista igitur (8/1), sicut habet (7/2), tota sua (6/2), sunt naturaliter (6/1), haec opinio (6/1), per exercitium (5/1), naturaliter scilicet (4/1), sic sit (4/1), sic universaliter (4/1), sic contingit (4/1), habent quaedam (4/1), suam opinionem (3/1), ex tali (3/1), ratione quia (3/1), de talibus (3/1), a tali (3/2), de possibili (3/1), hoc ratione (3/1), per suos (3/2), quod contingit ex (5/1), quandoque non et (4/1), in diversis locis (4/5), quibusdam et in (4/1), et ex iis (4/1), illud quod possibile (3/1), in aliquo modo (3/1), per quas fit (3/1)

Alkindi's *De radiis*, which does not seem to be extant in Arabic, is a treatise on the physics of the cosmos as constituted by rays issuing from the stars and the elements, and on the magic which can be based on these physics. This text contains regular stylistic phrases of only one translator, Gundisalvi: *sic ut* and *in plerisque*. As to the above table with rare stylistic terms, there is a tendency towards Gundisalvian vocabulary, which is underlined by the fact that the text contains many exclusively Gundisalvian phrases with the content term *effectus*.³⁵ There is, however, so much vocabulary shared with other translators in this text, especially with Michael Scot, that the translator cannot be determined with certainty. It is likely that more can be said on this issue if the text is compared to a corpus of magical translations from Arabic into Latin.

	Alfarabi, <i>Liber excitationis ad viam felicitatis</i> : rare stylistic terms shared with known translators
Adelard of Bath	habebitur (4 occ. in translations by Adelard / 8 occ. in this text)
John of Seville	facilitatis (3/1), prima facie (12/1), vocata est (7/1), uno ex (4/1), fuerit post ipsam (3/1)

35 The phrases are the following: *in effectum* (27/1), *effectu non* (20/1), *effectum non* (11/1), *effectu igitur* (8/1), *effectu cum* (6/1), *effectu secundum* (4/1), *effectum sicut* (4/2), *in effectum et* (6/1), *sunt in effectum* (6/1), *in effectum secundum* (4/1).

Plato of Tivoli	constituamus (6/1), periti (3/1), cavendum est (4/1)
Hermann of Carinthia	–
Hugo of Santalla	incurret (7/1), procedentis (5/1), asseruit (4/1), vitandum (3/1), alia item (4/1), in quo agitur (3/1)
Gerard of Cremona	necessitate quod (8/1), per artem (8/2), et ars (7/1), intendit ad (7/1), verumtamen in (6/2), ab extremitate (4/1), mente et (4/1), erunt apud (3/1), in eis per (7/1), inter duas extremitates (5/1), sit ex illis (3/2), est ut consideremus (3/1)
Dominicus Gundisalvi	acquiretur (8/1), negaverit (5/1), instituat (5/2), accedamus (3/1), immediate (3/1), divulgatum (3/1), omne id (10/1), nulla autem (9/1), actiones suas (9/1), multa sunt (5/1), nomen vero (5/1), unamquamque istarum (4/1), quod faciat (4/3), et acquiritur (3/1), quod has (3/1), quae intelliguntur (3/1), autem modo (4/1), agit non (3/1), est procedens (3/1), ars vero (3/4), intentio cum (3/1), non debeat (3/1), illarum sit (3/1), accidit sibi (3/1), aliquibus non (3/1), id per quod (17/1), hoc quod de (6/1), est id per (4/1), est et ad (4/1), quod dicimus de (4/1), omne id quod (4/1), et in aliquibus (3/2), est sed quod (3/1), est similiter et (3/1)
Alfred of Shaftesbury	–
Michael Scot	consimilitudo (7/2), a pluribus (8/1), per istam (6/1), multipliciter et (5/1), cum voluerint (4/1), modo possumus (4/2), amobus et (4/1), quod ars (4/1), cum contraria (4/1), per dispositiones (3/3), casu in (3/1), et istum (3/2), opinatur esse (3/1), cum habeat (3/1), et propter quid (10/1), oportet nos cum (3/1), et quod simile (3/1), istorum modorum habet (3/1), propter quid est (3/1), hoc non indiget (3/1), in quibusdam et in (4/1)

The translation of Alfarabi's *Liber excitationis ad viam felicitatis*, a propaedeutic introduction to ethics, contains regular stylistic terms by Hugo, Gerard, Gundisalvi and Michael Scot, as well as rare stylistic terms in greater number by Gerard, Gundisalvi and Michael Scot. The translator cannot be determined on these grounds.

	Alfarabi, <i>Quintus liber</i>: rare stylistic terms shared with known translators
Adelard of Bath	non dissimiliter (3 occ. in translations by Adelard / 1 occ. in this text)
John of Seville	universarum (6/2)
Plato of Tivoli	metiendi (6/1)

Hermann of Carinthia	minoris cum (5/1)
Hugo of Santalla	expressam (4/1), recurrendum (4/1), interserens (3/1), tali ordine (4/1), ea siquidem (3/1), cuius rei exemplum (6/1)
Gerard of Cremona	notiora (5/1), ad utrasque (5/1), sint species (4/1), ut utraque (4/1), quid ipsa (4/1), inveniuntur enim (3/1)
Dominicus Gundisalvi	communioris (8/1), assignata (4/1), est certa (8/1), oppositum est (6/1), totum habet (4/1), etiam fiet (4/1), se intelligere (4/1), ad assignandum (3/1), et alia huiusmodi (9/2), in illis et (8/1), idem est quod (7/2), sub eodem genere (5/1)
Alfred of Shareshill	–
Michael Scot	terminamus (3/1), dicens hoc (7/1), apparet hic (5/1), innuit quod (3/1), sit consimilis (3/1), aliquod genus (3/1), est possibile nisi in (3/1)

Alfarabi's *Quintus liber* is a commentary on the postulates of the fifth book of Euclid's *Elements* (2.257 words). Of the regular terms specific to the translators, this text only contains Gundisalvian material, the phrases *vel est* (1) and *ullo modo* (1). The above table with rarer stylistic phrases, however, is ambiguous. The translator of this text therefore remains uncertain.

	Ḥwān al-Ṣafāʾ, <i>Cosmographia</i>: rare stylistic terms shared with known translators
Adelard of Bath	–
John of Seville	minuentur (4 occ. in translations by John / 1 occ. in this text)
Plato of Tivoli	–
Hermann of Carinthia	prosequi (3/1)
Hugo of Santalla	–
Gerard of Cremona	et partibus eius (7/1), et quot sint (3/1), quod sit necessarium (3/1), et ex ea est (3/1), fuerunt qui dixerunt quod (11/1)
Dominicus Gundisalvi	distans (4/1), amodo (4/1), sciendum quod (7/1), sic ad (3/1), appareat et (4/1), et loqui (3/1)
Alfred of Shareshill	ut plurimum (5/6)
Michael Scot	operationibus et (7/1), sunt naturaliter (6/1), modus secundum (5/1), incipiamus modo (3/1), iuvandum et (3/1), positi in (3/1), est intelligenda (3/1), nos loqui (3/1), et propter multitudinem (6/1), et quodlibet istorum (6/1), et sic oportet (4/1), inter ista duo (3/1), ista duo scilicet (3/1), et principium eorum (3/1)

The *Epistola fratrum sincerorum in cosmographia* is a translation of a treatise on geography, which forms the fourth letter of the encyclopedia of the Iḥwān al-Ṣafā'. The above tables on regular phrases have unearthed some faint resonance of vocabulary with Hugo of Santalla (*ut inde*), Gerard of Cremona (*nam quando*) and Michael Scot (*quodlibet istorum*), while the rare stylistic phrases have a tendency towards Michael Scot.³⁶ This evidence does not allow the identification of the translator.

	Algazel, Prologue to <i>De intentionibus</i> : rare stylistic terms shared with known translators
Adelard of Bath	–
John of Seville	–
Plato of Tivoli	–
Hermann of Carinthia	–
Hugo of Santalla	controversiam (3 occ. in translations by Hugo / 1 occ. in this text)
Gerard of Cremona	ponam itaque (6/1), speculatio in (6/1), plurimum vero (4/1), deus gloriosus (3/1)
Dominicus Gundisalvi	ostendam tibi (4/1), et naturalibus (3/1)
Alfred of Shareshill	–
Michael Scot	opinionum (4/1), corruptum in (9/1)

This extremely short text of 414 words, a translation of Algazel's prologue to the *Maqāṣid al-falāsifa* (*Intentions of the Philosophers*), does not yield enough stylistic evidence for any of the translators of the corpus. Hence, for these six texts, the translator cannot be determined with certainty or with some probability. There is hope that the extension of the textual corpus towards magic and alchemy as well as towards other centuries and areas will offer more evidence eventually.

The overall result of the philological analysis presented so far can be summed up as follows:

anonymous translation	Alonso	translator based on analysis of particle usage
01-Aristotle, <i>Metaphysica</i> A, fragm.		probably Michael Scot
02-Alexander of Aphrodisias, <i>De intellectu et intellecto</i>	Gundisalvi	Gundisalvi

³⁶ On the unknown translator and date of this translation see also Gautier Dalché, *Epistola*, 146–8.

03-Anonymous, <i>Turba philosophorum</i>		?
04-Alkindi, <i>De intellectu et intellecto</i>	Gundisalvi	probably Gundisalvi
05-Alkindi, <i>De mutatione temporum</i>		?
06-Alkindi, <i>De radiis</i>		?
07-Alfarabi, <i>De intellectu et intellecto</i>	Gundisalvi	Gundisalvi
08-Alfarabi, <i>Liber excitationis</i>	Gundisalvi	?
09-Alfarabi, <i>De scientiis</i>	Gundisalvi	probably Gundisalvi
10-Ps.-Alfarabi, <i>Flos</i>	Gundisalvi	Gerard of Cremona
11-Alfarabi, <i>Quintus liber</i>		?
12-Ps.-Alfarabi, <i>De ortu scientiarum</i>		probably Gundisalvi
13-Iḥwān al-Ṣafā', <i>In artem logicae demon.</i>	Gundisalvi	Gundisalvi
14-Iḥwān al-Ṣafā', <i>Cosmographia</i>		?
15-Anonymous, <i>De 4 confectionibus</i>		very probably John of Seville
16-Isaac Israeli, <i>De definitionibus</i>	Gundisalvi	probably Gundisalvi
17-Avicenna, <i>Logica, Isagoge</i>	Gundisalvi	Gundisalvi
18-Avicenna, <i>Physica I–III</i>	Gundisalvi	Gundisalvi
19-Avicenna, <i>De diluviis</i>		Michael Scot
20-Algazel, Prologue to <i>De intentionibus</i>		

Upon the evidence of particles and stylistic terms, Dominicus Gundisalvi was clearly the translator of five anonymous translations, probably of nine. One translation, that of Ps.-Alfarabi's *Uyūn al-masā'il*, comes from Gerard of Cremona. One translation, that of *De quatuor confectionibus*, in all likelihood comes from John of Seville. One translation, that of Avicenna's *De diluviis*, comes from Michael Scot, as probably also does the translation of *Metaphysics Alpha Meizon*. Note that Manuel Alonso is proved right on several cases, but that he did not detect Gerard of Cremona's hand in Ps.-Alfarabi's *Flos*, since he concentrated on Gundisalvi's vocabulary only.

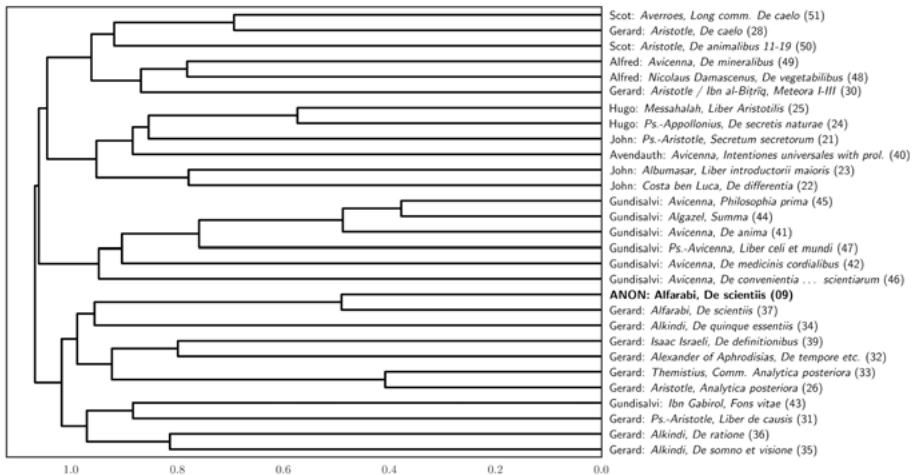
2 Computational Stylometry

The above results can be confirmed to a significant degree by a computational analysis of the authorship of our texts. Our analysis follows, in principle, the idea of John Burrows that authorship can be determined computationally by comparing the standardized relative frequencies of the most frequent words of individual texts.³⁷ By now, there are several implementations of the method

37 Burrows, 'Delta': a Measure of Stylistic Difference, pp. 267–87.

available: A very user-friendly graphical interface is included in the ‘Stylo’ R-package by Maciej Eder and Jan Rybicki,³⁸ whereas our own implementation in Python owes much to Fotis Jannidis’ ‘pydelta’. When we began to analyse the text corpus computationally, we were not entirely optimistic that we would achieve results, because it was unclear whether the author signal would over-trump the translator signal. In an earlier study, Rybicki had tried to identify English-Polish, French-Polish, French-English and English-French translators by comparing the usage of the most frequent words.³⁹ But his disappointing conclusion was that translators are condemned to stylometric invisibility. Multivariate analysis of most frequent words cannot tell translator from translator, because the texts usually cluster around the author rather than the translator. Fortunately, however, this does not seem to be true for translations from Arabic into Latin—possibly because the linguistic differences between the Semitic and Indo-European languages block author signals, or perhaps because the scientific translations do not restrict the style of the translator to the same degree as the literary translations Rybicki was working with.

Plot 1



In a first step, we analysed only that part of our corpus for which the translators are known, that is, texts 21 to 51. The computational analysis of the stylistic similarities between these texts, as based on the frequency of occurrence of

38 The script was published in 2011 in a Stanford paper and is since freely available on the net. See Eder and Rybicki, *Stylometry with R*, pp. 308–11. I am grateful to Fotis Jannidis for directing my attention to ‘Stylo’ and for introducing me to computational stylistics in general.

39 Rybicki, *The Great Mystery*, pp. 231–48.

the 500 most frequent words, delivered the above dendrogram (Plot 1). The dendrogram is a graphic expression of the grouping of the texts in the corpus according to the distance measured between them. It turns out that the clustering represented in Plot 1 is affected by two serious problems, one of which we illustrate by including text 9, the anonymous translation of Alfarabi's *De scientiis*. This translation groups together with text 37, which is Gerard of Cremona's translation of the same text. As was mentioned above, the anonymous translation very likely is a revision of Gerard's. For stylometry, this has the detrimental effect that the common content covers up the stylistic differences. The same problem applies to texts 36 (Alkindi's *De ratione*) and 39 (Isaac's *De definitionibus*), which can be expected to show a similar stylometric affinity with their anonymous revisions, texts 4 and 16 respectively. To avoid the disturbing influence of common content in two texts, we decided to remove all these texts from our corpus for the purpose of stylometric analysis.

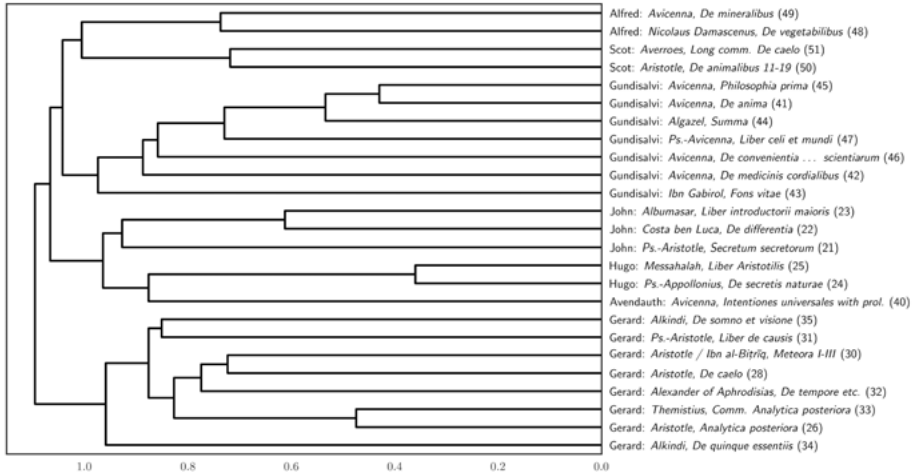
The second problem is the influence of scientific subdisciplines. Text 21 (Ps.-Aristotle's *Secretum secretorum*), for example, does not group with the other translations of John of Seville, but is situated in vicinity to text 24 (Ps.-Apollonius' *De secretis naturae*), obviously because both texts border on philosophy and the occult sciences. A quick glance at the wordlist that produced the clustering of Plot 1 reveals the reason for this: Even among the 100 most frequent words of the corpus are words like *anima, corpus, causa, forma, potentia, substantia, materia, tempus, aqua, natura*. The only way to eliminate the influence of these content words was to remove them from the wordlist. Since we did not want to select the features by hand, our aim was to develop an automatic procedure.⁴⁰ The procedure chosen is based on the idea that nouns and adjectives carry more content information than conjunctions or pronouns and that content words and non-content words can be differentiated by the part of speech they represent. By using the parts of speech classification of a Latin-English dictionary⁴¹ we were able to tag each Latin word with its most probable part of speech. Even if this procedure was far from a rigorous morphological and grammatical analysis, it produced sufficiently accurate results for improving the classification of the texts. Based on an evaluation of all possible combinations of parts of speech and different lengths of the wordlist, we decided to take the 2000 most frequent words and keep only those words that were classified as 'adverb', 'conjunction', 'packon' (*quidam, unaquaeque, ...*), or 'pronoun', and those words that were in the dictionary but without any parts of speech classification (*qui, se, aliquid, ...*).

40 If the corpus is large enough, this can be achieved by machine learning, as shown by A. Büttner and T. Proisl in Büttner et al., 'Delta' in der stilometrischen Autorschaftsattribu-tion, section 4.

41 William Whitaker's Words (<http://mk270.github.io/whitakers-words>).

As soon as we took out the double translations and constrained the wordlist to the aforementioned parts of speech, the analysis delivered the following satisfactory dendrogram (Plot 2):

Plot 2



In principle, this method is able to differentiate between the translators Gundisalvi, Gerard, Alfred, Michael Scot and one group consisting of John of Seville, Hugo and Avendauth, if we cut the branches at the 1.0 mark. It is encouraging that Alfred's translation of the section *On Stones and Minerals* of Avicenna's *al-Šifā'* does *not* group together with the many other translations of Avicenna's *al-Šifā'*, which were produced by Gundisalvi. The author signal in this case is weaker than the translator signal. The strongest similarity in the corpus exists between the two translations by Hugo of Santalla, which is not surprising given that Hugo is a very idiosyncratic stylist, as we have seen above.

Some brief comments on the statistical parameters which produce this dendrogram are necessary. The translator attribution rests on an analysis of the most frequent 2000 words, from which the words belonging to the aforementioned parts of speech are selected, thereby producing a list of 273 words.⁴² In the

42 In order of descending frequency: et, quod, non, quae, ut, hoc, autem, eius, quia, ergo, si, sed, sicut, aut, enim, nisi, eo, qui, vero, illud, uel, quoniam, tunc, etiam, eorum, scilicet, quam, eis, ei, ipsum, super, ea, haec, quo, iam, nec, quaedam, se, ipsa, igitur, quando, id, quidem, neque, eam, similiter, aliquid, nos, ita, deinde, eorum, quibus, iterum, quoque, illa, qua, atque, cuius, unde, sic, tamen, modo, illius, quare, ideo, huius, nam, ipsius, quasi, nobis, quamvis, ipse, quid, eum, his, omnino, eas, dum, sui, quidam, illo, ipso, magis, aliquo, nunc, sibi, aliqua, hunc, hic, item, siue, quem, semper, ac, huiusmodi, hanc, illis, postquam, illi,

computation, each text in the corpus is mathematically represented as a vector containing the standardized relative frequencies of these words (z-scores). The distance between the vectors is then calculated using Cosine Delta. This distance measure has recently been shown to yield the best attribution results of all current Deltas,⁴³ and we too gained much better results with Cosine Delta than with other distance measures tested. The distances are then used to construct hierarchical clusters by iteratively combining the two texts with the smallest distance between each other into a cluster, which is then compared to the remaining texts (or clusters of texts) until all texts and clusters are connected.⁴⁴ These clusters are visualized in the dendrogram by representing the distances between text and text, text and cluster, or cluster and cluster as vertical connections. The position of these connections in relation to the x-axis indicates the values of the distances.⁴⁵

We chose this selection of texts and this set of words as our calibrated standard. Once we had this standard, we could add anonymous translations.

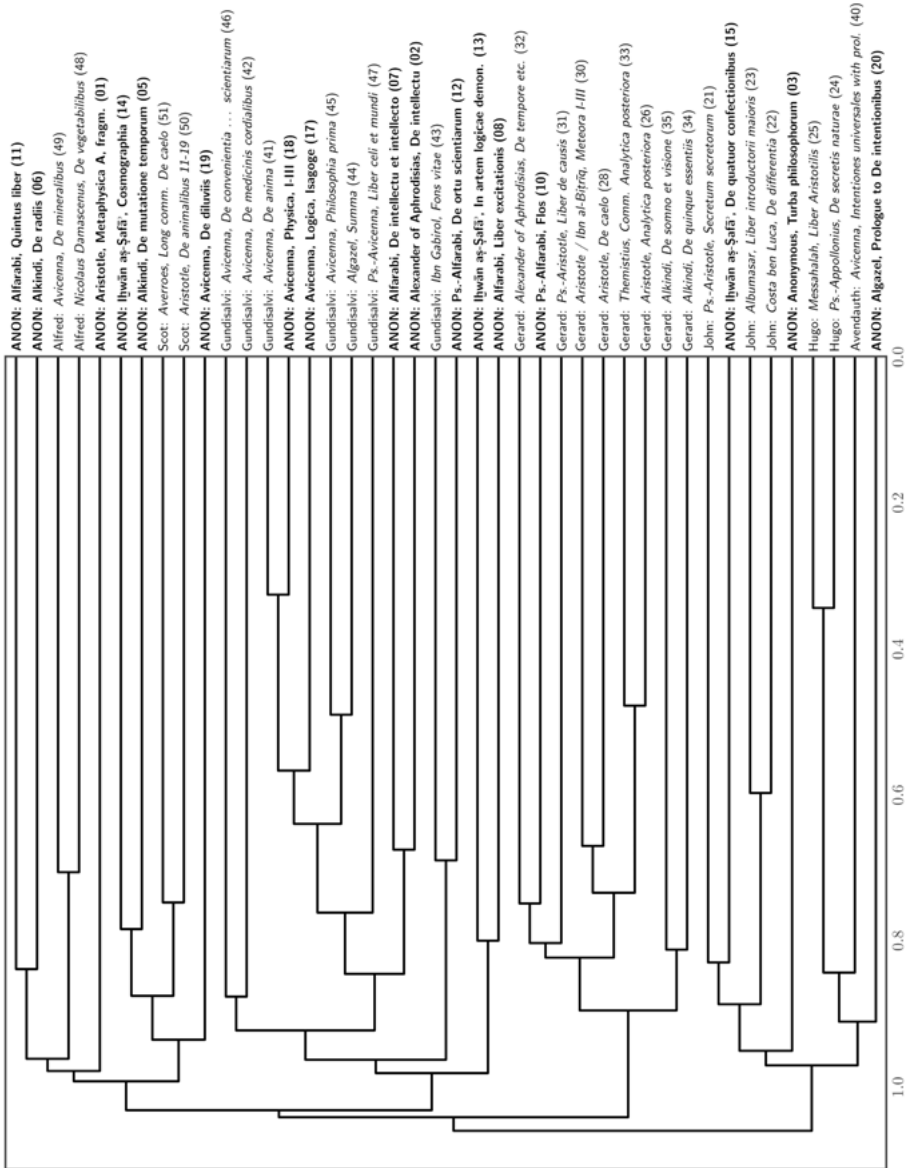
quibusdam, idest, ipsam, an, quarum, quomodo, propterea, mihi, hac, cui, quas, quorum, ille, quicquid, postea, usque, invicem, donec, simul, videlicet, namque, aliquando, eos, illum, verumtamen, immo, inde, quandoque, huic, aliquis, iste, eodem, ista, eadem, horum, ipsi, eiusdem, vis, illam, ubi, itaque, me, aliquod, bene, sursum, valde, idem, ne, quos, tibi, quis, ibi, naturaliter, alicuius, ipsis, antequam, quemadmodum, amplius, qualiter, vult, proculdubio, harum, ipsae, quin, hae, quinque, istae, aliquam, rursus, deorsum, istorum, inquantum, istius, alicui, aequaliter, illic, has, te, aliquem, licet, tandem, illorum, iis, uniuscuiusque, tu, ipsorum, illas, quousque, consequenter, etenim, unumquodque, fortassis, ipsas, istud, ultimum, quapropter, illarum, fortasse, quadam, sicque, quarundam, aliter, unicuique, nondum, adhuc, tam, illae, statim, paulatim, unaquaeque, ibidem, aliquibus, mediante, pariter, ego, nimis, deinceps, istarum, at, eiusque, subito, unusquisque, quotiens, saepe, universaliter, quaelibet, quiddam, fere, etsi, quoddam, quorundam, siquidem, ipsarum, nostri, adeo, cuiusque, seipsam, intus, praeterea, cuiusdam, quasdam, numquam, saltem, simpliciter, quolibet, illos, qualibet, ideoque, cuidam, nuper, istum, nihilominus, tamquam, diligenter, eundem, uti, interim, vix, idcirco, essentialiter, quicquam, eidem, cur, eorumque, potissimum, indubitanter, seipso, prout, unamquamque, quodlibet, ipsos, seipsum, hos, vobis.

43 Evert et al., *Towards a Better Understanding*, pp. 79-88. The authors show that normalizing the word frequency vectors improves the accuracy of the method of authorship attribution.

44 The clusters are built according to the WPGMA-Algorithm: The distance between any element and a cluster is simply the arithmetic mean of the distances between the element and each of the constituents of the cluster.

45 Two very similar texts with z-score vectors pointing in the same direction would have a cosine distance of 0 and therefore be connected at 0. Two quite different texts with orthogonal z-score vectors would have a cosine distance of 1 and therefore be connected at 1.

Plot 3



In this dendrogram (Plot 3) the groups of texts of the calibrated standard remain largely intact. When studying the dendrogram from left to right, one can distinguish four different groups of texts: by Gerard, Gundisalvi, Alfred/Scot, and John/Hugo/Avendauth. The two groups with several translators nicely branch

out towards the right into subgroups for each of the translators: Alfred, Scot, John, Hugo, Avendauth.

Text 10 (Ps.-Alfarabi's *Flos*) can unambiguously be interpreted as Gerard of Cremona's translation, thus confirming the philological analysis of the present paper. Texts 2 (Alexander's *De intellectu*), 7 (Alfarabi's *De intellectu*), 17 (Avicenna's *Logica*) and 18 (Avicenna's *Physica*) can be ascribed to Gundisalvi with great certainty, again just as in the philological analysis above. Text 12 (Ps.-Alfarabi's *De ortu*) groups closely with Gundisalvi's translation of Ibn Gabirol. There are two translations which are only loosely associated with Gundisalvi: texts 8 (Alfarabi, *Liber excitationis*) and 13 (Iḥwān, *In artem logicae demonstrationis*).

Text 15 (Iḥwān, *De quatuor confectionibus*) is clustered together with John of Seville's texts, just as in the philological analysis above. Text 3 (Anonymous, *Turba philosophorum*) is vaguely associated with John's translations. Text 20 (Algazel's Prologue) is grouped with Avendauth, but this grouping is to be treated with much caution since both texts 40 and 20 are extremely short. Texts 5 (Alkindi's *De mutatione temporum*) and 14 (Iḥwān, *Cosmographia*) are loosely associated with Michael Scot's translations, as is text 19 (Avicenna, *De diluviis*), albeit with less certainty. Texts 1 (Aristotle, *Metaphysics* Alpha Meizon), 6 (Alkindi, *De radiis*) and 11 (Alfarabi, *Quintus liber*) are placed in the vicinity of Alfred of Shareshill, but much too loosely to allow for a translator attribution. All texts which are associated only vaguely with known translators may well be the translations of persons not known to us or not considered in this study.

Hence, in 6 of the 20 cases, we arrive at unambiguous results when analysing the texts computationally with the Delta method. The computer analysis of the distances between the most frequent word vectors results in the ascription of four anonymous translations to Dominicus Gundisalvi (texts 2, 7, 17, and 18), of one anonymous translation to John of Seville (text 15), and of one anonymous translation to Gerard of Cremona (text 10).

It is a very good sign that, whenever the computational analysis of most frequent words groups a text unambiguously with one translator, the result agrees with the philological analysis. In many cases, the details of the dendrogram—such as the weaker attributions to Alfred or Michael Scot, or the subgroups within Gundisalvi's and Gerard's translations—should be an occasion for further philological and stylometric studies. Finally, it is important not to take the results of the statistical analysis at face value just because of its apparent mathematical precision. There are many factors in the production and analysis of the corpus of translations that are dependent on decisions, starting with the compilation of the texts, the quality of the editions, the scans, the text recognition, the normalization of the orthography, and ending with selecting statistical methods and stylistic features for the analysis. Therefore, the results of a computational stylometric analysis are only valuable in an interplay with philological scrutiny.

3 Conclusion

The overall result of this study is summarized in the following table. Note that the conclusion, as presented in the column on the right, is more cautious and conservative than in earlier versions of this paper, as we have decided to present only those results of which we are fully convinced. The number of question marks indicates the degree of uncertainty.

anonymous translation	Alonso	statistical analysis (Cosine Delta)	conclusion based on analysis of particle usage
01-Aristotle, <i>Metaphysica</i> A, fragm.		Alfred???	probably Michael Scot
02-Alexander of Aphrodisias, <i>De intellectu et intellecto</i>	Gundisalvi	Gundisalvi	Gundisalvi
03-Anonymous, <i>Turba philosophorum</i>		John of Seville??	?
04-Alkindi, <i>De intellectu et intellecto</i>	Gundisalvi	—	probably Gundisalvi
05-Alkindi, <i>De mutatione temporum</i>		Michael Scot?	?
06-Alkindi, <i>De radiis</i>		Alfred??, similarities with 11	?
07-Alfarabi, <i>De intellectu et intellecto</i>	Gundisalvi	Gundisalvi	Gundisalvi
08-Alfarabi, <i>Liber excitationis</i>	Gundisalvi	Gundisalvi???, similarities with 13	?
09-Alfarabi, <i>De scientiis</i>	Gundisalvi	—	probably Gundisalvi
10-Ps.-Alfarabi, <i>Flos</i>	Gundisalvi	Gerard of Cremona	Gerard of Cremona
11-Alfarabi, <i>Quintus liber</i>		Alfred??, similarities with 06	?
12-Ps.-Alfarabi, <i>De ortu scientiarum</i>		Gundisalvi??, similarities with 42 (<i>Fons vitae</i> , transl. by Gundisalvi)	probably Gundisalvi
13-Iḥwān al-Şafā', <i>In artem logicae demon.</i>	Gundisalvi	Gundisalvi???, similarities with 08	Gundisalvi
14-Iḥwān al-Şafā', <i>Cosmographia</i>		Michael Scot?	?

15-Iḥwān al-Ṣafā', <i>De 4 confectionibus</i>		John of Seville	very probably John of Seville
16-Isaac Israeli, <i>De definitionibus</i>	Gundisalvi	—	probably Gundisalvi
17-Avicenna, <i>Logica, Isagoge</i>	Gundisalvi	Gundisalvi	Gundisalvi
18-Avicenna, <i>Physica</i> I–III	Gundisalvi	Gundisalvi	Gundisalvi
19-Avicenna, <i>De diluviis</i>		Michael Scot?	Michael Scot
20-Algazel, Prologue to <i>De intentionibus</i>		Avendauth/Hugo?	

The evidence for the translator ascriptions proposed in this paper is clearly much stronger than Alonso's evidence had been. Some of the evidence, such as for Dominicus Gundisalvi as the translator of Avicenna's *Physics*, is so overwhelming that we may safely call it conclusive. But it is not without reason that this study is called 'Notes'. It is impossible to provide full documentation of all the statistical material relevant for these attributions in one paper. Also, we believe that there is room for improvement both with the philological and the computational analysis.

The results are interesting in many historical and philological respects. It has turned out that Gerard of Cremona was responsible for the translation of Ps.-Alfarabi's *Flos* ('*Uyūn al-masā'il*'). This ascription is noteworthy because it demonstrates that Gerard of Cremona had translated more texts than those listed by his *socii* in the famous list of his translations, which they drew up after Gerard's death in 1187.⁴⁶ The result shows that we should be prepared to attribute more translations to Gerard of Cremona than previously known. The same is true of Michael Scot, whose translation of *De diluviis* (and probably also of *Metaphysics* Alpha Meizon) reminds us that Michael Scot may have been responsible for more translations, also outside the Averroes corpus.

Dominicus Gundisalvi's list of translations is now increased by five clear cases: Alexander's *De intellectu*, Alfarabi's *De intellectu*, the Iḥwān's *In artem logicae demonstrationis*, Avicenna's *Logica* and Avicenna's *Physica*. Four further translations are probably also by Gundisalvi. Dominicus Gundisalvi emerges from this study as one of the major Arabic-Latin translators of the Middle Ages, alongside other great names such as John of Seville, Gerard of Cremona and Michael Scot. Gundisalvi much contributed to the transport of Alkindi, Alfarabi and Avicenna into Latin culture. We know that, for some translations, Gundisalvi worked together with Arabic-speaking scholars, the Jew Avendauth and the Mozarab Johannes Hispanus. This may also have been the case for the anonymous translations that are attributed to Gundisalvi in this

46 Burnett, *The Coherence*, pp. 249–88.

paper. But in view of the great experience that he must have collected over the years and in view of the fact that his Latin style remains recognizable, one may surmise that he produced some translations by himself.

Dominicus Gundisalvi signs several Latin and Mozarabic charters between 1162 and 1190. He was archdeacon of Cuellar north of Segovia, but was resident in Toledo, where he was a canon of the cathedral. Gerard of Cremona was canon of this cathedral too, in the very same decades. The attribution of anonymous translations to Gundisalvi adds to the importance of Toledo, and in particular of the cathedral of Toledo, in the translation movement. Gerard of Cremona, of course, the translator of at least 70 texts from Arabic, among them great works of Greek and Arabic astronomy and medicine, remains the towering figure. But his fellow canon Gundisalvi also translated at least 12 texts—7 with explicit attribution and 5 that are firmly assigned to him in this paper. In contrast to Gerard, Gundisalvi was a philosophical and theological author in his own right. He was the translator and first reader of the translations at the same time. And in contrast to Gerard, Gundisalvi, when translating, was less interested in Greek authors transmitted in Arabic, but predominantly in Arabic philosophy proper. In this particular respect, he was very important for the history of philosophy of the Latin West.

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Avicenna's Influence on William of Auvergne's Theory of Efficient Causes

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William of Auvergne, bishop of Paris from 1228 until his death in 1249, was one of the first thinkers who had access to the Latin translation of the *Ilāhiyyāt* (*Metaphysics; Liber de philosophia prima sive scientia divina*) and the *Kitāb al-Nafs* (*Book on the Soul; De anima*) of Avicenna's philosophical summa *Kitāb al-Šifā'* (*Book of the Cure*).¹ He discussed Avicennian theories especially in his *De trinitate*, *De universo* and *De anima*. These three works constitute the so called *primum magisterium*, that is, the first part of William's *Magisterium divinale et sapientiale*, which consists altogether of seven works. While the other works appeal to the Christian faith, the *primum magisterium* contains philosophical treatises in which the arguments do not rely upon authority and Scripture, but rather on reason.² William deals especially with Aristotle and the Peripatetics, who are according to him 'the followers of Aristotle and those who were best known from the nation of the Arabs in the doctrines of Aristotle'³. On one occasion, William explicitly names al-Fārābī, al-Ġazālī and Avicenna.⁴

There is a broad agreement that William usually refers to Avicenna when he speaks of Aristotle and his followers (*Aristoteles et sequaces eius*).⁵ When dealing with the philosophers' teachings, William encounters several theories which are incompatible with the Christian doctrine. However, this does not lead him to adopt a generally dismissive attitude towards the philosophers. In *De anima* he summarizes his approach to them as follows:

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- 1 I am grateful for advice to Dag Nikolaus Hasse, Amos Bertolacci and Jörn Müller.
 - 2 See Teske's introduction in William of Auvergne, *The Universe of Creatures*, p. 15, and Teske, William of Auvergne on the Relation, esp. pp. 286–8.
 - 3 William of Auvergne, *De universo* Ia-iae, c. 24, p. 618bG: 'Philosophi maxime peripatetici, idest sequaces Aristotelis et qui famosiores fuerunt de gente Arabum in disciplinis Aristotelis'. (This translation into English as well as the following ones for *De universo* are drawn from Teske in William of Auvergne, *The Universe of Creatures*.)
 - 4 See William of Auvergne, *De anima*, c. V.2, p. 112b: 'Post haec autem incipiam destruere errorem eorum qui causas alias efficientes quam creatorem benedictum eidem posuerunt, ex quibus fuit Aristoteles et sequaces ejus, videlicet Alpharalius, Algaxel et Avicenna et plures alij qui post eum et per eum forsitan a via veritatis in parte ista deviaerunt.'
 - 5 See De Vaux, *Notes et textes*, pp. 20–22; Teske, William of Auvergne's Use of Avicenna's Principle, pp. 102–3, and id., William of Auvergne on the Individuation, pp. 124–6.

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But though on many points one must contradict Aristotle, as is really right and proper—and this holds for all the statements by which he contradicts the truth—he should be accepted, that is, upheld in all those statements in which he is found to have held the right view.⁶

William decides case-by-case if and under which circumstances a theory is worthy of being adopted or must be rejected. Therefore, it does not surprise that evident parallels to Avicenna can be found in *De trinitate*, where William sets forth his ontology and the characterization of the first principle, that is, God.⁷ Like Avicenna, William maintains the distinction of essence and existence,⁸ and in combination with this he even calls the first principle, which alone is not subject to the distinction, a necessary existent in itself (*nesesse esse per se ipsum*),⁹ while every other being is only possible in itself (*possibile esse per se ipsum*). According to both Avicenna and William, a possible

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- 6 William of Auvergne, *De anima*, c. II.12, p. 82b: ‘Quamquam autem in multis contradicendum sit Aristoteli sicut revera dignum et justum est, et hoc in omnibus sermonibus quibus dicit contraria veritati, sic suscipiendus est id est sustinendus in eis omnibus in quibus recte sensisse invenitur.’ (The English translation of this quotation as well as the following ones of *De anima* are drawn from Teske in William of Auvergne, *The Soul*.) For a short interpretation of this quotation see e.g. Miller, William of Auvergne and the Aristotelians, p. 263, and Teske, William of Auvergne’s Use of Avicenna’s Principle, pp. 101–2.
- 7 For a general overview of Avicenna’s influence on William’s language, style and teachings, see Teske, William of Auvergne’s Debt to Avicenna. For an analysis of the influence concerning special topics, see the other articles in Teske, *Studies*.
- 8 See William of Auvergne, *De trinitate*, c. 1–3 and 6, esp. c. 6, p. 43, line 66–p. 44, line 70: ‘Quoniam autem ens possibile non est ens per essentiam, tunc ipsum et eius esse, quod non est ei per essentiam, duo sunt revera, et alterum accidit alteri, nec cadit in rationem vel quidditatem ipsius. Ens igitur, secundum hunc modum, compositum est et resolvable in suam possibilitatem sive quidditatem et suum esse.’ For Avicenna’s theories, see his *Šifā’*: *Ilāhiyyāt*, esp. I, 5–7 (ontology); VI, 1–2 and VIII, 1–2 (causes); VIII, 4–6 and IX, 1–5 (Necessary Existent and emanation).
- 9 The exact denomination of the first principle in *De trinitate* varies between *nesesse esse*, *nesesse esse per se ipsum* and *nesesse esse per semetipsum*. See e.g. c. 6, p. 39, lines 32–3: ‘Per viam similem esse possibile deducet nos ad esse nesesse per se ipsum’; c. 6, p. 40, lines 62–7: ‘Restat igitur esse aliquid, quod non sit possibile. Hoc autem ex necessitate erit nesesse esse per semetipsum, opposita namque sunt affirmatio et negatio, possibile et nesesse esse per se; est enim nesesse esse quod in se ipso consideratum invenitur habere esse in effectu, et prohibens suum non esse’; c. 6, p. 42, lines 28–30: ‘Hae igitur propriae sunt intentiones et nominationes primi esse quibus et est et nominatur verissime esse, essentiale esse, cui idem est esse et id, quod est esse sufficientiae, esse nesesse sive necessitatis’, and c. 14, p. 85, lines 95–9: ‘Quod si eius essentia non fuerit nesesse esse per se ipsam, sed fuerit possibile esse in se ipsa, tunc prima emanatio in se ipsa nihil habebit omnino necessitatis sive actualitatis. Qualiter autem ex nesesse secundum se sit tantum possibile in se, non est videre’. In *De universo* William even acknowledges that the philosophers have ‘most correctly’ called God the necessary existent in itself: IIA-IIae, c. 10, p. 853bA: ‘primum

existent, through itself, is not sufficient to obtain being in actuality; rather, it needs an external coexisting efficient cause in order to actually exist—in contrast with the necessary existent in itself.¹⁰ Furthermore, again like Avicenna, William emphasizes God's uniqueness, his indefinability, perfect simplicity and immutability.¹¹ Given this characterization of God, one might assume that William's cosmological theory too is very close to the Avicennian model, in which the world proceeds from God in an eternal cascade of emanation. Such a theory, however, is not an acceptable option for William. Quite the opposite: it is beyond all question for him that an eternal emanation from God is one of the issues that contradict the truth, which is why he considers it his duty to vehemently reject this theory. Lengthy rebuttals of the eternity of the world as well as of emanation theory can be found in *De trinitate* and more particularly in *De universo*.¹² William's main argument against these theories defends God's absolute freedom against the idea of a first principle acting with natural necessity, a doctrine which is, according to him, found in Avicenna. To illustrate God's exceptional status as a cause, William in a noteworthy comparison contrasts different kinds of efficient causes.¹³ Interestingly, three issues of his theory of efficient causality are influenced by Avicenna: the theory of potency (*potentia*), the characterization of natural causality, and the concept of sufficiency of cause (*sufficiencia causae*).

In what follows, I will expound Avicenna's influence on these issues. In the first section, I will compare Avicenna's discussion of the term potency (*quwwa*; *potentia*) in *Ilāhiyyāt* IV, 2 to William's discussion of the same term in *De trinitate*, chapter eight, in order to show the parallels between both thinkers. The theory of potency, and especially the distinction drawn by both authors between twofold and single potency, is important for William's classification of efficient causes, which I will expound in the second section. Natural causes only possess single potency and therefore act through necessity, or, as William preferably characterizes it, in the manner of a servant. I will point out that this

principium, quod rectissime nominaverunt [sc. Aristoteles et omnes sequaces eius] necesse esse per se⁷.

- 10 See William of Auvergne, *De trinitate*, c. 2, esp. p. 24, lines 45–50: 'Quoniam autem omne causatum, intellige causatum quale determinavimus et causam similiter, habet esse acquisitum et de non esse eductum per causam suam in esse, quantum est in ipso (non enim est prohibens a se ipso suum non esse, nec est dans sibi ipsi suum esse, sed est sustinens et recipiens illud), est igitur possibile et susceptibile utriusque, quantum in ipso est.' For Avicenna, see his *Šifā'*: *Ilāhiyyāt* I, 6, esp. p. 31, lines 1–2, and VIII, 3, p. 272, lines 1–4 (ed. Marmura); *Philosophia prima*, p. 44, lines 38–41, and p. 395, line 18–p. 396, line 23.
- 11 See Avicenna, *Šifā'*: *Ilāhiyyāt* I, 6–7 and VIII, 4–6, and William of Auvergne, *De trinitate*, c. 3–6, 10 and 24.
- 12 See William of Auvergne, *De trinitate*, c. 10, and id., *De universo* Ia-Iae, c. 17–27; IIa-Iae, c. 1–11, and Ia-IIae, c. 9 and 25–30.
- 13 See id., *De universo* IIa-Iae, c. 9, p. 694aF–H.

characterization of natural causality, which William often attributes to Aristotle, originally stems from Avicenna. In contrast to natural causes, human beings and God act by will. God, however, differs from other voluntary causes, in that he is most free and immutable. To show the great difference between his acts and those of all other causes, William introduces the concept of sufficiency of cause (*sufficiencia causae*). In the third and last section of this paper, I will show on the one hand that this concept is inspired by Avicenna and on the other hand that William uses it to argue against Avicenna's emanation theory.

1 The Theory of Potency (*quwwa; potentia*)

William's classification of efficient causes in *De universo* part Ila-Iae, chapter nine is based on a theory of potency which is developed in detail previously in *De trinitate*. After expounding his ontology, which is mainly influenced by Boethius and, as already mentioned, by Avicenna,¹⁴ William proceeds in chapter eight of *De trinitate* to analyse the terms potency (*potentia*) and possibility (*possibilitas*) with the aim of determining God's omnipotence.¹⁵ In this chapter, as well as the following one, William obviously draws on Avicenna's discussion of potency (*quwwa; potentia*) and possibility (*imkān; possibilitas*) in *Ilāhiyyāt* IV, 2,¹⁶ but his treatment is a considerable simplification thereof.¹⁷ Since Avicenna's discussion, in turn, is deeply influenced by Aristotle's analysis of the term potency (δύναμις) and related terms in *Metaphysics* Delta, 12 and Theta, 1, 2 and 5, and even contains many quotations from those chapters,¹⁸ it is evident that William's treatment is at least indirectly also influenced by Aristotle. Since William, who does not name his source, knew Aristotle's *Metaphysics*, one may suspect that Aristotle's discussion is his primary direct template. However, if one compares the statements of all three thinkers, it becomes apparent that William is closer to Avicenna than to Aristotle, with regard both to content and terminology. In fact, William is one of the authors of the thirteenth

14 For an overview of William's ontological treatise in the first chapters of *De trinitate*, see Teske's introduction in William of Auvergne, *The Trinity*, pp. 8–14. See also Caster, *The Distinction between Being and Essence*.

15 For an overview of this discussion, see Teske's introduction in William of Auvergne, *The Trinity*, pp. 15–25.

16 Both thinkers begin their treatise with an enumeration of different meanings of the term potency and proceed to the concept of possibility, which both of them relate to matter. Furthermore, William is inspired by Avicenna to differentiate the potencies according to the following pairs of opposites: rational—irrational, perfect—imperfect, proximate—remote.

17 As Teske also remarks in William of Auvergne, *The Trinity*, p. 93, n. 6.

18 See Bertolacci, *The Reception of Aristotle's Metaphysics*, pp. 330 and 355–7.

century whose interpretation of Aristotle's *Metaphysics* is deeply influenced by the *Ilāhiyyāt*.¹⁹

Inspired by Avicenna,²⁰ William starts his analysis by listing three main meanings of potency: active, dominating and resisting potency.

For the present, then, we shall say that potency [*potentia*] is called the principle of operations, and it is the overflowing or ray of being itself, from which operations come forth. This is also called capacity [*virtus*] and is called agent or active potency ... Secondly, superiority or domination is called potency. This happens only by the obedience or the consent of another will and is in common speech called power [*potestas*] ... Thirdly, we customarily call potency that quality by which a thing resists being modified, such as hardness in a stone. For a stone resists many actions upon it either partially or entirely.²¹

According to William, potency can be understood as agent or active potency (*potentia agens sive activa*) or simply capacity (*virtus*) to conduct an operation. Furthermore there is potency of rulership, in case of which the subjects follow the will of the ruler, whether voluntarily or not, so that the ruler is able to get his will. This kind of potency is commonly called 'power' (*potestas*). In *De anima*

19 See id., On the Latin Reception of Avicenna's *Metaphysics*, pp. 202–3.

20 Avicenna also starts his discussion of potency in chapter IV, 2 by listing different usages of the term potency, see his *Šifā'*: *Ilāhiyyāt* IV, 2, p. 130, line 9–p. 132, line 7; *Philosophia prima*, p. 193, line 72–p. 196, line 29. According to Avicenna, the term potency (*quwwa*) is used in (1.) non-philosophical, (2.) philosophical and (3.) geometrical contexts. The different usages are, in short: (1.) in non-philosophical contexts (common sense): potency as (1.1) an ability to perform arduous acts in the category of movement (*ḥaraka; motus*), as opposite to debility (*da'f; debilitas*) and as intensification of power (*qudra; fortitudo*), which simply is the ability to perform volitional acts; (1.2) a disposition to be not affected or to be only slightly affected (*infa'ala; pati*) either while performing arduous acts or during inactivity; (1.3) a disposition of not being affected at all; (1.4) being the principle of action or inaction in the sense of having power (*qudra; fortitudo*, see (1.1)); (2.) in philosophical contexts: potency as (2.1) every disposition which is a principle of change (*mabda' al-tagayyur; principium variationis*); (2.2) the possibility (*imkān; possibilitas*) of acting or not acting; (2.3) the potency to be acted upon (*quwwa infī 'āliyya; potentia passibilitatis*); (3.) in geometrical contexts: a more complex geometrical figure as potency of a simpler geometrical figure, when it is possible for the simpler one to be a part of the more complex one. For the division into the three contexts, see also Bertolacci, *The Reception of Aristotle's Metaphysics*, p. 330.

21 William of Auvergne, *De trinitate*, c. 8, p. 49, line 8–p. 50, line 25: 'Interim igitur dicemus, quod potentia nominatur principium operationum, et est exuberantia vel radius ipsius esse, de qua exeunt operationes; et hoc alio nomine dicitur virtus et nominatur potentia agens sive activa ... Secundo modo potentia dicitur superioritas et velut dominatio, quae tamen non est nisi oboedientia vel consensu alienae voluntatis et dicitur vulgato nomine potestas ... Tertio, potentiam nominare consuevimus eam qualitatem, qua resistitur passionibus, qualis est duritia in lapide. Ea namque repellit multas ex passionibus aut in parte, aut in toto'. (The translation into English as well as the following ones for *De trinitate* are drawn from Teske in William of Auvergne, *The Trinity*. The translation is slightly altered here.)

William calls the dominating potency in case of human rulership the ‘power of jurisdiction and principality’²². Finally, potency can designate the ability to resist—whether wholly or to a certain degree—external influences acting upon oneself.²³

Of this enumeration, the first concept of potency, the agent or active potency (*potentia agens sive activa*), is most relevant to William’s theory of causality. It is described as a principle of operations, and one can infer that every efficient cause possesses certain potencies to act, regardless of whether the acts are proper acts or not.²⁴ With respect to terminology only, William’s potency as principle of operation (*principium operationis*) seems to correspond to potency as principle of action (*mabda’ al-fi’l; principium effectus*) in Avicenna’s list.²⁵ According to the common sense definition, however, which Avicenna quotes here, the principle of action is restricted to beings that act out of volition (*mašī’a; appetitus*).²⁶ This is not the case with William’s active potency, which

22 Id., *De anima*, c. III.6, p. 92b: ‘potestas inquam jurisdictionis et principatus.’ William states at the end of this chapter that while power as the human power of jurisdiction depends on the obedience of the subjects and ceases if their obedience ceases, God’s power does not depend on anything else. Therefore power in its truest and proper sense belongs to God.

23 While the second kind of potency lacks an equivalent in Avicenna’s enumeration of the usages of the term potency in chapter IV, 2 of his *Ilāhiyyāt*, the third kind of potency, i.e. potency as resistance, is a combination of two usages listed by Avicenna: potency signifying that something is only slightly affected by something else and potency signifying that something is not at all affected by something else. See Avicenna, *Šifā’*: *Ilāhiyyāt* IV, 2, p. 131, lines 1–3; *Philosophia prima*, p. 194, lines 86–90: ‘Deinde imposuerunt eam nomen huius intentionis, ita ut, in quantum non patitur nisi parum, vocetur potentia, quamvis nihil agat. Deinde rem quae non patitur ullo modo posuerunt digniorem hoc nomine, et ideo dispositionem eius in quantum est sic, vocaverunt potentiam’. See also Teske’s remark in William of Auvergne, *The Trinity*, p. 94, n. 7.

24 In *De anima* William differentiates between potencies which are principles of proper acts, and those which are principles of non-natural acts. For that purpose, he analyses statements about both kinds of potencies. In our speech, potencies are expressed by the verb ‘can’ (*potest*). The verb following the term ‘can’, in turn, signifies the act one has a potency of. If we speak about potencies of proper acts, our statements do not predicate anything added to the essence of a subject, because subjects are able to perform their proper acts out of themselves alone. This is, for example, the case if one states that fire can heat or human beings can understand. Besides this, there are acts which subjects do not perform out of themselves (or out of their substances). Statements about potencies of those acts are statements about something different from the essences and added to them. William gives the example of a white body, which can differentiate what is seen. Differentiation of what is seen does not take place through the essence of the body; rather, it takes place through a potency added to the body, namely whiteness, whose proper act, in turn, is to differentiate what is seen. See William of Auvergne, *De anima*, c. III.5 and 6, pp. 90b–93a.

25 For Avicenna’s list see above, n. 20.

26 See Avicenna, *Šifā’*: *Ilāhiyyāt* IV, 2, p. 130, lines 12–13, and p. 131, lines 3–5; *Philosophia prima*, p. 194, lines 77–8 and 90–p. 195, line 93: ‘fortitudo, videlicet cum animal est eius-

is also applicable to inanimate things, such as fire. Therefore, William's idea more closely corresponds to the philosophical concept of potency, which is broader, since, as Avicenna explains, the philosophers apply it to every disposition in a being that is 'a principle of change (*mabda' al-taḡayyur*; *principium variationis*) [coming] from some other, [acting] on another inasmuch as [the latter] is an other.'²⁷ This definition, in turn, corresponds to the definition of δύναμις in Aristotle's *Metaphysics* Theta, 1: 'a starting-point of change [ἀρχὴ μεταβολῆς] in another thing or in the thing itself *qua* other'²⁸.

Besides the enumeration of different meanings of potency, William adopts from Avicenna a further idea which is important for his classification of efficient causes, namely the difference regarding the extent of active potencies. In *De trinitate* he states:

A potency that extends only to (*est super*) one of two opposites is diminished in comparison to one that extends to both opposites. For example, fire only has power to heat and not to not heat. For it is not able to heat or not to heat, when it encounters what can be heated, but it necessarily has only the power to heat.²⁹

William here differentiates between a twofold and a single potency. A twofold potency extends to both alternatives of the pair of opposites 'to act' and 'not to act', while a single potency is restricted to one of them. This distinction is already made by Aristotle³⁰, from whom Avicenna adopts it. With respect to

modi quod provenit ex eo actio quando vult [*idā šā'a*], et non provenit quando non vult ... Deinde fortitudinem ipsam quae est dispositio animalis, ex qua est ei ut agat, sed non agit, vel propter appetitum [*bi-hasabi l-mašī'a*] vel propter privationem appetitus et remotionem instrumentorum, posuerunt potentiam, eo quod est principium effectus [*mabda' al-fi'l*]'.

27 Ibid. IV, 2, p. 131, lines 6–8; *Philosophia prima*, p. 195, lines 94–8.

28 Aristotle, *Metaphysics* Θ, 1, 1046a11. (This translation into English as well as the following ones for Aristotle's *Metaphysics* are drawn from Barnes in Aristotle, *The Complete Works*.) Aristotle here gives the definition of the basic kind of potentiality (δύναμις), from which the other kinds of potentialities are derived. See also Aristotle, *Metaphysics* Δ, 12, 1019a15–16 and 19–20.

29 William of Auvergne, *De trinitate*, c. 9, p. 54, lines 41–6: 'Potentia autem, quae non est nisi super alterum oppositorium, diminuta est comparatione eius, quae potest super utrumque, verbi gratia, ignis non potest nisi super calefacere, super non calefacere non potest; non enim est in eo, ut calefaciat vel non calefaciat, cum obviaverit calefactibili, sed necesse habet calefacere tantum.'

30 See Aristotle, *Metaphysics* Θ, 2, 1046b4–24: 'And each of those which are accompanied by reason [μετὰ λόγου] is alike capable of contrary effects, but one non-rational power produces one effect; e.g. the hot is capable only of heating, but the medical art can produce both disease and health. The reason is that science [ἐπιστήμη] is a rational formula [λόγος], and the same rational formula explains a thing and its privation, only not in the same way ... And so the things whose potentiality is according to a rational formula act contrariwise

terminology and content, William's citation is a mix of formulations from Avicenna and from the Latin translation of al-Ġazālī's *Maqāṣid al-falāsifa*.

Avicenna: For each of these powers is a power over a thing and its opposite.³¹

al-Ġazālī: The potency to act is divided into two, i.e. either [the potency] merely to act and not to its opposite, like the potency of fire is [able] to burn, and not [able] not to burn, or [the potency] to act and to its opposite, i.e. to refrain [from acting], like the potency of man to move and to rest. The first is called natural potency, the second voluntary potency.³²

In contrast to Aristotle and Avicenna, William does not give the proper reason for having a twofold potency, namely that such a potency is associated to the rational faculty which is able to grasp a thing and its opposite.³³ Thus, while his predecessors causally link rationality to twofold potency and, consequently, irrationality to single potency, William focuses on the fact that having a twofold potency implies the existence of a determining instance which decides between both alternatives. According to Aristotle, it is desire or choice (ὄρεξις ἢ προαίρεσις), according to Avicenna, it is the decisive will (*irāda ġāzima; voluntas prompta*). Without such an instance, there would be no preponderance either toward action or toward refraining from action. Or, if the twofold potency itself were the determining instance, it would realize both contrary alternatives

to the things whose potentiality is non-rational; for the products of the former are included under one principle, the rational formula.' See also Θ, 5, 1047b35–1048a8.

- 31 Avicenna, *Šifā': Ilāhiyyāt* IV, 2, p. 133, lines 11–12; *Philosophia prima*, p. 198, lines 64–5: 'unaquaeque enim harum potentiarum est potentia super rem et super eius contrarium'. (Here, the English translation is based on the Latin text.)
- 32 Al-Ġazālī, *Algazel's Metaphysics*, pt. I, tr. I, 7, p. 45, lines 11–16: 'potencia agendi dividitur in duo scilicet vel ad agendum tantum, et non ad eius oppositum, ut potencia ignis est ad conburendum, et non est ad non conburendum; vel est ad agendum, et eius oppositum scilicet ad cessandum ut potencia hominis ad movendum, et quiescendum; primum vero vocatur potencia naturalis, secundum vocatur potencia voluntaria'. Cf. the Arabic text in al-Ġazālī, *Maqāṣid al-falāsifa*, pt. 2, p. 52, lines 11–15. William also uses the term *oppositum* instead of *contrarium* and like al-Ġazālī explicitly formulates the restriction that fire does not have the power not to heat.
- 33 See Avicenna, *Šifā': Ilāhiyyāt* IV, 2, p. 133, lines 8–11; *Philosophia prima*, p. 198, lines 58–64: 'Haec autem potentia quae est principium motuum et actionum, quaedam est comes rationalitatis vel imaginationis et quaedam quae non est comes earum. Quae autem est comes [qārana] rationalitatis [nuṭq] vel imaginationis [taḥayyul], quasi fit eiusdem generis cum illis; paene enim una potentia potest sciri [ulima] homo et non homo, et quod delectat et quod molestat aestimare [tawahhama] unius virtutis est, et omnino aestimare rem et eius contrarium'. For Aristotle, see above, n. 30.

at the same time, which is against the principle of non-contradiction and therefore absurd.³⁴ William's version of his predecessors' thoughts is as follows:

Of these potencies there are some which are accompanied by deliberation [*deliberatio*] and will [*voluntas*], such as the power of walking in us, and these are called rational [*rationalis*], because they do not pour forth their acts and operations except by a command of another [power]. There are other potencies which are not accompanied by deliberation and will and are called irrational [*irrationalis*], such as the potency of fire, as we mentioned. For, when fire has set before it matter that is possible and suitable and fitting for its action, it pours forth into it, so to speak, the flow of its operation, as when it comes into contact with burnable wood, wax, lead or tin.³⁵

In this quotation William brings in the issue of rationality by distinguishing rational from irrational potency, in obvious parallel to the distinction of twofold and single potency. He names deliberation (*deliberatio*) and will (*voluntas*) as determining instances and uses them as the criterion with respect to which rational and irrational potencies are differentiated, leaving the exact role of the rational faculty aside. William does so because in the context of causality, as will become clear in what follows, the concept of will is much more important for him than that of rationality.

2 The Classification of Efficient Causes

As already mentioned, the theory of potency in *De trinitate* is closely related to William's classification of causes. A key passage for this classification is found in *De universo* part IIa-Iae, chapter nine:

To it I reply that [1.] some causes work through necessity, and these are natural causes, and they do not have power [*potestas*] over their action or freedom or choice for both

34 See Avicenna, *Šifā': Ilāhiyyāt* IV, 2, p. 133, line 12–p. 134, line 5; *Philosophia prima*, p. 198, line 65–p. 199, line 87, and Aristotle, *Metaphysics* Θ, 5, 1048a8–15. In the passage concerning the irrational potencies, Avicenna's denomination of the determining principle is closer to the Aristotelian terminology: *Šifā': Ilāhiyyāt* IV, 2, p. 134, lines 4–5; *Philosophia prima*, p. 199, lines 85–7: 'Sed potentiae quae sunt in eis quae sunt extra rationalitatem et imaginationem, cum obviaverint potentiae patienti, profecto debet esse actio ibi, eo quod non est ibi voluntas [*irāda*] nec electio [*iḥtiyār*] quae expectetur.'

35 William of Auvergne, *De trinitate*, c. 8, p. 50, lines 27–36: 'Potentiarum autem istarum aliae sunt, quas comitantur deliberatio et voluntas—qualis est in nobis potestas gradiendi—et hae vocantur rationales, eo quod actus et operationes suas non exuberant, nisi alieno imperio; aliae sunt, quas non comitantur, et nominantur irrationales, qualis est potentia ignis, quam diximus, haec enim, cum habuerit obviantem sibi materiam possibilem et idoneam et congruentem actioni suae, exuberat in illam vel fluxum operationis suae, quemadmodum cum continget ligna combustibilia, aut ceram, aut plumbum, vel stannum.'

alternatives. For this reason Aristotle said that nature works in the manner of a servant. An example of this is fire; you know that it does not have power over heating and not heating, nor freedom to choose both of them; in fact, it must heat the material that comes into contact with it and is receptive of its action.

[2.] But other causes operate through will and choice, and among these are

[2.1] some which operate by a will that can change to the contrary, that is, to not willing. Likewise, some act by a will that is renewable by new counsel or a new persuasion or by one of the passions, such as love and hatred, sorrow and joy, hope and fear, anger and peace. For such a will is changed to the opposite. Or something new is produced in the one who wills, and it is undoubtedly true in such wills that, when they produce something new that they were not producing before, an innovation is necessarily produced in the agents or in one of the dispositions or relations that we have often mentioned ...

[2.2] The creator, however, acts through a will that is most free and most dominant and immutable in every respect, and on this account his effects are joined to him when he wills and are separated from him when he wills.³⁶

It should be noted that William here categorizes only efficient causes; the other three kinds of cause are not considered. The reason for this lies in the context of this citation: the discussion of the eternity of the world. As main representatives of this theory William names Aristotle and Avicenna. In the preceding chapter he enumerates several arguments for the eternity of the world based on statements of Avicenna.³⁷ Now he invalidates these arguments, one after the other, in favour of the origin of the world with time. The second argument³⁸ discussed by William is based on Avicenna's statement in *Ilāhiyyāt* IX, 1, that if a cause is now in all its dispositions as it has been before when nothing proceeded from

36 Id., *De universo* IIA-Iae, c. 9, p. 694aF–H: ‘Respondeo quia causarum [1.] aliae sunt operantes per necessitatem et hae sunt causae naturales et non est eis potestas super operari, neque libertas aut electio ad utrumlibet, propter quod dixit Aristoteles, quia natura operatur per modum servientis. Exemplum autem huiusmodi est ignis, de quo scis, quia non est ei potestas super calefacere et non calefacere, neque libertas eligendi utrumlibet, immo necesse habet calefacere obviantem sibi materiam receptibilem actionis suae. [2.] Aliae vero causae sunt operantes per voluntatem et electionem et inter has sunt, [2.1] quae operantur per voluntatem mutabilem ad contrarium, videlicet noluntatem, similiter et renovabilem vel consilio novo vel suasionem nova, vel aliqua ex passionibus, quales sunt amor et odium, dolor et gaudium, spes et timor, ira et pax. Huiusmodi enim mutatur voluntas ad contrarium vel nova res generatur in volente; et indubitanter in huiusmodi verum est, quia cum novum aliquid operantur, quod prius non operabantur, necesse est ut innovatio aliqua fiat in ipsis agentibus, vel in aliqua ex dispositionibus et comparisonibus saepe dictis ... [2.2] Creator autem operatur per liberrimam ac dominantissimam atque per omnia immutabilem voluntatem et propter hoc coniunguntur ei causata sua cum vult et separantur ab eo cum vult.’

37 See *ibid.* IIA-Iae, c. 8, pp. 690bG–692bE.

38 For the presentation of the second argument and its Avicennian background, see *ibid.* IIA-Iae, c. 8, pp. 691bA–692aG.

it, then, consequently, now nothing proceeds from it either. On the other hand, if the cause now produces something and did not do this before, one must infer that there was some sort of change in the cause, which induced the procession of the effect by giving preponderance to production over non-production.³⁹ For both, William as well as Avicenna, such a scenario is excluded for the first principle, that is, God, since God is utterly immutable. Thus, according to William, the Avicennian argument for the eternity of the world can be formulated as follows: if God bestowed existence upon the world—as he obviously did—and if, moreover, God is immutable, then one must infer that God did the same ever before as soon as he existed. Hence, since he is eternal, he created the world from all eternity. The world is therefore eternal.⁴⁰ In his confutation of this argument, William levels criticism against the general assumption that there must be some sort of change concerning the cause if the effect changes or begins to proceed at all. He emphasizes that there is no such correlation with respect to God. God created the universe after not having created it without any change in himself.⁴¹ In his role as the creator of the universe, God is understood as an efficient cause and moreover the only one which is capable of creation.⁴² To illustrate God's exceptional status, William contrasts different kinds of efficient causes in the above citation. According to him, there are two main groups: on the one hand, causes that operate through necessity (*per necessitatem*); on the other hand, causes that operate through will (*voluntas*) and choice (*electio*).⁴³

It is obvious that the members of the first group are causes possessing single, irrational potencies. According to William, such potencies are found

39 See Avicenna, *Šifā': Ilāhiyyāt* IX, 1, p. 302, line 18–p. 304, line 6, esp. p. 303, lines 5–9; *Philosophia prima*, p. 439, line 13–p. 442, line 56, esp. p. 440, lines 23–9: 'Intellectus autem purus et verus testatur quod essentia una sī, sicut erat ante cum non erat ab ea aliquid, modo etiam esset sic ex omnibus suis partibus, profecto modo etiam non esset ab eo aliquid. Si autem modo factum est ut fiat ab ea aliquid, tunc iam contigit in essentia illa intentio vel voluntas vel natura vel posse vel aptitudo vel aliquid aliud his simile quod non erat. Qui autem negaverit hoc, iam discessit a vero intellectu lingua'.

40 See William of Auvergne, *De universo* IIa-Iae, c. 8, pp. 691bD–692aE. The concrete argument is influenced by Avicenna's statement in *Šifā': Ilāhiyyāt* IX, 1, p. 300, lines 3–6; *Philosophia prima*, p. 435, lines 24–8: 'Et post hoc claruit tibi quod necesse esse per hoc est necesse esse omnibus suis modis, quod non potest esse ei aliqua dispositio futura quae non erat. Et adhuc etiam patuit tibi quod causa, quantum in se est, facit necessario esse causatum; quae, si fuerit semper, facit causatum necessario esse semper'.

41 See William of Auvergne, *De universo* IIa-Iae, c. 9, pp. 693aA–694bE.

42 See e.g. id., *De anima* c. V.2, p. 112b: 'anima humana non est nisi per creationem et propter hoc non habet causam efficientem nisi creatorem benedictum'. To be sure, in Aristotle, Avicenna, and the Christian tradition, God is also considered as the universe's final cause, but this aspect is irrelevant to the present discussion.

43 The combination of the terms *voluntas* and *electio* as an alternative to *voluntas* and *deliberatio* is also found in the Latin translation of the *Ilāhiyyāt*, see above, n. 34.

in natural causes like fire, which is mentioned in the passages already quoted. Natural causes do not have the capacity of will to make a decision about their operation. Rather, the performance of their operation is determined by external conditions. Once the conditions are fulfilled, a natural cause must produce its effect in the way determined by its nature. If, on the contrary, the conditions are not fulfilled, the cause does not operate. In the example of fire, the conditions are fulfilled if a burnable object is in contact with the fire for a certain amount of time. The fire then heats or even burns the object and has no possibility to refrain from this.

In the above citation as well as in *De universo* in general, William often employs the term *potestas* instead of *potentia* in the context of the discussion of causes. *Potestas*, as William uses it here, is the power to make a decision about one's act. Natural causes do not have such a power (*non est eis potestas super operari*). For this reason, as William remarks, 'Aristotle said that nature works in the manner of a servant (*per modum servientis*).'⁴⁴ A servant does not decide what to do nor how or when to act, but merely obeys his master's orders, without being able to refuse them. The case is similar with natural causes, as William states in *De trinitate*: 'nature really depends on the sign and will of the lordship that gives orders to (*imperantis*) all things.'⁴⁵ Nature's lord is God, who is the giver (*dator*) of being to all natural substances. Along with their being, these substances receive their particular power from God. Hence, 'the power of natures is only the will of the maker and ... they are able to do nothing against his will or beyond it or other than it.'⁴⁶ Therefore, natural causes merely act in a prescribed manner or, as William explicitly states, with necessity of servitude (*necessitas servitutis*).⁴⁷ This characterization of the action of natural causes, which William regularly attributes to Aristotle,⁴⁸ originally stems from Avicenna, who states in *Ilāhiyyāt IX, 2*: 'nature does not act by choice (*bi-ḥti-yār; per electionem*), but by way of subjection (*'alā sabīl al-tashḥīr; ad modum servientis*), and by way of what necessarily follows it essentially.'⁴⁹

44 William of Auvergne, *De universo* IIa-Iae, c. 9, p. 694aF: 'dixit Aristoteles, quia natura operatur per modum servientis.'

45 Id., *De trinitate*, c. 11, p. 75, lines 6–7: 'natura ... revera pendet a nutu et voluntate omnibus imperantis dominationis.'

46 Ibid., c. 11, p. 76, lines 30–32: 'potestas naturarum sola voluntas est conditoris, nec aliquid contra eam, nec supra eam, nec praeter eam possunt'. See also Miller, William of Auvergne and the Aristotelians, pp. 264–6.

47 See William of Auvergne, *De universo* IIIa-Iae, c. 21, p. 788aH: 'in hoc sermone de necessitate, qua natura naturaliter operatur, sicut praedixi tibi, et haec est necessitas servitutis sive servilitatis.'

48 See e.g. ibid. IIIa-Iae, c. 3, p. 759bC; IIIa-Iae, c. 21, p. 787bD; Ia-IIae, c. 30, p. 833aB; IIa-IIae, c. 20, p. 863aC, and id., *De fide et legibus*, c. 20, p. 55bB–C.

49 Avicenna, *Šīfā': Ilāhiyyāt IX, 2*, p. 308, lines 3–4; *Philosophia prima*, p. 448, lines 71–3: 'Naturalis [*tabī'a*] enim non agit per electionem, sed ad modum servientis [*tashḥīr*] et ad

While Avicenna does not repeat his statement about natural acts by way of subjection in the *Ilāhiyyāt*,⁵⁰ William frequently cites it, mostly in *De universo*, but also in *De trinitate*, *De anima*, *De fide et legibus* and *De virtutibus et vitiis*.⁵¹ For him Avicenna's statement that nature acts in the manner of a servant is a principle perfectly suited to describe natural causality. It should be mentioned that besides inanimate natural substances animals too are subject to this kind of causality, since they comply entirely with their passions, which is why William even explicitly calls them servants.⁵²

As opposed to the natural causes, causes that operate through will and choice do have power (*potestas*) over their operations, since they are able to choose whether to act or not to act. According to William, there are two subdivisions within this second basic group of efficient causes. The first subdivision comprises worldly voluntary causes (*causae operantes voluntarie apud nos*), that is, humans,⁵³ whose characteristic is that their will itself is changeable to opposites or renewable. Both change and renewal are induced by the

modum eius quod comitatur per essentiam' (English translation slightly altered). In the context of this quotation, Avicenna analyses the circular movement of the celestial spheres. Marmura remarks that the term *tashīr* is 'used in the Qur'ān where the movements of the heavens, the clouds, and the winds are said to be compelled by God', see Avicenna, *The Metaphysics of The Healing*, p. 418, n. 4. For William's adaption of this Avicennian principle and its employment against Avicenna, see Miller, William of Auvergne and the Aristotelians.

- 50 The term *tashīr* can only be found one more time in the *Ilāhiyyāt*. It is again used in combination with nature, but the principle is not repeated, see Avicenna, *Šifā': Ilāhiyyāt* VI, 4, p. 219, lines 8–10; *Philosophia prima*, p. 325, lines 35–8: 'Videtur autem quod formae rerum naturalium sint apud causas praecedentes naturam aliquo modo; apud naturam vero sunt secundum solitum cursum suum [*alā tarīq al-tashīr*] aliquo modo'.
- 51 Besides the passages already mentioned above in n. 48, see William of Auvergne, *De universo* Ia-Iae, c. 9, p. 603aA; Ia-Iae, c. 21, p. 614bF; Ia-Iae, c. 26, p. 620aF; IIa-Iae, c. 21, p. 720bE; IIIa-Iae, c. 25, p. 793bD; Ia-IIae, c. 2, p. 808bF; Ia-IIae, c. 4, p. 811aD; Ia-IIae, c. 8, p. 816bE; IIa-IIae, c. 97, p. 951bD; IIa-IIae, c. 122, p. 974bF; IIa-IIae, c. 151, p. 999bC; id., *De trinitate*, c.11, p. 75, lines 5–6; id., *De anima*, c. V.22, p. 148a, and id., *De virtutibus et vitiis*, c. 19, p. 120aF.
- 52 See William of Auvergne, *De anima*, c. II.15, p. 85b: 'non enim est in libera potestate ipsorum [sc. canum et alium animalium] ut timori vel amori hujusmodi non cedant; modis enim omnibus servi sunt hujusmodi passionum non habentes eis contradicere, nec valentes eas avertere a se, vel reprimere ullo modorum ... Quemadmodum enim non est laudandus lapis ex eo quod descendit et movetur in deorsum, neque culpatur si moveatur in sursum, cum alterum faciat necessitate naturali, alterum vero violentia invincibili ... Quod si quis dixerit, quia secundum hoc non sunt culpandi homines pro his quae ex viribus inferioribus agunt, quoniam illa faciunt, ex viribus quas communicant cum animalibus brutis: Et propter hoc illa faciunt ut bruta animalia quod est dicere necessitate non libertate. Respondeo in hoc quia hujusmodi vires non sic se habent naturaliter in hominibus'. For the subjection of brute animals to their irascible and concupiscible powers, see also *ibid.*, c. II.14, p. 85a.
- 53 Angels are not discussed here.

occurrence or change of the dispositions that influence the will, although the will's act itself is not determined by them. The will simply reacts to altered dispositions: for example, to a new counsel, persuasion, passions and above all the acts of the rational faculty (*vis intellectiva seu ratiocinativa*). According to William, the will is the most noble power of the human soul, comparable to a king or an emperor. The state of the will in the soul is analogous to God's state in the universe or to that of a human king in a city.⁵⁴ According to Teske, it is William who first draws this influential analogy.⁵⁵ The analogy might be the reason for the mentioned preference of the term *potestas* to the more neutral term *potentia*. *Potestas*, as listed in the enumeration of different kinds of potencies in *De trinitate*,⁵⁶ is used to express the king's domination over his subjects. This idea can be transferred to the will. Whereas the will is the king, all the other powers—that is, the sensitive, irascible, concupiscible and motive powers as well as the rational power—are subject to it like ministers or servants.⁵⁷ According to William, the will is most free; that is, it is not determined by these lower powers, just as a king in a well-ordered kingdom is not dominated by his subjects. Nevertheless, the will commands an action by the counsel of the rational power. The act of willing, however, is freely willed by the will.⁵⁸

3 The Concept of Sufficiency of Cause (*sufficiencia causae*)

While in worldly voluntary causes a change of the voluntary act is preceded by a change of the will, this is not true of the second group of voluntary causes, whose only member is God. His distinguishing feature is that his will is totally immutable and need not change to cause different effects. So despite his immutability, God is most free because of his most free will. To show in which way God's freedom of will differs from all other causes, and especially to show the difference between his acts and those of worldly voluntary agents concerning freedom, William introduces the term 'sufficiency of cause' (*sufficiencia causae*), a notion which is inspired by his reading of passages in Avicenna's *Ilāhiyyāt*. In *De universo* part IIa-Iae, chapter nine, William defines it as follows: 'the sufficiency of a cause

54 See William of Auvergne, *De anima*, c. II.15, p. 85b and III.8, p. 96a.

55 See Teske, *The Will as King*. Teske argues against the thesis of Stadter and Macken that the image of the will as the king of the soul was developed in the final third of the 13th century in the anti-Aristotelian movement. Teske shows that this image is already found in William of Auvergne; he discusses William's reason for using such an image and moreover for using the analogous image of God as the king of the universe.

56 For the list, see above, n. 20.

57 See William of Auvergne, *De anima*, c. II.15, pp. 85b–86a; c. III.8, p. 95a–b, and id., *De virtutibus et vitiis*, c. 3, p. 112aH.

58 See id., *De anima*, c. II.15, p. 85b; c. III.7, p. 94a–b, and c. III.9, p. 96b. For an analysis of William's understanding of the freedom of human will, see also Teske, *Freedom of the Will*.

[*sufficiencia causae*] is the cause which produces [*efficit*] the inseparable conjunction [*coniunctio inseparabilis*] between the cause and the effect.⁵⁹ This definition means, as William already states in the previous chapter, that once *sufficiencia causae* is present, if you posit the cause, you must posit the effect.⁶⁰ At the moment of *sufficiencia causae* nothing can step between cause and effect; the cause simply produces the effect. The production of the effect is only possible if all conditions for the cause's operation are fulfilled, the internal as well as the external ones. On the internal side, the cause generally must have the potency—either singular or twofold—concerning the operation, there must not be any defect in it, and it has to be prepared to operate. This fulfilment of the conditions on the part of the cause does not suffice for the presence of the sufficiency of cause and with it for the procession of the effect. On the external side, sufficiency of cause must imply or at least presuppose the fulfilment of the conditions external to the cause, such as the lack of an external impediment and the presence of the object which is receptive for the effect. In *De trinitate*, William summarizes this as follows:

We call a sufficiency that to which nothing is lacking, neither a part, nor a mode, nor an operation, nor any other of those things which in some way aid the operation insofar as the operation requires it for its being.⁶¹

William here only uses the term sufficiency (*sufficiencia*), but from the context it is clear that his statement can be squarely applied to sufficiency of cause.⁶² If all the conditions are fulfilled, or, as William formulates it, if the whole sufficiency (*tota sufficiencia*) required for the existence of the effect is present, then the effect is present.⁶³

William's concept of sufficiency of cause is inspired by Avicenna's *Ilāhiyyāt* IV, 1 and 2. There is a passage in IV, 1 which contains the key words adopted by William in his discussion of the sufficiency of cause, namely *sufficere*, *coniunctio*, *dispositio* and *necesse*:

59 William of Auvergne, *De universo* Ila-lae, c. 9, p. 694aE–F: 'sufficiencia causae causa est, quae efficit conjunctionem inseparabilem inter causam et effectum, quod quidem probabile est et eius probabilitas multos decipit'.

60 See *ibid.* Ila-lae, c. 8, p. 692aF: 'Ut causa et effectus conjuncta sint inseparabiliter, ita ut posita ea, necesse sit poni et effectum, non facit nisi sufficiencia causae'.

61 William of Auvergne, *De trinitate*, c. 10, p. 71, line 20–p. 72, line 23: 'et vocamus sufficientiam, cui nihil deest, nec pars, nec modus, nec operatio, nec aliquid aliud eorum, quae adiuvant operationem quoque modo, dum tamen illud exigit ad esse suum illa operatio.'

62 The context again is the discussion of the eternity of the world.

63 See William of Auvergne, *De trinitate*, c. 10, p. 71, lines 19–20: 'aut igitur tota erat sufficientia eorum, quae exigebantur ad esse a, aut non', and p. 72, lines 26–7: 'Si vero non erat tota sufficiencia haec, igitur ad esse eius deerat aliquid'.

But, if the condition of its being the cause is not its very self, then itself by itself is something from which it is possible for a thing to be generated and for it not to be [generated]—neither alternative having precedence over the other ... Therefore, the mere fact of [the cause's] being capable of generating it is not sufficient [*kāfin*; *sufficiens*] for a thing's coming into being from it ... Indeed, sound reason necessitates that there should exist a state [*hāl*; *dispositio*] that differentiates between [the thing's] existence from it and its nonexistence [from it]. If this state [*hāl*; *dispositio*] also necessitates this distinction, [and] if this state [*hāl*; *dispositio*] occurs to the cause and exists, then, together, the “entity” and what has joined it become the cause. Prior to this, the “entity” was the subject of causality and the thing that appropriately could become the cause. [Prior to this,] that existence would not have [constituted] the existence of the cause, but, rather, an existence, which, when another existence is added to it, would [constitute] the cause [through] the combination [*mağmū*’; *coniunctio*] of the two. The effect would then proceed from it necessarily [*yağibu* ‘*anhū*’; *debet esse per illam*], regardless of whether [the added existence] is a will, an appetite, an anger, some nature that has come into existence, some other thing, or some external thing awaited for the existence of the cause. If, then, it becomes such that it is appropriate for the effect to proceed from it and no causal condition is left unsatisfied, the effect must necessarily exist [*wağaba wuğūd al-ma* ‘*lūl*’; *debebit esse causatum*]. Hence, with the existence of the cause, the existence of every effect is necessary [*wāğib*; *necessario*]; and the existence of its cause necessitates the existence of the effect.⁶⁴

In this passage, Avicenna describes the transition from a cause in potentiality to a cause in actuality. In short, he explains that if a thing is not the condition for being the cause of another thing in virtue of its essence alone, it is merely a cause in potentiality and is not sufficient (*sufficiens*; *kāfin*) to produce an effect. Rather, it is indifferent towards operation, and therefore a disposition (*dispositio*; *hāl*) is needed that induces a preponderance towards producing an effect. This disposition can be internal, for example a passion or an act of volition, or it can be external, such as the fulfilment of external conditions. In both cases

64 Avicenna, *Šifā*’: *Ilāhīyyāt* IV, 1, p. 126, line 14–p. 127, line 18; *Philosophia prima*, p. 187, line 66–p. 189, line 00: ‘Sed, si ipsa sua essentia non fuerit condicio ipsum essendi causam, tunc ipsum per se est sic quod possibile est rem esse ex eo et possibile est non esse, et neutrum eorum dignius est altero ad hoc ...; hoc enim quod possibile est per ipsum fieri aliud non est sufficiens ad hoc ut res sit per illud ... Sed certus intellectus facit debere hic esse dispositionem qua discernatur suum esse per illam a suo non esse per illam. Si autem fuerit illa dispositio etiam quae faciat debere esse hanc discretionem, et haec dispositio fuerit attributa causae et habuerit esse, tunc totalitas essentiae et eius quod adiungitur ei erit ipsa causa; ante hoc autem, essentia erat subiectum causalitatis et erat talis quod posset vere fieri causa. Et ideo hoc esse non erat tunc esse causae, sed cum adiungitur ei aliud esse, ex eius coniunctione fit causa; et tunc causatum debet esse per illam, sive illud adiunctum sit voluntas, sive voluptas, sive natura contingens et similia, sive aliquid extrinsecum parans esse causalitatis; et cum fuerit eiusmodi proveniet ex ea causatum sine diminutione condicionis et debebit esse causatum. Igitur esse omnis causati necessario est cum esse suae causae, et propter esse suae causae necessario est esse sui causati’ (English translation slightly altered).

the disposition bestows causality; or more precisely, the conjunction (*coniunctio*; *maǧmū*) of disposition and thing constitutes the cause, that is, the cause in actuality. Therefore, Avicenna states in the passage just quoted that, since the cause is 'such that it is appropriate for the effect to proceed from it and no causal condition is left unsatisfied, the effect must necessarily exist'⁶⁵, that is, the cause must act. This is exactly what William postulates, and the sentence just quoted describes what William for his part designates with the concept of sufficiency of cause. Avicenna's influence will become even clearer in what follows. If one compares William's discussion of this concept to the present passage, it is obvious that Avicenna is the source, although we do not find in Avicenna the term 'sufficiency of cause' explicitly. There are further differences. For example, William does not use the term *coniunctio* for the coming together of disposition and thing, as does Avicenna; instead he uses *concurrere*⁶⁶ and transfers the concept of *coniunctio* (specifically, *coniunctio inseparabilis*) to the relation between cause and effect.⁶⁷ Nevertheless, the opinion that a cause necessarily acts if all conditions are fulfilled, is identical in both authors.

William, however, refines his theory of sufficiency of cause. After defining this concept, he proceeds to the already discussed classification of efficient causes and then compares the different kinds of causes with regard to the stage at which sufficiency of cause occurs:

[1.] In natural causes, then, which act through necessity, as I told you, such sufficiency suffices for the previously mentioned conjunction [i.e. the inseparable conjunction between cause and effect].

[2.1] The same is true in those beings which act voluntarily among us, and the reason is that it is not in their power that they do not begin to act once the power, knowing, willing, and other dispositions concur.

[2.2] But in the creator on account of a will that is most free and most dominant and on account of his immutability, it is not necessary that he act or begin to act, except when he wills. And notice that it is possible that the creator now will something, but he could

65 See n. 64.

66 See William of Auvergne, *De universo* IIa-Iae, c. 9, p. 694aH: 'quia non est in potestate eorum, postquam posse, scire et velle caeteraque dispositiones concurrerint, ut non incipient operari.' For the context, see below, n. 68.

67 See *ibid.* IIa-Iae, c. 8, p. 692aF: 'Ut causa et effectus conjuncta sint inseparabiliter, ita ut posita ea, necesse sit poni et effectum, non facit nisi sufficientia causae', and IIa-Iae, c. 9, p. 694aE-H: 'sufficientia causae causa est, quae efficit conjunctionem inseparabilem inter causam et effectum, quod quidem probabile est et eius probabilitas multos decipit ... In causis igitur naturalibus, quae per necessitatem, ut praedixi tibi, operantur, sufficientia huiusmodi sufficit ad praedictam conjunctionem'.

have not willed it without any change of his will. In us, however, just the opposite is necessarily the case.⁶⁸

First, William analyses the natural causes: here sufficiency of cause is present simply if the cause free of defect is present and the external conditions are fulfilled. So in the case of fire, sufficiency of cause is given if the fire is present and in contact to a burnable object, so that an inseparable conjunction between cause and effect results: that is, fire instantaneously and necessarily produces its effects, i.e. it heats or burns the object.

According to William, such a model of causality, in which it is necessary that the cause begins to act or acts, is transferable to the worldly voluntary agents. Of course, with the latter, no necessity of a servant can be found, since the aspect of will has to be considered. Therefore, the simple presence of voluntary agents and their objects is not enough for the occurrence of the sufficiency of cause. Instead, a further step is interposed, namely the act of volition. As soon as the will wills in actuality, that is, as soon as it freely chooses an act, sufficiency of cause is present. From that moment on, the process runs in parallel to that of the natural causes: the voluntary agent is inseparably conjoined to its effect. William explicitly states that after the act of volition, the agent has no power not to operate (*non est in potestate eius, ut non incipiat operari*); that is, he does not have a twofold potency anymore, but is determined to one of the opposites, namely to act or not to act, depending on which alternative the will has chosen. Thus, at the moment of the sufficiency of cause, the agent is not free anymore but necessarily begins to act if action has been chosen. This is exactly the case with natural causes, although at an earlier stage. Compared to the natural causes, in worldly voluntary agents the presence of sufficiency of cause is just delayed by one step. Although in the end both kinds of causes act with necessity,⁶⁹ the difference between them is that natural causes at no time possess any freedom in terms of power over their action. Worldly voluntary agents, by contrast, are free up to the point at which the act of volition has taken place and with it sufficiency of cause occurs. This kind of freedom ensures that voluntary agents, i.e. humans, do not act with natural necessity;

68 Ibid. Ila-lae, c. 9, p. 694aH–bE: ‘In causis igitur [1.] naturalibus, quae per necessitatem, ut praedixi tibi, operantur, sufficientia hujusmodi sufficit ad praedictam conjunctionem [sc. conjunctio inseparabilis inter causam et effectum], similiter et in [2.1] operantibus voluntarie apud nos et hoc est, quia non est in potestate eorum, postquam posse, scire et velle caeteraeque dispositiones concurrerint, ut non incipiant operari. In [2.2] creatore vero propter liberrimam ac dominantissimam ejusdem voluntatem, atque immutabilitatem non est necesse, ut operetur vel incipiat operari, nisi cum velit. Et attende, quia possibile est, ut creator velit modo aliquid, poterit tamen non velle illud absque ulla mutatione voluntatis suae. In nobis autem e converso se habet ex necessitate’.

69 Cf. Miller, William of Auvergne and the Aristotelians, p. 274, n. 10.

that is, they do not follow their passions which result from the original sin, but possess freedom of action, since they are able to act as they will.⁷⁰ Therefore, they are morally responsible for their actions and hence subject to praise and blame, which is important for William as a Christian thinker.⁷¹ With his theory of freedom of human action William endorses a voluntarist position.⁷²

The idea that causes in the end act with necessity is parallel to Avicenna's theory of causation.⁷³ In *Ilāhiyyāt* IV, 2, Avicenna explains that causes with single potency necessarily act, as soon as they meet an object suitable for their acting upon it, provided that there are no impediments:

As regards the powers that are present in things not possessing reason and imagination, when these meet the passive power, then action necessarily [takes place] [*wağaba hunāka l-fi 'lu; debebit esse actio ibi*].⁷⁴

By contrast, a cause with twofold potency does not act as soon as it meets a suitable object. Rather, it needs the act of will, as already mentioned. It is only then that all conditions are fulfilled and the cause necessarily starts to act:

In general, from their meeting the passive power, it does not follow necessarily that [these] powers would enact that [effect] ... Rather, if they became [conjoined with the decisive will], as we have stated, they would then act by necessity [*fa-imahā taf'alu bi-l-darūrati; tunc aget necessario*].⁷⁵

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- 70 See William of Auvergne, *De anima*, c. II.15, p. 85b: 'Respondeo in hoc quia hujusmodi vires non sic se habent naturaliter in hominibus, sed ex corruptione originali factae sunt effraenes atque praecipites, ipsique nobili imperativae ac superioris suae rebelles. Praevalet autem et dominatur eis imperativa nobilis superior et possibile est ei coercere eas et fraenare impetum earum et avertere hominem quominus sequatur eas'.
- 71 See *ibid.*, c. II.15, p. 85b: 'Voluntas autem, quoniam in se est, liberrima est, suaeque per omnia potestatis quantum ad antedictam operationem suam et propter hoc suae correctionis est, atque directionis. Quapropter merito requiritur ab ea rectitudo in operatione sua quae est velle, meritoque culpatur in ea peccatum quod est contrarium rectitudini: hinc est quod cum brutis animalibus non agitur de moribus aut virtutibus.'
- 72 See also Teske, *The Will as King*, p. 70. According to Teske, William 'anticipates the voluntarism of members of the Franciscan school later in the century'.
- 73 Furthermore it is already found in Aristotle, see his *Metaphysics* Θ, 5, 1048a5–7: 'as regards potentialities of the latter kind [i.e. non-rational potentialities], when the agent and the patient meet in the way appropriate to the potentiality in question, the one must act and the other be acted on', and 1048a13–15: 'Therefore everything which has a rational potentiality, when it desires that for which it has a potentiality and in the circumstances in which it has it, must do this.'
- 74 Avicenna, *Šifā'*: *Ilāhiyyāt* IV, 2, p. 134, lines 4–5; *Philosophia prima*, p. 199, lines 85–7: 'Sed potentiae quae sunt in eis quae sunt extra rationalitatem et imaginationem, cum obviaverint potentiae patienti, profecto debebit esse actio ibi' (English translation slightly altered).
- 75 *Ibid.* IV, 2, p. 134, lines 1–3; *Philosophia prima*, p. 199, lines 80–84: 'et omnino, ex eo quod obviat potentiae patienti, non sequitur ut agat ... Cum autem fuerit sicut diximus, tunc aget necessario'.

In contrast to his predecessor Avicenna, William formulates an exception. As is not difficult to guess, the case is completely different with God, even if a form of *sufficere* is applicable to him. In the long passage quoted from *Ilāhiyyāt* IV, 1 Avicenna uses the negation of the participle *sufficiens* to express the deficiency of a cause to act solely out of its essence: ‘its merely being capable [of generating it] is not sufficient [*laysa kāfiyan; non est sufficiens*] for a thing’s coming into being from it’⁷⁶. In the context of causality in the *Ilāhiyyāt*, Avicenna normally makes no positive use of *sufficere* (*kafā*); the positive use is found in a more ontological context to indicate that a thing can acquire existence or non-existence out of itself alone.⁷⁷ William likewise uses the negation of the participle *sufficiens* to indicate the deficiency of beings and causes. There is, however, another form of *sufficere* used in an ontological as well as causal context: what can exist out of itself, as well as what is in itself a cause, is a sufficient being (*esse sufficientiae*).⁷⁸ This exclusively applies to God. For William—and according to him for the Peripatetics including Avicenna—God is at any time in himself the most sufficient cause of the universe. However, this does not at all imply that there is any sufficiency of cause in him, and this is what the Peripatetics failed to see, argues William. They concluded from God’s being the most sufficient cause that he necessarily has to create the universe from all eternity.⁷⁹ With this they negate God’s most free will, and although

76 Ibid. IV, 1, p. 127, lines 1–2; *Philosophia prima*, p. 188, lines 74–5: ‘hoc enim quod possibile est per ipsum fieri aliud non est sufficiens ad hoc ut res sit per illud’.

77 See Ibid. I, 6, p. 31, lines 6–8; *Philosophia prima*, p. 45, lines 47–50: ‘tunc, ad appropriandum sibi utrumlibet [sc. esse vel non esse], id quod ipsum est [*māhiyyat al-amr*] vel est sufficiens [*takfī*] vel non sufficiens. Si autem id quod est sufficiens est ad appropriandum sibi utrumlibet illorum duorum, ita ut sit aliquid illorum duorum, tunc illud est necessarium sibi ipsi per se’.

78 See e.g. William of Auvergne, *De trinitate*, c. 6, p. 38, line 19–p. 39, line 32: ‘Esse igitur indigentiae non potest solum esse, sive finitum sive infinitum ponatur, nec sufficere solum ad hoc, ut aliud sit. Necessesse igitur est, ut sit esse praeter esse indigentiae, et hoc est quod nominamus esse sufficientiae ... Item, quia esse indigentiae necessario eget esse sufficientiae ... necesse est, ut primum causetur per esse sufficientiae. Esse igitur indigentiae necessario inducit inquisitionem diligentiae ad esse sufficientiae, et huius ratio est esse, quod nullo eget’, and c. 13, p. 80, lines 44–5: ‘Et iam quidem claruit ex his, quae praecesserunt, quod essentia altissima est esse sufficientiae per seipsam’.

79 William adds to the already discussed Avicennian argument for the eternity of the world a further argument which the Peripatetics could have urged. This argument concludes from God’s being the most sufficient cause that he must necessarily create the universe from all eternity. See William of Auvergne, *De universo* IIa-1ae, c. 8, p. 692aF–G, esp. the statement on p. 692aG: ‘Manifestum igitur est, quia omnimoda sufficientia causalitatis creator est per semetipsum solum causa sufficientissima universi, quare conjunctissima cum ipso; quare ex necessitate eo posito, ponitur universum. Hujusmodi autem conjunctio prohibet separationem inter causam et causatum. Non fuit igitur creator nec in aeternitate, nec in tempore separatus ab universo, quod est dicere sine universo.’

Avicenna in *Ilāhiyyāt IX*, 4 points out that God does not act by way of nature,⁸⁰ William reproaches the Peripatetics for even putting God on a level with the causes acting out of natural necessity.⁸¹ He emphasizes that any aspect of a necessary operation is totally alien to God's acting to the outside.⁸² Therefore, he categorically differs from both kinds of worldly cause. He indeed acts voluntarily as do human beings, but in a completely different way. In man, sufficiency of cause occurs with the act of volition, so that there is not a twofold potency anymore; that is, the power over the action is lost, and instead the action takes place necessarily. Unlike man, God is not at any moment determined by his own act of volition. He does not lose his power, but has twofold potencies at every moment⁸³ and could always act differently. Therefore, we do not find any aspect of *sufficientia causae* in God and consequently—despite his being the most sufficient cause of the universe—no necessary conjunction between him and the creatures. Although God, according to William, is most sufficient in himself for being a cause and his power is in the ultimate degree of sufficiency

80 See Avicenna, *Šifā'*: *Ilāhiyyāt IX*, 4, p. 327, lines 1–2; *Philosophia prima*, p. 477, lines 56–60: 'Omne enim esse quod est ab eo non est secundum viam naturae ad hoc ut esse omnium sit ab eo non per cognitionem nec per beneplacitum eius: quomodo enim hoc esse posset, cum ipse sit intelligentia pura quae intelligit seipsum?'

81 See William of Auvergne, *De universo* Ia-Iae, c. 21, p. 614bF–G: 'His etenim et similibus respondebo tibi in sequentibus videlicet in destructione antiquitatis sive aeternitatis mundi et stabilitione novitatis ipsius. Et etiam in hoc capitulo aliqua tibi ostendam super his, quorum primum et radicale est voluntas liberrima ac potentissima creatoris, quam libertatem multi non intelligentes erraverunt. Et non solum necessitatem, immo naturalem servitutem imposuerunt creatori existimantes ipsum operari ad modum naturae, qui modus est, ut jam saepe praedixi tibi, modus servientis et modus servilis ... et propter hoc ex necessitate inducti fuerunt in illud inconueniens, ut opinari cogerentur creatorem neque aliud, nec aliter facere potuisse ... Creator autem sic habet bonitatem suam, sic potentiam, sic sapientiam, ut ex ea non exeat nisi quod voluerit et cum voluerit et quomodo voluerit', and c. 26, p. 620aF: 'Si non esset operatus in creatione per electionem suam, et libertatem supereminetissimam, sed per ordinem, quem isti hic opinantur, esset operatus proculdubio per modum naturae. Hic autem modus, prout didicisti, modus est servientis et non libertate ultima et modum operandi et operationem suam eligentis.'

82 While William denies any sufficiency of cause concerning the creation with the aim of securing God's freedom and a world that is not coeternal to him, things are different when it comes to the inner-Trinitarian realm. William claims in *De trinitate*, c. 15, p. 96, line 94–8: 'Quoniam autem prima potentia non eget eductore alio, quo educatur ad actum, sed ipsa est sibi sufficiens per omnia, manifestum est ipsam nec fuisse nec posterius umquam fore, nisi in actu. Quare aeterna est prima generatio et coaeternus aeterno patri primus filius.' This is quite typical for William: when describing the inner-Trinitarian structure, he applies principles and theories deriving from Avicenna—such as the *ex-uno*-principle—which he vehemently rejects for the explanation of God's external action. To this topic, see my article: Avicenna's *ex-uno*-Principle.

83 Similar to the synchronic contingency later found in Duns Scotus.

and fullness,⁸⁴ it is still in no way necessary that he acts. Therefore, ‘his effects are joined to him when he wills and are separated from him when he wills.’⁸⁵ Furthermore, creatures have power only over particular things, and there must be a change in the conditions or dispositions and in the will in order to begin or change actions. God, by contrast, has absolute power over everything possible, and he himself is the only condition for his willing. Therefore, nothing need change in him in order that he might will another thing, not even the will itself:

[I]n the creator on account of a will that is most free and most dominant and on account of his immutability, it is not necessary that he act or begin to act, except when he wills. And notice that it is possible that the creator now will something, but he could have not willed it without any change of his will. In us, however, just the opposite is necessarily the case ... On account of this Avicenna was mistaken on this point, and so too was Aristotle, for they did not see that the creator could will something and could not will it without any change of his will, just as is the case with his knowledge.⁸⁶

According to William, even if Avicenna’s treatment did justice to God’s power, wisdom and will—and indeed Avicenna does mention these properties in *Ilāhiyyāt* VIII, 7 and IX, 4⁸⁷—all three would, for Avicenna, be identical with God’s essence, and Avicenna would have to claim that the essence, being immutable, is restricted to one alternative, which would be a denial of God’s freedom of will. William, by contrast, emphasizes that even although God had always willed that there would be the creation of this actual universe, he could have willed something different, without any change in him. God is not restricted to one thing willed and therefore to one procession from him.

But what about God’s immutability with respect to action? The assumption of the world’s origination would seem to imply that God started to create the

84 See William of Auvergne, *De universo* Ia-Iae, c. 42, p. 641aD: ‘virtus creatoris in ultimitate est sufficientiae et copiositatis.’

85 Ibid. IIa-Iae, c. 9, p. 694aG–H: ‘propter hoc coniunguntur ei causata sua cum vult et separantur ab eo cum vult’. Cf. also Miller, William of Auvergne and the Aristotelians, p. 272.

86 William of Auvergne, *De universo* IIa-Iae, c. 9, p. 694aH–bE: ‘Et attende, quia possibile est, ut creator velit modo aliquid, poterit tamen non velle illud absque ulla mutatione voluntatis suae. In nobis autem econverso se habet ex necessitate ... Et propter hoc erravit Avicenna in hoc, similiter et Aristoteles, qui non viderunt, quod creator posset velle aliquid et posset non velle illud, absque voluntatis suae mutatione, quemadmodum et de scientia se habet’.

87 See Avicenna, *Šifā’*: *Ilāhiyyāt* VIII, 7, esp. p. 294, line 14–p. 296, line 2; *Philosophia prima*, p. 428, line 81–p. 429, line 20 where Avicenna shows the difference between the will of the Necessary Existent and that of human beings. See also ibid. IX, 4, p. 327, lines 13–15; *Philosophia prima*, p. 478, lines 78–82: ‘Certitudo autem intellecta apud eum [sc. primum] est ipsa, sicut nosti, scientia [*ilm*], potentia [*qudra*] et voluntas [*irāda*]. Nos enim ad exsequendum quod imaginamus, indigemus intentione, motu et voluntate ad hoc ut sit; in ipso autem hoc [non] est conveniens [*lā yaḥsunu fihi*], nec potest esse [*lā yaṣiḥḥu lahū*] propter suam immunitatem a dualitate’.

universe with the beginning of time; furthermore, as William acknowledges, God did not create everything at that moment, but continues to create beings at different moments of time. Here change must take place, even if in God's will there is no change. To prohibit such a change was the core of the argument for the eternity of the world discussed above. William's answer to this is that there indeed is no change in God although there is creation, because 'creation does not signify something in the creator, but something from him, nor does illumination signify something in the sun, but rather something from it. For creation is merely the newness of existing or of being from the will of the creator without any means.'⁸⁸ With this, the creation of the world with time is saved in William's eyes.

4 Conclusion

Even if William is in vehement disagreement with Avicenna concerning this most important issue of causality, namely God's acting as the universe's efficient cause, he does not hesitate, as has been shown, to draw widely on Avicenna concerning other issues of causality which are compatible with Christian faith. Inspired by Avicenna, William develops a theory of potency which is important for his theory of efficient causes. He begins his discussion, as Avicenna does, by listing the main usages of the term potency (*potentia*), although his enumeration is a simplified version of Avicenna's list. William then concentrates on the active potency (*potentia agens sive activa*), since this kind of potency is relevant for the classification of efficient causes. He understands active potency as a principle of operations (*principium operationis*), an interpretation which is close to the definition of potency as principle of change (*mabda' al-taḡayyur; principium variationis*), listed by Avicenna as the philosophers' usage of the term. Furthermore, from Avicenna (and indirectly from Aristotle), William takes over the distinction between single and twofold active potency; these correspond to the two basic kinds of efficient causes: natural and voluntary causes. Natural causes possess only single potency and therefore act through necessity, or, as William prefers to characterize it, in the manner of a servant. This characterization, which William regularly repeats, is taken over from Avicenna. In contrast to natural causes, voluntary agents, i.e. human beings and God, have twofold potencies and act by will. God, however, differs from other voluntary agents in that he is most free and immutable. To show the great difference between God's acts and those of all other causes, William

88 William of Auvergne, *De universo* Ia-lae, c. 23, p. 618bF: 'quia creare non dicit aliquid in creatore, sed ab ipso, neque illuminare dicit aliquid in sole, sed ab ipso. Et propter hoc creare non est aliquid in ipso creatore, vel apud ipsum, sed magis ab ipso. Creatio enim non est nisi novitas existendi vel essendi ex voluntate creatoris absque medio.'

introduces the concept of sufficiency of cause (*sufficiencia causae*). God, who is the most sufficient cause, is the only one who is utterly free from *sufficiencia causae*. This concept too is inspired by Avicenna, but William uses it to pursue his own aim: showing God's absolute freedom in the act of the creation of the world with time, contrary to the Peripatetic model, in which—at least according to William's interpretation—God necessarily causes an eternal emanation of the world.

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‘Averroes ubique Avicennam persequitur’:
Albert the Great’s Approach to the *Physics* of the *Šifā*
in the Light of Averroes’ Criticisms¹

Amos Bertolacci

In previous contributions, I have argued that Averroes aims at a systematic and definitive rejection of Avicenna’s philosophy, and that his approach to philosophical sources has two main poles: besides the positive one, represented by Aristotle, a negative one, coinciding with Avicenna. This is attested by several facts. First of all, some of Averroes’ treatises are openly aimed at the rebuttal of Avicenna’s positions, either *in globo* (with a polemical intention expressed in the title) or in the context of specific, independent sections. Even in works whose anti-Avicennian aim is not explicit from the outset or is not structurally evident, criticisms of Avicenna are numerous, and frequently accompanied by long and detailed argumentations. Second, criticisms are wide-ranging, in so far as they address all the main areas of Avicenna’s philosophy, from logic, to the different sections of natural philosophy, to metaphysics, and they are often repeated in similar terms in different works. That is to say, Averroes’ attacks against Avicenna’s positions are not occasional and incidental diversions, but represent a leitmotiv and a concentric target of these works. Finally, the tone of the criticisms is derogatory: Averroes tends by all means to stress the gravity of Avicenna’s errors, and he employs towards this end a style that is direct, emphatic, and polemical, speaking of Avicenna as ‘this man’, expressing surprise in front of his mistakes, and insisting on the faulty character of his positions².

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2 See Bertolacci, Avicenna and Averroes, and id., Averroes against Avicenna. I provide an overview of the criticisms of Avicenna contained in Averroes’ extant commentaries on Aristotle, the underlying reasons of dissent, and the evidence of Averroes’ reaction to the spread

The Aristotelian commentaries by Averroes are a privileged vantage point from which to observe in detail his critical attitude towards Avicenna. These commentaries show, first of all, that Avicenna is the most frequently quoted authority, together with al-Fārābī, after Aristotle, and that—differently from al-Fārābī—the majority of the quotations regarding him are critical. This proves unquestionably that Avicenna represents for Averroes a prime and direct polemical target, regardless of the reasons motivating his dissent. Averroes' commentaries on Aristotle also document that criticisms of Avicenna range over logic, natural philosophy, and metaphysics, in works belonging to different literary genres (epitomes, the so-called 'middle commentaries' or paraphrases, and the so-called 'long commentaries', i.e. the lemmatic explanations) across a long period of Averroes' mature and late career, with a climax reaching the long commentaries. Thus, despite the possible evolution of Averroes' own thought and of his consideration of Avicenna's philosophy, his disagreement with Avicenna shows a remarkable diachronic continuity, although it became more enhanced over time, as Averroes himself acknowledges. Finally, these commentaries also reveal the reasons lurking behind Averroes' disagreement with Avicenna, which revolve around fundamental tenets of the conception of philosophy: Averroes reproaches Avicenna for crucial mistakes in his approach to *falsafa*, in terms of too much originality and innovation with respect to the undisputed authority of Aristotle, an adulteration of the pristine Aristotelianism with Platonism, on the one hand, and Islamic theology, on the other, and the lack of an adequate argumentative methodology, so as to disqualify Avicenna's philosophy *toto coelo* and to upheave it from its roots.

Two of Averroes' long commentaries (*tafsīr*, pl. *tafāsīr*) on Aristotle can be taken as the most glaring expressions of the Commentator's critical attitude towards Avicenna, in terms of variety and intensity of criticisms: they are the Long Commentary on the *Physics* (henceforth: LCP)—lost in Arabic and preserved by the Latin and Hebrew translations—and the Long Commentary on the *Metaphysics* (henceforth: LCM)—extant in Arabic and translated into Latin and Hebrew³. These two commentaries, together with the commentaries on *Posterior Analytics* (LCPA), *De caelo* (LCDC), and *De anima* (LCDA), constitute the five long commentaries on Aristotle that Averroes is known to have written. LCP and LCM, however, contain a number of polemical references to

of Avicenna's philosophy in Andalusia, in «The Andalusian Revolt against Avicennian Metaphysics» (forthcoming).

- 3 A comprehensive overview of the criticisms of Avicenna contained in Averroes' LCP, together with their reception in Albertus Magnus, is given in the table in the Appendix (see also C. Cerami's contribution in the present volume); some of these criticisms are cumulatively recorded in Glasner, *Averroes' Physics*, p. 26, n. 35. A synopsis of the criticisms in the LCM can be found in Bertolacci, *From Athens to Buḥārā*, and id., *Avicenna's and Averroes' Interpretations*.

Avicenna that is unparalleled in the other three commentaries of the same kind: in both, Averroes confronts Avicenna on eighteen doctrinal points⁴, whereas in each of the other three long commentaries the number of criticisms detected to date does not exceed the seven cases (LCDC)⁵. Although recent scholarship is also collecting evidence for the other side of the story—namely Averroes’ silent dependence on Avicenna on many doctrinal issues—in LCP and LCM, as in other commentaries by Averroes, almost every explicit mention of Avicenna coincides with a criticism of this latter: Albertus Magnus (d. 1280) poignantly expresses this tendency by saying that ‘Averroes persecutes Avicenna everywhere’ (Averroes ubique Avicennam persequitur)⁶. The ubiquitous confrontation of the Commentator with his Persian predecessor permeates, to different extents and degrees, all his Aristotelian commentaries, being surely one of their most striking features. This tendency reaches its climax in LCM and LCP, where expressions like ‘Avicenna peccavit maxime’ (LCP) or ‘Et mirum est de isto homine quomodo erravit tali errore’ (LCM) can be found. The echo of this polemic was widespread and long-lasting, being still visible in Francisco Suárez in the sixteenth century (*Disputationes metaphysicae*, I, 1, 11).

Averroes’ criticisms of Avicenna contained in LCP and LCM have elicited various kinds of reactions in Latin Medieval philosophy, where both Averroes and his ‘antagonist’ Avicenna were greatly esteemed *auctoritates*. Elsewhere, I have documented how Albertus Magnus, in his own Commentary on the *Metaphysics*, faces the criticisms of Avicenna’s metaphysics (essentially the *Science*

4 One of the mentions of Avicenna in Averroes’ LCP (no. 17 in the table in the Appendix) is meant by Averroes as a (veiled) criticism, despite not being followed by an outspoken rebuttal of Avicenna’s position, since immediately after the report of Avicenna’s opinion Averroes expresses a personal stance on the issue that looks like an alternative to Avicenna’s; he possibly does not engage into an explicit rebuttal of Avicenna’s view, since he is going to criticize this same opinion of Avicenna shortly afterwards, in criticism 18. In Averroes’ LCM, on the other hand, a further reference to Avicenna (see *α.15*, p. 47, lines 10–12 [fol. 35E]) regards Avicenna’s followers, to the exclusion of Avicenna himself, and cannot be counted among the criticisms of this latter. Here and in what follows, the quotations of Averroes’ LCM indicate the book of the *Metaphysics* commented upon by Averroes, and the section of Averroes’ commentary (for instance: *α.15* = book Alpha Elatton, *commentum* 15), and report the number of pages and lines of Bouyges’ edition (for instance: p. 47, lines 10–12), followed, between square brackets, by the folia of the Giunta 1562 edition of the Latin translation and their sections (for example: [fol. 35E]).

5 At the present state of research, six criticisms of Avicenna can be ascertained in LCPA, seven in LCDC (on this, see the article by C. Cerami in the present volume), whereas two references to Avicenna (one of which critical) surface in the LCDA. If the investigation is extended, beyond the long commentaries, also to the so-called ‘middle commentaries’ or paraphrases (*talāhīs*) and to the epitomes (*ḡawāmi*), one arrives at most at thirteen criticisms in the Epitome of the Metaphysics, whereas in all the other commentaries the cases of dissent are no more than five.

6 Albertus Magnus, *Physica* (henceforth: *In Phys.*), II, 1, 3, p. 85, lines 2–3.

of *Divine Things*, *Ilāhiyyāt*, of Avicenna's *Book of the Cure* or of the *Healing*, *Kitāb al-Šifā'*, known to Albertus through its Latin medieval translation) that were available to him in the Latin translation of Averroes' LCM⁷. Albertus' Commentary on the *Metaphysics*—written by him as a retired bishop in the Dominican Kloster of Würzburg between 1264 and 1267—exhibits an original, articulated, and coherent line of action, by means of which Albertus minimizes, in a way, veils, in another, and overcomes, in still another, the conflict of thought between his two Arabic sources. On the issues about which Avicenna's and Averroes' standpoints are at odds, Albertus adopts a harmonizing strategy, that consists in (1) disregarding some of the cases of disagreement; (2) reporting all the other cases in such a way that the conflict between Avicenna and Averroes may pass unnoticed by the reader; and (3) finding theoretical solutions to the most relevant disputed issues that he reports. (1) In other words, on what we can call the 'material' level of the strategy, Albertus removes a good deal of disagreement by omitting some of Averroes' criticisms from his commentary. (2) Then, on the 'stylistic' level, he disguises the remaining contrasts by means of argumentative devices that avoid a joint mention of Avicenna and Averroes on the issues at stake. (3) Finally, on the 'doctrinal' level, he also provides a theoretical accommodation to the most crucial issues, through the introduction of theories that can mediate between Averroes' and Avicenna's contrasting positions. In the case of the Commentary on the *Metaphysics*, this tendency can be observed in the case of the pivotal doctrine of the primary concepts or 'transcendentals', where in the remaining points of conflict Albertus seems to sympathize with Averroes' stances. This multi-layer strategy has the effect of concealing in complementary ways—by means of elimination, disguise, and settlement—the recurrent disagreement with Avicenna that Albertus finds in Averroes. In virtue of this line of action, the Commentary on the *Metaphysics* represents a noteworthy case: it is the only Aristotelian commentary of Albertus in which the latter, despite using the corresponding Long Commentary of Averroes, does not reproduce explicitly (i.e. by naming both Avicenna and Averroes) any of the criticisms of Avicenna that he finds in Averroes. This is a conscious and deliberate move, since Albertus shows himself to be deeply aware of the dissent that he tries to conceal: the Commentary on the *Metaphysics* has, in fact, another striking feature, in so far as it is one of the few Aristotelian commentaries by Albertus in which Avicenna and Averroes are never explicitly said to be in agreement on any other position.

The present contribution aims at comparing Albertus' attitude towards Avicenna and Averroes, as expressed in the Commentary on the *Metaphysics*, with the approach displayed in his earlier Commentary on the *Physics*, with regard

7 Bertolacci, Albert's Use of Avicenna; id., From Athens to Buḥārā, and id., Avicenna's and Averroes' Interpretations.

to the first section of *Natural Philosophy* (*Samā‘ tabī‘ī*) of Avicenna’s *Šifā‘* and Averroes’ LCP. The study of Albertus’ attitude will be conducted on a large scale, i.e. with regard to all the criticisms by Averroes against Avicenna that Albertus could find in his sources⁸. The reasons for selecting Albertus’ Commentary on the *Physics* as a term of comparison are mainly three. First, the *Physics* is the first work of Aristotle that the *doctor universalis* commented upon: the commentary was written in the newly opened *studium* of the Dominican order in Cologne around 1250, about fifteen years before the Commentary on the *Metaphysics*. The chronological distance, therefore, allows us to evaluate whether Albertus’ attitude towards the two Arabic masters has evolved in any significant way over time. Second, the Commentary on the *Physics* represents a case study which is similar, in format and sources, to that of the Commentary on the *Metaphysics*: both commentaries are instances of the same type of exegesis, namely the paraphrase with digressions commonly adopted by Albertus; and in the Commentary on the *Physics*, as in that on the *Metaphysics*, Albertus had at his disposal and used quite extensively the Latin translations of Avicenna’s and Averroes’ corresponding works, which represent, after the Latin translation of the text of Aristotle commented upon, the works most widely cited and exploited⁹. Finally, as already stated, in both commentaries the author was put in front of a debate between his main Arabic sources that was so ample and heated as to impose on him, as on any other commentator attentive to the Arabic transmission of Aristotle’s philosophy, a determined stance on the dispute and some ensuing interpretive choices and strategic decisions.

From the comparison of Albertus’ commentaries on the *Metaphysics* and on the *Physics*, noteworthy differences surface with respect to his consideration of Avicenna and Averroes. These differences point to a sensible change in Albertus’ approach to his two main Arabic sources, from which a precise evolution in his thought can be traced, and clarifying light can be shed on the intellectual tendencies at work in the Latin philosophy of the time. This adds a further

8 The study of the reception by Albertus Magnus of Averroes’ criticisms of Avicenna in LCP has been piece-meal so far (specific criticisms are discussed, for instance, in Weisheipl, *Albertus Magnus and the Oxford Platonists*, p. 138, n. 83; Hasse, *Spontaneous Generation*, p. 163, and Noone, *Albert on the Subject of Metaphysics*, pp. 547–8).

9 Neither Averroes’ LCPA (translated into Latin from Hebrew in the 16th century), nor the part of Avicenna’s *Kitāb al-Šifā‘* corresponding to the fourth section of the *Organon*, was available to Albertus (the hypothesis that Albert might have known unattested Latin translations of the logic of the *Šifā‘* is discussed in Janssens, *Albert le Grand*, and the studies quoted therein). In the Commentary on the *De caelo*, Albert did not use Avicenna’s original work, not yet translated at his time (see Bertolacci, *A Community of Translators*), but the *De caelo et mundo* falsely ascribed to Avicenna. For the Commentary on the *De anima* (henceforth *In De anima*), finally, Albert could find in Averroes’ LCDCA only one criticism of Avicenna (see above, n. 5).

element of interest to the study of the reception of Avicenna and Averroes in Albertus' Commentaries on the *Physics* and the *Metaphysics*, pointing to an aspect that overcomes the boundaries of the scholarship on Albertus Magnus: this reception is interesting not only historically, since it portrays Albertus as a protagonist of the crucial phase of the transmission of Arabic physics and metaphysics into Latin, in so far as it documents the process of joint reception of the two fundamental Arabic accounts of Aristotle's works in some of the earliest, most extensive, and most influential Latin commentaries thereupon; stylistically, in as much as Albertus' exegetical method of paraphrasing Aristotle's text and inserting in it doctrinal digressions can be seen as a sort of hybrid between Avicenna's and Averroes' respective styles; or doctrinally, since Albertus tries to solve and overcome the conflict between the views of these two Arabic authors on many relevant issues. From the perspective adopted here, this study can also provide a glimpse of the intellectual climate of Latin philosophy and theology in a crucial phase of the development of Latin Aristotelianism, at the time of the increasing success of Averroes' interpretation of Aristotle in the faculties of arts in Christian Europe, and on the eve of the Paris condemnation of 1277.

In order to document the aforementioned differences, in what follows I will adopt the threefold perspective already displayed in my previous analysis of Albertus' Commentary on the *Metaphysics*, taking as main rubrics Albertus' 'material', 'stylistic', and 'doctrinal' strategy. The final Appendix provides a conspectus of Averroes' criticisms of Avicenna in the LCP discussed in the present contribution, and of their quotations by Albertus in the Commentary on the *Physics*.

1 The Material Strategy ('Omitting Part of the Dissent')

In the Commentary on the *Metaphysics*, Albertus does not deal with all the criticisms of Avicenna contained in Averroes' LCM, but omits many of them. More precisely, he reports only six of the seventeen critical references to Avicenna that he could read in the Latin translation of LCM (one of the eighteen criticisms of the LCM is omitted in the Latin translation¹⁰): he therefore reports almost

10 One of the eighteen criticisms of Avicenna in Averroes' LCM—i.e. criticism 6 (Δ.14, p. 557, lines 16–19 [om.]), according to the numeration provided in the studies mentioned above, n. 7—was not known to Latin readers, since it occurs in an extensive lacuna of the Latin translation. The Latin fate of another criticism is uncertain: in the Giunta 1562 edition, in the 1560 edition by Comin da Trino di Monferrato, and in the provisional texts of D.N. Hasse and S. Georges' forthcoming edition, criticism 19 (Λ.41, p. 1632, lines 1–3 [fol. 324I–K]) is translated without the mention of Avicenna, surely attested in Arabic. It is therefore uncertain whether Albertus was aware of this criticism, although M. Bouyges, the editor of the Arabic text of Averroes' LCM, does not signal any omission of this mention of Avicenna in

one third of the criticisms with which he was acquainted¹¹. Although few in quantity, the six criticisms reported by Albertus are nonetheless representative of the main areas of Avicenna’s metaphysics and of Averroes’ dissent towards it: they concern the epistemology of metaphysics (one criticism)¹², the theory of the primary concepts—or transcendentals—in ontology (four criticisms)¹³, and the doctrine of emanation of forms from the Agent Intellect in philosophical theology (one criticism)¹⁴. With regard to quantity, Albertus accords a decided preference to the second area of dissent, both in absolute and in relative terms: four of the overall six criticisms that Albertus takes into account regard the doctrine of the transcendentals, and Albertus reports four of Averroes’ eight critiques of Avicenna’s view on ‘being’, ‘one’, and ‘necessary’ (i.e. half of the total number of Averroes’ criticisms of this issue). The same preference for the polemic regarding the transcendentals is visible on the stylistic and doctrinal levels (see sections 2–3, below).

This kind of material strategy is certainly at work also in Albertus’ Commentary on the *Physics*: not all the criticisms of Avicenna that one finds in Averroes’ LCP, for example, are reported in Albertus’ own Commentary. But the proportion of Averroes’ criticisms reported by Albertus in the Commentary on the *Physics*, with regard to those available to him, appears to be decidedly higher: Albertus reports expressly nine of Averroes’ fifteen criticisms of Avicenna that he could surely read in the Latin translation (the criticisms reported by him are nos. 2–5, 7, 10, 12, 15, 18)¹⁵. In this case, therefore, the criticisms

the testimonia of the Latin translation that he has consulted (ms. Paris, BNF, Latinus 15453; ed. Lyon 1542). It is reasonable to assume that Albertus was acquainted with all the remaining criticisms.

- 11 Completely omitted are criticisms 1 (α.15, p. 46, line 18–p. 47, line 4 [fol. 35D]), 5 (Δ.5, p. 508, lines 9–11 [fol. 107I]), 8 (Z.31, p. 882, lines 17–19 [fol. 181B]), 9 (Z.31, p. 885, line 18–p. 886, line 3 [fol. 181I]), 11 (I.8, p. 1279, line 12–p. 1280, line 11 [fol. 257E–G]), 12 (I.8, p. 1282, lines 8–12 [fol. 257K]), 14 (Λ.5, p. 1426, lines 11–12 [fol. 293K]), 15 (Λ.6, p. 1436, lines 5–6 [fol. 295D]), 16 (Λ.8, p. 1442, lines 14–16 [fol. 296D]), 17 (Λ.10, p. 1447, lines 15–16 [fol. 297A]) and 19 (Λ.41, p. 1632, lines 1–3 [fol. 324I–K]).
- 12 Criticism 13 (Λ.5, p. 1423, line 18–p. 1424, line 4 [fol. 293D]); cf. Albertus Magnus, *Metaphysica* (henceforth: *In Metaph.*), XI, 1, 3, p. 462, lines 73–7 and 81–3.
- 13 Criticisms 3 (Γ.3, p. 313, line 6–p. 314, line 11 [fol. 67B–E]), 4 (Γ.3, p. 315, lines 3–9 [fol. 67G]), 7 (Δ.14, p. 558, line 17–p. 559, line 14 [fol. 117C–D]) and 10 (I.5, p. 1267, line 15–p. 1268, line 3 [fol. 255B]); cf. *In Metaph.* IV, 1, 5, p. 166, line 67–p. 167, line 72; IV, 1, 4, p. 166, lines 42–51; V, 1, 11, p. 234, lines 37–42; V, 2, 6, p. 243, lines 36–42, and X, 1, 5, p. 437, lines 17–27 and 31–35.
- 14 Criticism 18 (Λ.18, p. 1498, lines 12–15 [fol. 304G]); cf. *In Metaph.* XI, 1, 8, p. 470, lines 9–41.
- 15 At the present state of research it cannot be assessed with certainty whether Albertus was acquainted or not with criticism 8 in Averroes’ LCP, since the passage in question is missing in some of the known codices of the Latin translation; moreover, the Giunta 1562 edition, like the Hebrew translation (see Glasner, *Averroes’ Physics*, p. 26, n. 35), reproduces this

reported are more than half of the entire set, being significantly more numerous than those reported in the Commentary on the *Metaphysics*. In this way, Albertus covers a large part of all the main areas of Averroes' disagreement with Avicenna in the LCP, namely the epistemology of natural philosophy and its relationship with metaphysics (criticisms 2–6, 14), specific issues of natural philosophy regarding the sublunary world (criticisms 1, 7, 8, 15), and specific issues of natural philosophy regarding the superlunary world, with particular regard to the nature of the heavenly motion and the heavenly bodies (criticisms 9–13, 16–18). The same tendency can be observed also in Albertus' Aristotelian commentaries coeval to that on the *Physics*¹⁶. In fact, the proportion between criticisms reported by Albertus in the Commentary on the *Physics* and criticisms known to him can be seen as even higher if one considers that some of the criticisms of Avicenna in Averroes' LCP omitted by Albertus in the Commentary on the *Physics* might have been taken into account by him in the same commentary, as he was reporting other criticisms of Avicenna by Averroes regarding the same or similar issues¹⁷.

passage in a different context (in *commentum* 60 of book A, fol. 36D, rather than in the Prologue of book Γ), without any mention of Avicenna. On the various aspects of this issue, see Schmieja, *Drei Prologe*. According to Schmieja, *Arabic-Latin Reception*, p. 163, Albert is apparently unaware of *commenta* ε.75–81 of Averroes' LCP, which he does not quote in his Commentary on the *Physics*: this portion of Averroes' LCP contains two criticisms of Avicenna (nos. 16 and 17 in the table) that Albertus might therefore not have known. In case of criticisms of Avicenna unknown to, or disregarded by, Albertus, the table reports between square brackets, after the abbreviation "om.", the passages of Albertus' Commentary on the *Physics* corresponding to the loci in question of Averroes' LCP.

- 16 In the Commentary on *De caelo*, likewise, written immediately after that on the *Physics*, Albertus reports more than a half of Averroes' criticisms of Avicenna in LCDC, namely at least four out of seven: one may compare the following four passages of Albertus' commentary (*De caelo et mundo*: [i] I, 3, 4, p. 63, line 61–p. 65, line 7; [ii] II, 3, 5, p. 151, lines 52–65; [iii] II, 3, 8, p. 160, lines 30–31, 69–72, 89–91 and 96–7; p. 160, line 98–p. 161, line 2; [iv] III, 2, 1, p. 221, lines 3–6; III, 2, 8, p. 241, lines 14–15, 22–6 and 44–5) with their corresponding places in the Latin translation of Averroes' LCDC ([i] B.37, p. 340, lines 80–83; [ii] B.42, p. 356, lines 222–4; [iii] B.49, p. 369, lines 60–68; [iv] Γ.67, p. 635, lines 115–39).
- 17 Criticism 6 in Averroes' LCP, although omitted by Albertus, might have inspired part of Albertus' report of criticism 6bis, which he takes from Averroes' LCM: Averroes' idea in criticism 6 that the essence of abstract forms is considered by metaphysics, whereas their existence is considered by physics, recurs also in Albertus' report of criticism 6bis, where Albertus contends that the consideration of the form of the efficient cause escapes the boundaries of physics with regard to essence, whereas it lies within the province of physics with regard to existence. The same applies to criticism 9 in Averroes' LCP: although omitted by Albertus, it seems to have influenced the way according to which he reports Averroes' criticism 10 (cf. in particular the expression 'et caelum non mutat locum secundum totum' in Averroes' criticism 9, fol. 134F, and the expression 'et locum non mutat totum coelum' in Albertus' report of criticism 10, in *In Phys.* IV, 1, 13, p. 226, lines 37–8; both expressions are underlined in the Appendix). Likewise, Albertus might have taken into account jointly

Moreover, one notices in Albertus’ Commentary on the *Physics* a certain tendency to *increase*, with respect to Averroes, the number of criticisms of Avicenna, according to an attitude that is not noticeable in the Commentary on the *Metaphysics*¹⁸. This happens in two ways: either because Albertus reports also in the Commentary on the *Physics* a criticism of Avicenna (criticism 6bis) which, although related with criticism 6 in LCP, stems originally from Averroes’ LCM, and will be reported by him also in the Commentary on the *Metaphysics*¹⁹; or because he adds by his own initiative further polemical references to Avicenna, extending to this latter criticisms that Averroes directs exclusively against other authors (Ibn Bāḡḡa)²⁰.

The smaller number of criticisms of Avicenna by Averroes reported by Albertus in the later Commentary on the *Metaphysics*, with respect to those reported in the earlier Commentary on the *Physics*, might look far from unexpected. One could observe, for instance, that some criticisms of Avicenna occur both in Averroes’ LCM and in Averroes’ LCP, being real *loci paralleli* in the two works, and that Albertus reports some of them only in the Commentary on the *Physics*, passing them over in silence in the Commentary on the *Metaphysics*²¹: Albertus might have been unwilling to repeat in the Commentary on the

criticism 17, omitted by him, and criticism 18, reported by him, which deal with the same issue.

- 18 Averroes’ criticism 10 in LCP is reported by Albertus according to two distinct formulations, the first occurring in *In Phys.* IV, 1, 13, p. 226, lines 30–51, the second in *ibid.* V, 1, 8, p. 416, line 65–p. 417, line 61 (see points (1) and (2) in the Appendix, below). The same duplication of a single criticism of Avicenna by Averroes in Albertus’ report can be found in LCM (see criticism (7)). Likewise, one can compare *In De caelo* III, 2, 1, p. 221, lines 3–6, with *ibid.* III, 2, 8, p. 241, lines 14–15, 22–6 and 44–5.
- 19 The contrast of opinions between Avicenna and the *plures sapientium* (p. 102, line 29) and the *plurimi Peripateticorum* (p. 103, line 5) in *In Phys.* II, 2, 3—although possibly inspired by criticism 6 in Averroes’ LCP—seems to mirror directly criticisms 13 and 18 in Averroes’ LCM, both reported by Albertus in the Commentary on the *Metaphysics*.
- 20 Albertus Magnus, *In Phys.* IV, 2, 7, p. 247, lines 59–61: ‘Propter haec et his similia dicit Averroes deceptum esse Avempace, et Avicennam per consequens relinquitur condeceptum’ (emphasis added; cf. Averroes LCP Δ.71, fols 160C–161F). In the table in the Appendix, this criticism by Albert without parallel in LCP is reported between criticisms 11 and 12, with specification of its additional character. In *In De anima* II, 3, 33, pp. 145–6, the *altercatio* between Alexander, Themistius and Avicenna, on the hand, and Averroes, on the other, does not correspond to any criticism of Averroes against Avicenna.
- 21 For example, criticism 1 of Avicenna in Averroes’ LCM (about Avicenna’s doctrine of the possibility of spontaneous generation of human beings), omitted by Albertus in the Commentary on the *Metaphysics*, corresponds to criticism 15 of Avicenna in Averroes’ LCP, reported by Albertus in the Commentary on the *Physics* (see Bertolacci, Averroes against Avicenna, and the bibliography quoted therein; Cerami, *Génération et substance*, p. 529). A thematic affinity can be noticed also between criticism 19 in Averroes’ LCM (on Avicenna’s distinction of necessary *per se* and necessary *per aliud*), omitted by Albertus in the Com-

Metaphysics a criticism already discussed *in extenso* in the Commentary on the *Physics*, as well as in other previous works of his²². This hypothesis, however, does not account for all the evidence, and applies only to two cases out of four, since in two other cases Albertus reports the same criticism both in the Commentary on the *Physics* and the Commentary on the *Metaphysics*²³. Another explanation, not incompatible with the former, presents itself: Albertus' inclination to report, and therefore underscore, the dissent between Avicenna and Averroes might have decreased over time. Only future, more comprehensive research on the reception of Avicenna and Averroes in Albertus' oeuvre will be able to assess whether this second hypothesis is correct. But the other two elements of his strategy that we are going to analyze seem to point in this direction.

2 The Stylistic Strategy ('Disguising the Dissent')

In the Commentary on the *Metaphysics*, Albertus never states explicitly that Averroes is criticizing Avicenna when he reports the criticisms of Avicenna by Averroes that he decides to take into account in the commentary. As a matter of fact, Albertus never mentions Avicenna together with Averroes in connection with Averroes' criticisms: he refers explicitly to the names either of Avicenna or of Averroes in three of the six aforementioned criticisms, but he never mentions the two authors together²⁴. In this way, no reader of Albertus' Commentary on

mentary on the *Metaphysics*, and criticism 18 in Averroes' LCP, reported by Albertus in the Commentary on the *Physics*.

- 22 See *In Metaph.* VII, 2, 9, p. 351, lines 51–66: 'Dubitari autem potest de his quae ex putrefactione generantur ... Sed nos iam de his in *Meteoris* et aliis locis librorum naturalium reddidimus causam ...'. Albertus reports the topic under discussion not only in the Commentary on the *Physics* (VIII, 2, 10), but also in the *De causis proprietatum elementorum* I, 2, p. 85, line 29–p. 87, line 23).
- 23 Two other criticisms of Avicenna by Averroes regarding similar topics in LCP and LCM, like criticism 4 in the LCP and criticism 13 in the LCM (about whether the proof of the existence of nature belongs to the province of physics or metaphysics), are reported by Albertus both in the Commentary on the *Physics* and the Commentary on the *Metaphysics*. In the following passage of the Commentary on the *De caelo*, Albertus announces a future, lengthier treatment of Averroes' criticism (with regard to *In Metaph.* XI, 3, 4): 'Sed tamen in hac materia intellectus sunt diversae sententiae Peripateticorum ... Et illa quidem quae est Aristotelis ... est, quod intelligentia sit forma caeli ... Et in hanc sententiam omnimodo convenit Averroes ... Avicenna autem et Theodorus parum ab ista declinant opinione. Dicunt enim ... caeli esse duplicem motorem, animam videlicet et intelligentiam, et intelligentiam esse extra et animam intra ... Haec autem sententia [sc. Avicennae et Theodori] non videtur conveniens ... *Erit autem alias locus de his latius tractandi*' (*In De caelo*, I, 3, 4, p. 63, line 61–p. 65, line 7, emphasis added).
- 24 One encounters four times the name 'Avicenna', all in the context of the report of criticism 3 (*In Metaph.* IV, 1, 5, p. 166, line 74, and p. 167, lines 15, 39 and 66); and twice the name

the *Metaphysics* lacking a direct knowledge of Averroes’ LCM would be able to guess a disagreement between the two Arab authors simply on the basis of Albertus’ report.

This concealment of dissent is performed in three main ways. (i) In some cases, Albertus reports the criticism as such (namely as an argument directed by someone against someone else) without mentioning, however, both Avicenna and Averroes as, respectively, the target and the source of the criticism, but referring to *either* of them or to *none* of them. More specifically, either he presents the criticism as coming from Averroes, but as regarding in general a group of unidentified authors (*alii*), rather than Avicenna in particular (criticism 18 in LCM)²⁵; or he disguises the identity of both the target and the source of the criticism by means of expressions like *quidam* and *quidam alii* (criticism 13 in LCM). (ii) In a second series of cases, Albertus does not report the criticism as having two poles, but simply either as an argument having a definite target but not having a definite source, or as an argument having a definite source but not having a definite target: thus, he presents the Avicennian doctrine criticized by Averroes as a more or less erroneous position held by Avicenna himself (criticism 3 in LCM) or by *quidam* (criticism 10 in LCM), but he does not ascribe the criticism of this doctrine to anyone (be he Averroes or someone else); he rather discards the Avicennian doctrine in question, more or less decidedly, by means of considerations which, though deriving from Averroes, are presented as his own. Conversely, Albertus occasionally ascribes the argument in question to Averroes but he does not specify any target for it (second report of criticism 7 in LCM). (iii) In a third series of cases, finally, Albertus totally deprives Averroes’ criticism of its character of an argument *ex persona ad personam* and simply adopts the doctrine by means of which Averroes refutes Avicenna’s stance, omitting whatever indication of the existence of a target and a source of the argument in question (criticism 4, and first report of criticism 7 in LCM). It does not seem coincidental that the most elliptical ways of reporting the criticisms (the second and the third ways just recalled) are concerned entirely and exclusively with the doctrine of transcendentals. Albertus seems to consider

‘Averroes’, once in the context of the report of criticism 7 (*ibid.* V, 1, 11, p. 243, line 38), and once in the context of the report of criticism 18 (*ibid.* XI, 1, 8, p. 470, line 33).

25 The omission of Avicenna’s name in the report of this criticism is intentional, since elsewhere Albertus does not hesitate to ascribe expressly the doctrine in question to Avicenna (see *De unitate intellectus* 2, p. 2, lines 61–4). Moreover, at the beginning of the digression in which this criticism is reported (*In Metaph.* XI, 1, 8, p. 468, lines 51–5), Albertus describes the phenomenon of spontaneous generation with examples taken from both Avicenna (‘mures ex terra ... serpentes parvi de capillis mulierum’, cf. Avicenna, *al-Ma’ādin wa-l-āiār* II, 6, p. 76, line 15–p. 79, line 6 [p. 307, lines 7–8]), and Averroes (‘apes ex carnibus vaccarum et vespae magnae citrinae ex carnibus equorum’, cf. LCM A.18, p. 1492, lines 5–6 [fol. 303G]).

this doctrine as the most sensible area of dissent opposing Avicenna and Averroes, and the most in need to be rescued—with stylistic and, as we shall see in section 3, doctrinal devices—from a radical divergence between the two Arab authorities.

Also in this regard, Albertus' Commentary on the *Physics* is markedly different from his Commentary on the *Metaphysics*. In the former, contrary to what he does in the latter, Albertus never reports a criticism in a totally anonymous way: in the majority of cases (seven out of nine), he mentions explicitly both Avicenna's and Averroes' names while reporting Averroes' criticisms; in the remaining two cases, he once reports a contrast of opinions between Avicenna, on the one hand, and *plures sapientium* and *plurimi Peripateticorum*, on the other, Averroes being apparently referred to by means of these two more general labels (criticism 6bis, taken from Averroes' LCM); and once he mentions only Avicenna without mentioning Averroes or any other opponent to Avicenna (criticism 12).

Moreover, rather than disguising the dissent, in the Commentary on the *Physics* Albertus very often emphasizes it: in several cases, he stresses the contrast of opinions between Avicenna and Averroes, speaking openly of a *dubitatio* determined by Avicenna and Averroes' opposition, and of a *contradictio*, a *reprehensio* and even a *persecutio* (as we have seen) launched against Avicenna by Averroes²⁶. Only in one case (criticism 7), Albertus' report does not emphasize the confrontation between Avicenna and Averroes; this happens in two ways: on the one hand, he indicates simply that Avicenna's and Averroes' opinions on a certain issue are different, avoiding an explicit mention of an opposition between them²⁷; on the other hand, he inserts both Avicenna and Averroes in a larger group of disputants (Averroes among the *Peripatetici posteriores* together with Alexander of Aphrodisias, Themistius and others, on the one side; Avicenna together with his followers, on the other side)²⁸. But the cases in which the confrontation is minimized, by means of stylistic devices

26 Report of criticisms 2, 3, 4, 5, 10 (second report), 15 and 18.

27 In the report of criticism 7, Albertus does not explicitly mention a dispute between Avicenna and Averroes, but he says to prefer the opinion of Averroes (together with Alexander of Aphrodisias and Themistius) to that of Avicenna and his followers. The difference of views between Avicenna and Averroes, with no reference to their opposition, emerges also in the first report of criticism 10.

28 In the first report of criticism 10, Albertus from the very beginning portrays Avicenna as following Alexander of Aphrodisias in the opinion contested by Averroes, and mentions first Alexander and then Avicenna as the upholders of the doctrine in question, whereas in LCP Avicenna is the main target of the criticism, Alexander of Aphrodisias being mentioned only at the end as the cause of Avicenna's error. It remains unclear whether this way of reporting Averroes' criticism does or does not amount to a way of minimizing the confrontation.

such as these, represent the exception: in the Commentary on the *Physics*, the majority of Averroes’ criticisms are reported by Albertus in this ‘dramatic’ way, with the two main characters mentioned jointly and portrayed as rivals. The same tendency to refer to both Avicenna and Averroes by name and to emphasize their dissent when the latter criticizes the former can be seen in Albertus’ commentaries coeval to that on the *Physics*²⁹.

This inclination to manifest the dissent in the Commentary on the *Physics* and to hide it in the Commentary on the *Metaphysics* might somehow be causally related to Albertus’ tendency to refer less frequently to Averroes and Avicenna as *auctoritates*, and to their works as normative texts, in the Commentary on the *Metaphysics* than in previous commentaries, apparently a sign of his

29 Significant evidence is provided by the Commentary on the *De caelo*, where Albertus reports four criticisms of Avicenna by Averroes, and quotes one of these criticisms in two distinct places of the commentary (see above, n. 16): in each case he mentions the names of both Avicenna and Averroes, and in three cases out of four he emphasizes the contrast, mentioning a *reprehensio* and a *redargutio* of Avicenna by Averroes and an *altercatio* between the two, saying at one point that Averroes ‘strikes Avicenna’s violation’ (*impingit crimen Avicennae*) (see *In De caelo* II, 3, 5, p. 151, lines 52–65: ‘Et utitur tali modo loquendi Averroes reprehendens Avicennam ... Et hoc dictum [sc. Averrois] absurdissimum est ... Et hoc idem dicit Averroes in libro suo, quem vocat De natura et substantia orbis, contradicens sibi ipsi’; II, 3, 8, p. 160, line 30–p. 161, line 2: ‘Est autem sciendum hic esse altercationem Averrois contra Avicennam ... Est autem ista redargutio secundum nos omnino irrationabilis, quia opinamur Avicennam veritatem dixisse, et quod ipse [sc. Averroes] dicit de dextro et sinistro, non totam dicit rationem Avicennae’; III, 2, 1, p. 221, lines 3–6: ‘Et istud in suis libris tradunt Avicenna et Averroes, licet in Caelo et mundo Averroes contradicere videatur Avicennae, et est sua contradictio in verbis tantum’; III, 2, 8, p. 241, lines 14–45: ‘Propter quod etiam Averroes impingit crimen Avicennae ... In commento autem Libri peri geneleos Averroes consentit cum Avicenna ... et ideo si Averroes hic contradicit Avicennam, ipse contradicit sibi ipsi ... et non est secundum rem contradictio aliqua inter istos duos viros ...’). In the remaining case (*ibid.* I, 3, 4, p. 63, line 61–p. 65, line 7), he simply speaks of ‘different opinions among the Peripatetics’ with regard to both Avicenna and Averroes. See also Albertus Magnus, *De causis proprietatum elementorum* I, 2, 13, p. 85, lines 32–3: ‘Est autem altercatio magna inter Avicennam et Averroem in suis libellis de diluviis ...’; *Super Ethica* I, 6, p. 26, lines 29–46: ‘Sed contra hoc videtur esse, quod dicit Avicenna ... Et sic tantum est verum dictum Avicennae; unde etiam Commentator de hoc dicto arguit ipsum’, and *In De anima* II, 3, 33, p. 145, line 65–p. 146, line 32, quoted above, n. 20. The aforementioned passage of *Super Ethica* I, 6, p. 26, lines 29–46, can be compared with *In Metaph.* V, 1, 11, p. 234, lines 37–42, where the same criticism is reported but neither Avicenna nor Averroes are mentioned. The criticism of Avicenna’s doctrine according to which heavenly bodies have phantasy in Averroes’ LCDC B.37, p. 340, lines 80–83, is reported with mention of both Avicenna and Averroes in the above mentioned passage of Albertus’ Commentary on the *De caelo* I, 3, 4, p. 63, line 61–p. 65, line 7, as well as in the Commentary on the *Liber de causis* (*De causis* I, 4, 7, p. 53, lines 3–69 and II, 1, 12, p. 74, lines 75–80), whereas in the Commentary on the *Metaphysics* it is reported with the explicit mention of only Avicenna (*In Metaph.* XI, 2, 34, p. 526, lines 27–43 and XI, 3, 4, p. 538, line 32–p. 539, line 27).

increasing assimilation of the Arabic philosophical heritage³⁰. But it is unlikely that this greater independence from Avicenna and Averroes as philosophical sources can alone explain the absence of any explicit mention of the criticisms of the former by the latter in the Commentary on the *Metaphysics*. In all likelihood, a precise decision on Albertus' part is also involved. The analysis of the doctrinal register of Albertus' strategy seems to confirm this impression.

3 The Doctrinal Strategy ('Eliminating the Dissent')

From the doctrinal point of view, in the Commentary on the *Metaphysics* Albertus eliminates the dissent between Avicenna and Averroes in a crucial theoretical area, that of the doctrine of transcendentals: this doctrine is of central importance, since it lies at the core of Aristotle's and Avicenna's metaphysics, represents a pivotal element of Averroes' anti-Avicennian polemic—judging from the number, intensity and recurrence of Averroes' criticisms—and is rightly detected as fundamental also by Albertus, on account of the frequency of his reports of criticisms of Avicenna by Averroes regarding this doctrine (four of the overall six, as we have seen, i.e. half of Averroes' eight criticisms on this topic). The elimination of dissent occurs as follows: in reporting the first of Averroes' criticisms regarding this doctrine (criticism 3 in LCM), Albertus shows that the position of Avicenna (whom he names several times) is not substantially different from the right one, namely from the position of Aristotle expounded and defended by Averroes (whom he does not name), and can therefore be saved and justified³¹. Criticism 3 in Averroes' LCM is the first,

30 In the Commentary on the *Physics*, one encounters 76 mentions of the name 'Avicenna' (or 'Albuali') and 60 mentions of the name 'Averroes' (or 'Commentator'); in the Commentary on the *Metaphysics*, the mentions of 'Avicenna' and 'Averroes' are, respectively, 26 (grouped around 17 quotations) and 33 (in 23 quotations). Only the explicit mentions of the Latin name of al-Ġazālī appear to have increased: they are 3 in the Commentary on the *Physics* ('Algazelus', 'Algazel'), 8 in the Commentary on the *Metaphysics* ('Algazel', 'Abihamidin'). In the Commentary on the *Physics*, the titles of the corresponding works of Avicenna ('*Sufficiencia*', *In Phys.* I, 3, 12, p. 60, line 67; II, 2, 12, p. 117, line 55 and IV, 1, 10, p. 220, line 63) and of Averroes ('*Commentum Physicorum Aristotelis*', *ibid.* VIII, 1, 11, p. 572, lines 3–4) are mentioned a few times; in the Commentary on the *Metaphysics*, on the other hand, Averroes' commentary is mentioned once ('*Commentum super Metaphysicam Aristotelis*', *In Metaph.* I, 1, 5, p. 8, lines 1–2), whereas the title of no work of Avicenna is mentioned. The data regarding Albertus' Commentary on the *Physics* are taken from the Index 'Auctores ab Alberto ipso allegati' in the critical edition of Albertus' commentary. The data regarding the Commentary on the *Metaphysics*, on the other hand, are the results of the revision of the entries regarding Avicenna and Averroes in the Indices of the critical edition: see Bertolacci, *A New Phase of the Reception of Aristotle*.

31 See Bertolacci, *Albert the Great*, and *id.*, *The Reception of Avicenna's 'Philosophia Prima'*.

longest and most detailed of Averroes’ criticisms of Avicenna on the issue of transcendentals; the remaining criticisms regarding this doctrine can be taken as attacks regarding particular aspects of the issue taken into account in its full scope in criticism 3. For this reason, the consensus created by Albertus between Avicenna and Averroes in this case—together with the stylistic strategy observed above about the doctrine of transcendentals in general—allows the interpreter to assume that, in Albertus’ eyes, Avicenna and Averroes do not substantially disagree also on the subsequent disputed points of the theory of transcendentals, and, more in general and by extension, on metaphysical doctrine *tout court*.

For the rest, in the case of the other five criticisms that he decides to report, Albertus shows a marked preference for Averroes’ anti-Avicennian positions. Either Albertus adopts Averroes’ anti-Avicennian standpoint without naming either Avicenna or Averroes (about an aspect of the doctrine of transcendentals: criticism 4, and first report of criticism 7 in LCM); or he subscribes to Averroes’ anti-Avicennian stances and arguments, saying that Averroes is right without naming Avicenna (about an aspect of the doctrine of transcendentals: second report of criticism 7 in LCM); or he contends conversely that Avicenna’s position, ascribed to *quidam*, is wrong without naming Averroes (about an aspect of the doctrine of transcendentals: criticism 10 in LCM); or he endorses the standpoint of Averroes, whom he names, and discards Avicenna’s position, which he ascribes to *alii* (about the ‘giver of forms’, criticism 18 in LCM). In another case, he rejects both the doctrine of Avicenna criticized by Averroes (ascribed to *quidam*), and the doctrine of Averroes (ascribed to *quidam alii*) on account of which this latter criticizes Avicenna (about the relationship between metaphysics and natural philosophy: criticism 13 in LCM). Thus, in four of these five cases, Albertus sides with Averroes against Avicenna, the fifth case being neutral, since about it Albertus holds that both alternatives are wrong. In other words, Avicenna (or his position) is never said by Albertus to be right at all, and Averroes (or his position) is never said to be wrong alone, i.e. in opposition to Avicenna.

Albertus’ Commentary on the *Physics* is different from the Commentary on the *Metaphysics* in three noteworthy aspects. First, in it the only case of real elimination of the dissent between the two authors does concern, properly speaking, *none* of Averroes’ criticisms of Avicenna in the LCP: it is Albertus’ account of criticism 6bis, which is a very *sui generis* report of a criticism of Avicenna by Averroes. The issue is whether the efficient cause is within matter and belongs to the principles of natural philosophy (according to the *plures sapientium* and the *plurimi Peripateticorum*, opponents of Avicenna), or it is rather immaterial and belongs to the domain of metaphysics (according to Avicenna): on this issue, Albertus endorses a neutral stance and states that both positions are partly tenable, since they rightly portray distinct aspects

of the problem, and leaves the reader free to endorse whatever alternative he prefers³². The opposition of views between the other thinkers and Avicenna reported by Albertus does not have any exact correspondence in Averroes' LCP, and appear to derive from two of Averroes' criticisms of Avicenna in LCM (criticisms 13 and 18, about Avicenna's doctrine of the *dator formarum*). From their *loci paralleli* in Albertus' Commentary on the *Metaphysics*, we infer that Averroes can be inscribed, in Albertus' intentions, among the *plures sapientium* and the *plurimi Peripateticorum*. Only the distinction by means of which Albertus accommodates the dispute, namely the idea that the consideration of the existence of the efficient cause falls within the domain of natural philosophy, whereas the study of its essence within metaphysics, derives possibly from criticism 6 of Averroes' LCP (about the scientific consideration of the existence of abstract forms in natural philosophy and of their essence in metaphysics). Criticism 6 in Averroes' LCP, however, is neither the first nor the most relevant of the Commentator's attacks on Avicenna's consideration of the epistemology of natural philosophy.

Albertus' report of criticism 6bis is therefore a 'hybrid' in various respects: with respect to its sources, since it conflates three distinct criticisms by Averroes, two in LCM and one in LCP; and with respect to Albertus' doctrinal preferences, since in it Albertus in a way parts company from Averroes, in so far as he does not totally subscribe to the position of the *plures sapientium* and the *plurimi Peripateticorum* with whom Averroes is associated, and in a way adheres to his stand-point, since he takes from the Commentator the fundamental distinction by means of which he solves the riddle, thus showing a considerable ambiguity towards Averroes. In the Commentary on the *Metaphysics*, Albertus' treatment of criticism 3 is markedly different: first of all, Albertus' report is very similar, occasionally verbatim identical, to criticism 3 in Averroes' LCM; secondly, it reveals a much more clear-cut and exclusive doctrinal preference for Averroes' position. More generally, the way of determining the doctrinal consensus between Avicenna and Averroes in the two cases is different: in the Commentary on the *Physics*, Albertus reaches a consensus between Avicenna and Averroes by means of a sort of compromise between the contrasting positions of the two, namely by agreeing *partly* with both, on the basis of a distinction—taken from Averroes—that is capable of saving a side of both stances. In the Commentary on the *Metaphysics*, on the contrary, Albertus strives to argue that both Avicenna and Averroes, despite their apparent opposition, upheld in fact one and the same thesis, since Avicenna—if deeply

32 Albertus Magnus, *In Phys.* II, 2, 3, p. 103, lines 34–77: 'Ecce haec est sententia utrarumque opinionum, et eligat unusquisque, quod vult. Nos autem dicimus ... quod utraque istarum opinionum vera est secundum aliquem modum ... Et ideo quantum ad essentiam ... verum dicit Avicenna ... sed quantum ad esse verum dicunt alii ...'.

inspected—can be taken to be in substantial agreement with Averroes. In other words, in the Commentary on the *Metaphysics* Albertus produces consensus between Avicenna and Averroes by pointing at an inner congruence between their doctrines, rather than by sharing truth in equal portions between the two rivals, as he does in the Commentary on the *Physics* and in other instances of consensus-making in Albertus’ Aristotelian commentaries coeval to his exegesis of the *Physics*³³.

Second, in the Commentary on the *Physics* Albertus agrees with Averroes (or with Averroes’ position, regardless of whether Averroes is named or not) versus Avicenna only in four cases out of nine, namely about criticisms 4, 7, 10, and 12³⁴. However, in at least three of these four cases, his departure from Avicenna and closeness to Averroes is nuanced: in one case, Albertus uses in part against Averroes a distinction that he draws from Averroes’ LCP, thus presenting as alternative to Averroes’ criticism of Avicenna a solution of the issue that he draws from Averroes himself (criticism 4)³⁵; in another case, he says that he agrees *more* with Averroes *than* with Avicenna, implying that Avicenna’s position is not totally false (criticism 7); in the third case, finally, he endorses Averroes’ position with some kind of hesitation and in a qualified way (‘Et hoc [sc. dictum Averrois] videtur esse concedendum. *Tamen res subtilis est haec et magna indigens consideratione*’, second report of criticism 10). In the other five quotations of criticisms of Avicenna taken from Averroes’ LCP, Albertus sides with Avicenna against Averroes (criticisms 2, 3, 4, 15, 18).

33 See Albertus Magnus, *De causis proprietatum elementorum* I, 2, 13, p. 86, lines 53–4: ‘Videtur autem mihi, quod utriusque secundum aliquid consentiendum sit’, and id., *In De anima* II, 3, 7, p. 109, lines 46–7 (on color): ‘Nos autem quantum intelligere possumus, utrosque [sc. Avicennam cum Avempace, et Averroem cum Alexandro] secundum aliquam partem verum dicere arbitramur’.

34 About criticism 12, Albertus says that Avicenna is wrong for the reasons adduced by Averroes, without however mentioning Averroes.

35 In the report of this criticism, after expounding Avicenna’s position (‘Huic autem sententiae opponit Avicenna ... Respondet autem Avicenna, quod ... naturalis non habet ex sua scientia demonstrare, an sit natura, sed in quantum induit formam philosophi primi; natura enim principium est naturalium. Et ideo supponit ipsam esse naturalis et ipsam esse probat metaphysicus’), and Averroes’ criticism (‘Huic autem sententiae contrarie nititur Averroes, eo quod ubique Avicennam persequitur, dicens, quod simpliciter est impossibile demonstrare naturam esse, sicut dixit Aristoteles’), Albertus proposes a *vera solutio*: ‘Sed vera solutio est quod de natura movente sive motore duplex potest esse quaestio, una quidem an sit, et haec demonstrari non potest; sed tamen negans naturam confutandus est a primo philosopho per deductionem ad inconveniens, sicut dicit Avicenna. Alia autem quaestio est, an differat a mobili vel sit idem cum ipso, et illa quaestio disputatur ab Aristotele; in hac enim bene habetur via demonstrationis ...’. This *vera solutio* mirrors in fact a part of Averroes’ criticism in LCP, B.3, Giunta 1562 edition, fol. 49B–C: ‘... nisi [sc. Avicenna] intendat quod primus philosophus debet contradicere eis qui negant illud principium esse, ut contradicit falsis opinionibus inductis de primis principiis ...’.

Third, in the Commentary on the *Physics* one finds a strenuous defense of Avicenna against some of Averroes' criticisms that is totally absent in the Commentary on the *Metaphysics* ('Dicit enim Avicenna verum ... cum ipsum sit necessarium, quod dixit Avicenna', criticism 2; 'bene dicit Avicenna ... ideo Avicenna non est reprehensibilis', criticism 3; '... patet perspicue, qualiter nulla est falsitas in verbis Avicennae', criticism 5; 'rectum est dictum Avicennae', criticism 18). In the Commentary on the *Metaphysics*, we encounter, at most, an *excusatio* of Avicenna, which amounts to a partial defense of him, but also—by the same token—to a partial charge of error. Conversely, in the Commentary on the *Physics* the defense of Avicenna in front of Averroes' criticisms is accompanied by various accusations launched against Averroes: according to Albertus, Averroes' criticism is faulty ('et tamen reprehendit eum [sc. Avicennam] de hoc Averroes, cum sua reprehensio non careat reprehensione', criticism 3; 'hanc reprehensionem [sc. Averrois] ego non iudico convenientem generaliter', criticism 15); it is irrational ('haec reprehensio [sc. Averrois] non est rationabilis', criticism 18); it is difficult to understand ('nescio, quare Averroes reprehendit, cum ipsum sit necessarium, quod dixit Avicenna', criticism 2); it is tendentious and due to Averroes' animosity against Avicenna ('... Averroes, cuius studium fuit contradicere semper paribus suis ... Averroes, si voluisset, potuisset de facili vidisse, quod ...', criticism 5). This outspoken rejection of Averroes' thought and behaviour has no parallel in the Commentary on the *Metaphysics*. On the contrary, the same defensive attitude towards Avicenna and aversion towards Averroes at work in the Commentary on the *Physics* are noticeable also in Albertus' Commentary on the *De caelo*³⁶.

36 Albertus Magnus, *In De caelo* II, 3, 5, p. 151, lines 52–65: 'Et utitur tali modo loquendi Averroes reprehendens Avicennam ... Et hoc dictum absurdissimum est ... Et hoc idem dicit Averroes in libro suo, quem vocat *De natura et substantia orbis*, contradicens sibi ipsi'; II, 3, 8, p. 160, line 30–p. 161, line 2: 'Est autem sciendum hic esse altercationem Averrois contra Avicennam ... Est autem ista redargutio secundum nos omnino irrationabilis, quia opinatur Avicennam veritatem dixisse, et quod ipse [sc. Averroes] dicit de dextro et sinistro, non totam dicit rationem Avicennae. ... quod dicit orbis super idem centrum omnes constitui, ipse hoc dicit sine probatione, ... et ideo Averroes errat graviter et sequentes inducit in gravem errorem ... Quod autem dicit, quod si caelestia sint eiusdem naturae in genere et diversae in specie, sequitur ipsa esse generabilia: omnino falsum est ...'. In the Commentary on the *De caelo*, the only case in which Albertus contended that both Avicenna and Averroes, despite their apparent opposition, upheld in fact one and the same thesis on a disputed point, was explained by Albertus by means of a certain inconsistency in Averroes' position: Albertus reproached Averroes with holding a certain thesis against Avicenna in a given commentary, but professing a thesis totally congruent with Avicenna in another, thus contradicting himself and making his alleged contrast with Avicenna more verbal than real: see *ibid.* III, 2, 1, p. 221, lines 3–6: 'Et istud in suis libris tradunt Avicenna et Averroes, licet in *Caelo et mundo* Averroes contradicere videatur Avicennae, et est sua contradictio in verbis tantum'. This statement is clarified later (*ibid.* III, 2, 8, p. 241, lines 14–45), as follows: 'Propter

To sum up: On the one hand, the elimination of dissent between Avicenna and Averroes that occurs marginally and incompletely in the Commentary on the *Physics* acquires centrality and breadth, gaining also argumentative perfection, in the Commentary on the *Metaphysics*. On the other hand, the pro-Avicennian inclination in front of Averroes’ polemic that one can observe in the Commentary on the *Physics* and in Albertus’ coeval Aristotelian commentaries appears much less enhanced, if not totally dismissed, in the Commentary on the *Metaphysics*. In this second regard, the comparative inspection of those criticisms of Avicenna by Averroes which Albertus reports in both commentaries confirms this impression³⁷. It thus seems that Albertus—in the fifteen years that intervene between the Commentary on the *Physics* and the Commentary on the *Metaphysics*—acquired a firmer grasp of Arabic philosophy, on the one side, and adhered progressively to Averroes’ anti-Avicennian doctrinal stances, on the other. In this second respect, Avicenna no doubt remains for Albertus an indispensable element for understanding the doctrine of the Aristotelian corpus, as the numerous digressions inspired by Avicenna in Albertus’ Commentary on the *Metaphysics* witness³⁸, and Albertus’ endorsement of the Avicennian doctrine of the subject matter of metaphysics in this commentary confirms³⁹. Aver-

quod etiam Averroes impingit crimen Avicennae ... In commento autem *Libri peri geneleos* Averroes consentit cum Avicenna ... et ideo si Averroes hic contradicit Avicennam, ipse contradicit sibi ipsi. ... et non est secundum rem contradictio aliqua inter istos duos viros ...’. The analogous case in the Commentary on the *Metaphysics* takes place in an opposite vein: here, the only case of consensus between Avicenna’s and Averroes’ positions is reached by means of an *excusatio* of Avicenna (and hence, implicitly, after the acknowledgment of an error on his part), at the end of a deep and subtle investigation that shows his position to be in substantial agreement with Aristotle’s position, read through Averroes’ lenses. See also *Super Ethica* VI, 8, p. 453, lines 63–5 (‘Averroes multas haereses dicit; unde non oportet, quod sustineatur’), in support of Avicenna’s position on the immortality of the individual human soul.

- 37 Criticism 18 of Averroes’ LCM is a case in point: in the Commentary on the *Physics*, Albertus gives a balanced account of it, naming explicitly Avicenna without however charging him of error (see *In Phys.* II, 2, 3, p. 103, lines 35–7 and 73–7: ‘Nos autem dicimus ... quod utraque istarum opinionum vera est secundum aliquem modum ... Et ideo quantum ad essentiam ... verum dicit Avicenna ... sed quantum ad esse verum dicunt alii ...’; see above, n. 32); in the Commentary on the *Metaphysics*, on the other hand, Albertus has a much more negative attitude towards the *alii* (behind whom lurks Avicenna), criticized by Averroes. Moreover, the passage of *In Phys.* I, 3, 15, p. 69, lines 39–41 (‘Et videtur in plerisque dictis Avicenna multum consentire huic opinioni [sc. quod omnis forma fit ex nihilo et fieri suum est creari], licet in veritate non consentiat’), emphasis added), sounds like a sort of defense of Avicenna against criticism 18 of Averroes’ LCM.
- 38 See on this, Bertolacci, «Subtilius speculando», and id., Le citazioni implicite testuali.
- 39 See Noone, Albert on the Subject of Metaphysics, and Bertolacci, The Reception of Averroes’ Long Commentary on the *Metaphysics*, and the further bibliography mentioned therein.

roes, however, looks to have gained considerable doctrinal prestige in Albertus' eyes as far as the correct interpretation of Aristotle's philosophy is concerned, and to have risen to the role of Commentator par excellence.

4 Conclusion

Considered in a diachronic perspective, the three elements of Albertus' strategy taken into account in the present paper appear to indicate a double trend. On the one hand, they attest Albertus' increasing assimilation of the Arabic philosophical heritage: the tendency to decrease the occasions, visibility, and import of the confrontation between Avicenna and Averroes—by means of, respectively, the material, stylistic, and doctrinal strategies—seems to be aimed at stressing the inner consistency of Arabic metaphysics, as represented by its two chief exponents. This inclination fits quite well the profile of a scholar like Albertus who has studied for a long time the Latin translations of Arabic *falsafa*, up to the point of mastering and digesting it, and for whom the unity and consistency of the Arabic philosophical heritage constitutes the quintessence of philosophy *tout court*. On the other hand, the last of these three elements documents a sensible change in Albertus' doctrinal preferences, marking a switch from Avicenna (strenuously defended against Averroes in the Commentary on the *Physics*, and only excused in the Commentary on the *Metaphysics*) towards Averroes (often accused of excessive anti-Avicennian vigour in the former commentary, and silently followed in the latter commentary) as the author to agree with on disputed theoretical points. This change seems to be corroborated by other signs of Albertus' gradual transition from Avicenna's works to Averroes' commentaries as the main interpretive tools for the understanding of the Aristotelian corpus⁴⁰.

The topic considered here, i.e. Albertus' attitude towards Averroes' criticisms of Avicenna in two of his main Aristotelian commentaries, does not exhaust in any way the wider rubric of his dependence on the two Arabic masters. A more general assessment of his debt towards the two authors—considering also non-polemical contexts and silent quotations, beside explicit references—is required before a clearer idea of his approach to Avicenna and Averroes during his career can be obtained⁴¹. The specific area taken into account in

40 The variation of the number of explicit quotations of Avicenna and Averroes in Albertus' commentaries over time might be significant in this regard: whereas in the Commentary on the *Physics* the author most frequently named, among the two, is Avicenna, in the Commentary on the *Metaphysics* it is Averroes (see above, n. 30).

41 Hasnawi documents that, on the issue of the ontological status of movement in the Commentary on the *Physics*, Albertus' debt towards Averroes—underscored, for instance, in the seminal studies by A. Meier—should not be taken in absolute terms, as remarked by subsequent scholarship (J.A. Weisheipl), and should not exclude Avicenna's influence: Albertus'

this paper, however, might represent the ‘tip of the iceberg’, so to say, of Albertus’ more general tendency. Dag N. Hasse’s studies on Albertus’ psychology, for example, have documented a similar trend, namely that in earlier works, like the *De homine*, Albertus finds Averroes to be unduly critical of Avicenna, whereas in later works, such as his Commentary on the *De anima*, he shows a much more positive attitude towards Averroes⁴². If the data gathered in the present contribution should be confirmed by further research, one would be entitled to conclude that, within Arabic philosophy in general, and metaphysics in particular, Albertus not only deepened and refined his knowledge of the main sources—as it is reasonable to expect—but also, at the same time, passed from a phase of stronger Avicennian ascendance to a stage of more marked Averroean influence.

This change, if assessed, would be certainly interesting for the scholarship on Albertus, since it would indicate the *doctor universalis*’ evolving attitude towards Arabic philosophy over time, and the peculiarity of his *forma mentis* in this regard in comparison with other Latin thinkers of the thirteenth century⁴³. More specifically, his initial defensive attitude towards Avicenna appears to reflect the role of ‘commentator’ on Aristotle originally assigned to Avicenna in Latin philosophy in the first half of the thirteenth century: Albertus looks like engaged in vindicating this traditional role of Avicenna against the competing authority of the Arabic philosopher whose writings have started to circulate in universities and who is already cherished by many as the Commentator par excellence, namely Averroes. His later reliance on Averroes is perhaps the sign that, at some point, he had to acknowledge the importance of Averroes as a very helpful tool for understanding Aristotle, especially for his enterprise of making Aristotle and the Peripatetic tradition intelligible to Latin readers, on the footsteps of the master of arts of his time, and he had to reconsider the function of Avicenna, assigning to this latter a still conspicuous, but subsidiary role. Seen in this light, the aforementioned shift surpasses the boundaries of Alber-

specific dependence on Averroes on this topic is in fact encapsulated in a wider structural and theoretical framework whose main source is Avicenna, see Hasnawi, *Le statut catégoriel du mouvement*, pp. 611–13.

42 Hasse, *Avicenna’s De anima*, pp. 60–69, and id., *The Early Albertus Magnus*.

43 If we compare Albertus with Thomas Aquinas, we notice that explicit attestations of a disagreement between Avicenna and Averroes appear to run through the entire theological and philosophical production of the *doctor angelicus* without any significant variation, from the early Commentary on the *Sentences* (in the early fifties of the 13th century), until the later Commentary on the *Metaphysics* (see the typologies (2) and (3) of ‘contrasting’ quotations of Avicenna and Averroes in Borgo, *Between Avicenna and Averroes*), despite Thomas’ awareness of ‘a clear proximity between the views of Avicenna and Averroes’ (ibid., p. 227). See Thomas Aquinas, *In duodecim libros Metaphysicorum Aristotelis Expositio*, nos. 1399, 1454 and 1467–9).

tus' philosophical production and exegetical practice, and has a wider significance, making of him the mirror of the intellectual tendencies of his century: in particular, it could be connected with the waning of the textual diffusion and doctrinal impact of the Latin translations of Avicenna around the middle of the thirteenth century, and with the concomitant increasing success of Averroes' philosophy in the following decades, in universities and elsewhere, to which Albertus appears to have contributed⁴⁴. This success will be sanctioned, about ten years after the composition of Albertus' Commentary on the *Metaphysics*, by the ecclesiastic Parisian condemnation of Averroes' philosophy issued in 1277.

Appendix

Criticisms of Avicenna in Averroes' LCP (Giunta 1562 edition) and Their Quotations in Albertus Magnus' Commentary on the *Physics*

Passage in Averroes' LCP (or LCM)	Doctrine of Avicenna	Quotation by Albertus Magnus
(1) LCP A.63, fol. 38D.	<i>What lacks dimensions [= prime matter] is subject of a form in actuality.</i>	Om. [see <i>In Phys.</i> I, 3, 8].
(2) LCP A.83, fol. 47F–H (cf. fol. 47I–K).	<i>The metaphysician, rather than the physicist, demonstrates the First Principle's existence.</i> Et ideo consideratio de formis est duarum scientiarum, quarum una, scilicet naturalis, considerat de formis materialibus, secunda autem de formis simplicibus abstractis a materia, et est illa scientia quae considerat de ente simpliciter. Sed notandum est quod	<i>In Phys.</i> I, 3, 18, p. 76, lines 37–45: Est autem et alia reprehensio, qua reprehendit Averroes Avicennam , minus congrua. Dicit enim Avicenna verum, cum dicit non idem esse quaesitum in aliqua scientia et suppositum, deum autem et substantias sive formas separatas esse quaesitas in prima philosophia et ideo non vere suppositas in ipsa et ideo non esse

44 A case in point are the so-called 'disclaimers' of Albertus' Aristotelian commentaries, namely those passages in which, about crucial and disputed topics, he expresses his intention of simply expounding Aristotle's and the Peripatetics' positions, without expressing his own personal views on the subjects (see Weisheipl, *Albert's Disclaimers*), which resemble the so-called 'double-truth theory' of Latin Averroists. A specimen of the influence exerted by Albertus on the masters of arts with Averroistic sympathies in the university of Paris (esp. Boethius of Dacia) is provided by the diffusion of his references to 'Avenzoreth' in the Aristotelian commentaries (see Bertolacci, *Albertus Magnus and 'Avenzoreth'*, and Bianchi, «Vae vobis homines»).

istud genus entium esse, scilicet separatum a materia, non declaratur nisi in hac scientia naturali. Et qui dicit quod prima philosophia nititur declarare entia separabilia esse peccat: haec enim entia sunt subiecta primae philosophiae, et declaratum est in *Posterioribus Analyticis* quod impossibile est aliquam scientiam declarare suum subiectum esse, sed concedit ipsum esse, aut quia manifestum per se, aut quia est demonstratum in alia scientia. Unde **Avicenna** peccavit maxime cum dixit quod primus philosophus demonstrat Primum Principium esse; et processit in hoc in suo libro de scientia divina per viam quam existimavit esse necessariam et essentialem in illa scientia. Et peccavit peccato manifesto: certior enim illorum sermonum, quibus usus est in hoc, non pertransit ordinem sermonum probabilium. Et iam causam innumus huius alibi. [...] Omne enim de quo loquitur in hoc libro [sc. in *Physics*] principaliter est propter illud principium [sc. Primum Principium]. Et iste est primus locus in quo naturalis inspicit alium modum essendi ab illo de quo considerat, et apud illum cessat, et dimisit considerationem de eo usque ad scientiam nobiliorem quae considerat de ente secundum quod est ens. Et totum hoc est quasi contrarium eius quod existimavit **Avicenna**, quoniam si hic non demonstraretur iste modus entium, scilicet separabilium, non esset nisi scientia naturalis et doctrinalis.

subiectum primae philosophiae, quod nescio, quare **Averroes** reprehendit, cum ipsum sit necessarium, quod dixit **Avicenna**.

(3) LCP A.83, fol. 47H–I.	<p><i>Physics takes from metaphysics the proof of the fact that bodies are compounds of matter and form.</i></p> <p>Et peius est hoc quod [sc. Avicenna] dicit, quod ista scientia accipit a primo philosopho corpora componi ex materia et forma. Negligens, est ne alia via ad sciendum hoc nisi ex transmutatione existente in substantia? Sed, sicut dicit Aristoteles, [primus] philosophus declarat substantiam materiae quae sit perfecte per comparisonem eius ad omnes differentias entium, secundum quod sunt entia; ergo impossibile est declarare ipsam esse nisi in hac scientia.</p>	<p><i>In Phys. I, 3, 18, p. 76, lines 17–36:</i> Scias autem, quod compositum esse compositum ex materia et forma accipit physicus a metaphysicus, sicut bene dicit Avicenna, et tamen reprehendit eum de hoc Averroes, cum sua reprehensio non careat reprehensione ... Et ideo Avicenna non est reprehensibilis, qui primo dixit physicum accipere principia compositi a primo philosopho.</p>
(4) LCP B.3, fol. 49B–E.	<p><i>The existence of nature has to be proved by the metaphysician, since it is not evident by itself.</i></p> <p>Et ista definitio naturae est manifesta hic, et naturam esse est manifestum per se ... et est unum principiorum istius scientiae et non est declarandum a primo philosopho, neque est ex eis quae non sunt nota per se, ut apparet ex verbis Avicennae, nisi intendat quod primus philosophus debet contradicere eis qui negant illud principium esse, ut contradicit falsis opinionibus inductis de primis principiis ...</p>	<p><i>In Phys. II, 1, 3, p. 84, line 65–p. 85, line 14:</i> Huic autem sententiae [sc. sententiae Aristotelis dicentis quod per naturam nos cognoscimus ea quae naturalia sunt] opponit Avicenna ... Respondet [sc. sententiae Aristotelis] autem Avicenna, quod ... naturalis non habet ex sua scientia demonstrare, an sit natura, sed in quantum induit formam philosophi primi; natura enim principium est naturalium. Et ideo supponit ipsam esse naturalis et ipsam esse probat metaphysicus. Huic autem sententiae contrarie nititur Averroes, eo quod ubique Avicennam persequitur, dicens, quod simpliciter est impossibile demonstrare naturam esse, sicut dixit Aristoteles. Sed vera solutio est quod de natura movente sive motore duplex potest esse quaestio, una quidem an sit, et haec demonstrari non potest; sed tamen negans naturam confutandus est a primo philosopho per deductionem ad inconueniens, sicut dicit Avicenna.</p>

		Alia autem quaestio est, an differat a mobili vel sit idem cum ipso, et illa quaestio disputatur ab Aristotele; in hac enim bene habetur via demonstrationis ...
(5) LCP B.22, fols 56M–57B.	<p><i>The natural philosopher deals only with the proximate matter; prime matter is dealt with by the metaphysician.</i></p> <p>Avicenna autem dicit quod naturalis non loquitur nisi de materia propinqua unicuique enti; de prima [materia] autem non considerat nisi primus philosophus. Et peccavit: cum enim audivit in <i>Posterioribus</i> quod nullus artifex demonstrat causas sui subiecti de quo considerat—quoniam, si demonstraret eas per res priores illis causis, tunc erit de genere superiori, quare illa declaratio erit de alia arte superiori quae considerat de genere continente subiectum illius artis—et, cum hoc audivit, existimavit hoc esse impossibile in tribus modis demonstrationum, scilicet in demonstratione simpliciter, et demonstratione quia, et demonstratione propter quid. Et non est ita: hoc enim non est impossibile nisi in demonstratione simpliciter et demonstratione ‘propter quid’; in demonstratione autem ‘quia’ non est impossibile, sicut fecit Aristoteles in demonstratione primae materiae et Primi Motoris in hoc libro. Quae, si fuerit de accidentibus propriis entis [naturalis?], erit demonstratio naturalis; et si fuerit de accidentibus propriis entis simpliciter erit demonstratio metaphysica. Et videtur quod prima materia non potest declarari esse proprie nisi per signum naturale.</p>	<p><i>In Phys.</i> II, 1, 10, p. 93, line 37–p. 94, line 13: Ad hoc autem dixit Averroes, cuius studium fuit contradicere semper paribus suis, quod Avicenna his rationibus concedit, quod physicus non considerat de materia prima, sed de quadam materia. Et arguit in contrarium sic ... Sed Averroes, si voluisset, potuisset de facili vidisse, quod materia prima est duplex ... Et sic patet perspicue, qualiter nulla est falsitas in verbis Avicennae.</p>

	<p>Primus autem Motor impossibile est ut declaretur esse nisi per signum naturale. Via autem qua processit Avicenna in probando primum principium est via loquentium [sc. Muslim theologians, <i>mutakallimūn</i>], et sermo eius semper invenitur quasi medius inter peripateticos et loquentes.</p>	
(6) LCP B.26, fol. 59B–D.	<p><i>The consideration of the existence of abstract forms belongs to metaphysics, not to natural philosophy.</i> Et notandum quod consideratio in esse istarum formarum [sc. abstractarum] est in scientia naturali, non in prima philosophia, sicut existimat Avicenna, quoniam in hac scientia [sc. naturali] apparet istud genus formarum esse, deinde prima philosophia considerat de quidditatibus et dispositionibus earum. Et hoc est rectum.</p>	Om. [see <i>In Phys.</i> II, 1, 11].
(6bis) (a) LCM Λ.5 (ed. Bouyges), p. 1423, line 18–p. 1424, line 4 (Giunta 1562 edition, fol. 293D) = criticism 13. (b) LCM Λ.18 (ed. Bouyges), p. 1498, lines 12–15; (Giunta 1562 edition, fol. 304A–L) = criticism 18.	<p>(a) <i>Since Avicenna takes the statement ‘no science demonstrates its own principles’ in an absolute sense, he believes that the metaphysician clarifies the existence of the principles of sensible substance (without distinguishing between eternal and non-eternal sensible substance), whereas the natural philosopher takes for granted from the metaphysician the existence of nature.</i> Et Avicenna hoc absolute dixit, quod primus philosophus habet declarare prima principia sensibilis substantiae sive aeternae sive non, et naturalis ponit positione naturam esse; et quod primus philosophus demonstrat eam esse; et non distinxit inter duas substantias.</p>	<p><i>In Phys.</i> II, 2, 3, p. 101, line 91–p. 103, line 77: Principium autem motus duplex est, sicut dicit Avicenna, scilicet praeparans et perficiens. Praeparans est id quod praeparat et disponit materiam ad hoc, quod suscipiat formam ... Movens autem perficiens est id quod tribuit formam ... et hoc quidem est extra materiam et extra numerum principiorum naturalium, ut inquit Avicenna ... In hac autem sententia plures sapientium Avicennae contradicunt dicentes in materia et intra principia naturalia esse principium efficiens, quod verissime trahit materiam de potentia ad actum. ... Rationes igitur pro Avicenna sunt haec ... In oppositum autem huius</p>

	<p>(b) <i>Avicenna is among those who think that the agent that creates the forms and places them in matter is immaterial and is called ‘giver of forms’. The belief in the creation of forms is common to the advocates of the ‘giver of forms’ and the Jewish, Christian and Muslim theologians.</i></p> <p>Unde quidam dicunt, quod omnes formae substantiales fiunt a forma abstracta extrinseca, quae dicitur a quibusdam dator formarum, et dicunt, quod haec est intelligentia agens ... Una autem istarum opinionum est, quod agens creat formam, et ponit eam in materia. Et istorum quidam dicunt, quod illud agens non est in materia omnino, et vocant ipsum datorem formarum, et Avicenna est de illis ... Intentio igitur sermonis Aristotelis quod conveniens fit a conveniente ... non est quod conveniens agit per se et per suam formam formam sibi convenientis, sed est dicere, quod extrahit formam sibi convenientis ex potentia in actum, et non est agens, quia adducit in illam materiam aliquid extrinsecum.</p>	<p>sententiae contra praedicta omnia sunt plurimi Peripateticorum dicentium, quod causae efficientes naturales ... non solum praeparant, sed etiam efficiunt res naturales ...</p> <p>Ecce haec est sententia utrarumque opinionum, et eligat unusquisque, quod vult. Nos autem dicimus, prout nobis videretur, quod utraque istarum opinionum vera est secundum aliquem modum; absque dubio enim una est forma omnium moventium ... Sed haec forma dupliciter consideratur, scilicet secundum essentiam et secundum esse ... Et ideo quantum ad essentiam ... verum dicit Avicenna ... sed quantum ad esse verum dicunt alii ...</p>
(7) LCP B.48, fols 66G–67A.	<p><i>Chance regards both what is contingent and equally occurs or does not occur, and what is contingent and occurs rarely.</i></p> <p>Avicenna autem dicit quod casus est in utroque [sc. in eis quae sunt possibilis in minori parte, et in eis quae sunt aequaliter].</p>	<p><i>In Phys. II, 2, 12, p. 117, line 40–p. 118, line 29: Ex his autem quae sic dicuntur secundum primos Peripateticos, quorum dux et princeps fuit Aristoteles, cuius sententiam hic posuimus ... Sed hoc non placet posterioribus Peripatetici sicut Themistio et Alexandro et aliis, quorum dicta ad nos pervenerunt ... Avicenna autem et quidam sequentes eum dicunt ... Haec igitur est sententia Avicennae volentis sequi Aristotelem ...</i></p>

		Ego autem magis consentio novis Peripateticis et concordo cum Alexandro et Themistio et Averro i et Porphyrio et multis aliis, qui etiam mihi videntur melius Aristotelem in hac sententia intellexisse.
(8) (a) LCP Γ.Prologue (ed. Schmieja, Drei Prologe), p. 177. (b) LCP A.60, fol. 36E.	<i>Nothing is generated from nothing.</i> (a) Similiter cum fuerit assuetus credere sermones falsos a pueritia, erit illa consuetudo causa ad negandum illam veritatem manifestam ... sicut accidit modernis dicentibus quod generatio fuit ex non ente, et causa istius aestimationis fuit consuetudo. Et tu potes scire hoc ex hoc quod dixit Aristoteles quod omnes antiqui conveniunt in hoc quod nihil generatur ex nihilo. Et iam vidi quosdam socios dubitantes in hac quaestione, et Avicenna oboedivit huic aliquantulum in suo tractatu de substantia orbis. (b) ... Et iam vidi quosdam socios dubitantes in hac quaestione, tamen obviavi huic aliquantulum in tractatu de substantia orbis.	Om. [see <i>In Phys.</i> III, 1, 1 = prologue of III; see also I, 3, 8, where Albertus cites Averroes' LCP A.60].
(9) LCP Δ.32, fol. 134F.	<i>The heaven does not move in space.</i> Et [Aristoteles] dixit hoc [sc. coelum proprie esse in locum], quia coelum habere locum latet. Existimatur enim quod illud quod movetur in loco debet mutare locum secundum totum; <u>et coelum non mutat locum secundum totum</u> ; et ideo opinatus est Avicenna quod [coelum] non habet motum in loco; et ponere quod movetur secundum partes et non movetur secundum totum est inopinabile.	Om. [see <i>In Phys.</i> IV, 1, 8, p. 215, line 21–p. 216, line 9]. Cf. <i>ibid.</i> IV, 1, 13, p. 226, lines 30–51.

<p>(10) LCP Δ.45, fol. 144E–I.</p>	<p><i>The celestial body is not in space, either essentially or accidentally.</i> Et debes scire quod Avicenna opinatur quod corpus coeleste non est in loco, neque per se neque per accidens: dicit enim quod motus rotundi non est translatio, sed motus in situ, et non est necessarium in motu secundum situm ut sit in loco. Et hoc est contra Aristotelem et contra verum. Primo quidem quoniam in situ non est motus, ut declaratum est in quinto. Et etiam quoniam locus est prior situ et acceptus in definitiones eius ... Et existimavit Avicenna quod motus, qui mutat locum in forma, non in subiecto, est motus in situ; et hic est error manifestus. ... Et hoc ignoravit Avicenna aut vitiose protulit. Et movit ipsum ad dicendum hoc quod dixit Alexander ...</p>	<p>(10.1) <i>In Phys.</i> IV, 1, 13, p. 226, lines 30–51: Propter hoc Avicenna secutus Alexandrum dicit ... Dicunt ergo Alexander et Avicenna quod primi orbis motus est in situ et non in loco, eo quod in partibus eius renovatur situs et <u>locum non mutat totum coelum</u>. Contra hanc opinionem videtur esse, quod locus cadit in diffinitione situs ... Adhuc autem, non placuit Aristoteli, quod motus sit in situ ... et ita non videtur conveniens esse dictum virorum istorum in parte ista. Propter quod dicit Averroes, quod ... (10.2) <i>In Phys.</i> V, 1, 8, p. 416, line 65–p. 417, line 61: De situ autem magna dubitatio est et contradictio inter praecipuos peripateticorum. Dicit enim Avicenna ... Hoc autem non placet Averrois ... Et hoc [sc. dictum Averrois] videtur esse concedendum. Tamen res subtilis est haec et magna indiget consideratione. Et videtur hoc [sc. dictum Avicennae] non esse verum ...</p>
<p>(11) LCP Δ.67, fol. 156B.</p>	<p><i>Everything that moves unnaturally is also capable of moving naturally.</i> Secunda autem [propositio Aristotelis] est quod omne habens motum extra naturam habet motum naturalem, et ista est etiam manifesta per se: quod enim est extra naturam intelligitur in respectu eius quod non est extra naturam ... quoniam dispositio in hoc est sicut dispositio in habitu et privatione, quoniam habitus est prior privatione in re quae caret habitu ... Et haec propositio, ut mihi videtur, non conceditur ab Avicenna, et est fatuitas in illo.</p>	<p>Om. [see <i>In Phys.</i> IV, 2, 5].</p>

(Add.) Cf. LCP Δ.71, fols 160C–161F.		<i>In Phys.</i> IV, 2, 7, p. 247, lines 59–61: Propter haec et his similia dicit Averroes deceptum esse Avempace, et Avicennam per consequens relinquitur condeceptum.
(12) LCP Z.85, fol. 300K–M.	<p><i>The motion of the heavenly spheres is not a motion in space, but a motion in site. Avicenna's argument is useless and very sophisticated.</i></p> <p>Avicenna vero, quia non distinxit alietatem quae est in loco per se ab ea quae est per accidens—scilicet alietatem quae est secundum subiectum, non secundum formam—et concessit sphaeram moveri, coactus est appellare motum sphaerae motum in situ. Unde nititur, ut dictum est, sanare aegritudinem per maius aegrum ... Quid igitur utile dedit nobis, cum dixit quod iste motus est in situ? Nisi intendebat quod illud quod movetur hoc motu non diversatur secundum situm: hoc enim proprium est huic motui. Sed tamen non sequitur ex hoc quod motus eius est in situ: nam iste sermo valde est sophisticus.</p>	<i>In Phys.</i> VI, 3, 3, p. 492, line 70–p. 493, line 11: Falsum est etiam, quod dicit Avicenna , quod circuli motus est secundum situm et non secundum motum, quia supra ostendimus, quod in situ non est motus nisi per accidens, eo quod est forma indivisibilis.
(13) LCP Ξ.1, fol. 339A–F.	<p><i>Aristotle's intention in the first [chapter] of this book is to show that there is a motion before every motion, and that change never ceases in genus, so as to conclude to the existence of a first and eternal motion, either one or many in number. Averroes provides a different interpretation, according to which Aristotle's aim is to prove the eternity of the motion of the celestial sphere.</i></p> <p>... et hoc intellexit Alfarabius secundum quod dixit in libro suo de entibus transmutabilibus,</p>	Om. [see <i>In Phys.</i> VIII, 1, 1].

	et hoc idem intellexit Avicenna et Avempace Hispanus, scilicet quod intentio Aristotelis in primo istius tractatus est declarare quod ante omnem motum est motus, et ante omnem transmutationem est transmutatio, et quod motus non deficiet secundum genus, ut procedat ex hoc ad declarandum motum esse primum et eternum, qui continet omnia, aut unum aut plura. Et in hac declaratione est difficultas ... Ego autem, cum hoc quod credebam expositionem istius loci esse istam tantum, eram aliquantulum in errore ... Falsa igitur fuit haec aestimatio illorum.	
(14) LCP Ξ .3, fol. 340E–F.	<i>The metaphysician has to prove the existence of the First Principle. The method that Avicenna pretends to have invented and that he follows is weak and not demonstrative.</i>	Om. [see <i>In Phys.</i> VIII, 1, 2, p. 553, lines 40–49].
(15) LCP Ξ .46, fol. 387H.	<i>Man can be generated from earth, although he is generated more properly in the female’s uterus. A statement like this, pronounced by a man who devotes himself to science, is quite vain.</i>	<i>In Phys.</i> VIII, 2, 10, p. 612, line 65–p. 613, line 25: Sed hoc non videtur esse verum secundum Averroem ... Et ideo reprehendit Avicennam ... Et hanc reprehensionem ego non iudico convenientem generaliter.
(16) LCP Ξ .78, fol. 424L.	<i>The doctrines that Avicenna transferred from Aristotle in his own books seem to be the demonstrations proposed by Aristotle, but in fact they are not.</i> Habito ergo hoc patet eorum error qui obiciunt Aristoteli quod in corporibus coelestibus impossibile est divisibilitas quam Aristoteles posuit in sua demonstratione. <i>Modern philosophers limit themselves to the books of Avicenna.</i>	Om. [see <i>In Phys.</i> VIII, 4, 1–3]. According to Schmieja, <i>Drei Prologe</i> , p. 163, Albertus is unaware of <i>commenta</i> Ξ .75–81 of Averroes’ LCP, which he does not quote in his Commentary on the <i>Physics</i> .

<p>(17) LCP Ξ.79, fol. 426L–M.</p>	<p><i>The heaven is necessary on account of something else, whereas the movers of the heaven are necessary on account of themselves.</i> Audiens autem Avicenna verba haec Aristotelis [in secundo <i>De Coelo et mundo</i>, quod coeli est potentia finita], qui [pro: quia?] iam audierat verba Alexandri, opinatus est duplex esse necessarium: necessarium scilicet ex altero, contingens et possibile ex seipso, et necessarium ex se; necessarium quidem ex alio, ut coelum, necessarium vero ex se, ut motores coeli. Nos autem dicimus quod ...</p>	<p>Om. [see <i>In Phys.</i> VIII, 4, 3]. According to Schmiejka, <i>Drei Prologe</i>, p. 163, Albertus is unaware of <i>commenta</i> Ξ.75–81 of Averroes' LCP, which he does not quote in his <i>Commentary on the Physics</i>.</p>
<p>(18) LCP Ξ.83, fol. 432C–D.</p>	<p><i>Idem.</i> Unde videmus Aristotelem opinari quod corpus coeleste ... est necessarium ex se, non ex alio, ut Avicenna dixit; verumtamen necessitas est in ipso in modo recipiendi, in motore vero in modo agendi.</p>	<p><i>In Phys.</i> VIII, 4, 5, p. 649, lines 42–63: ... sumit Averroes occasionem, quod reprehendit Avicennam dicentem, quod caelum et omne corpus et omne causatum est possibile et non necesse ... Dicit enim Averroes quod caelum est ens necesse, licet necessitas eius sit in suscipiendo et non in agendo. Et haec reprehensio non est rationabilis ... et hoc modo rectum est dictum Avicennae.</p>

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Avicenna's *Physics* in Roger Bacon's *Communia naturalium*

Cecilia Trifogli

Introduction

Avicenna is rarely mentioned in the medieval Latin commentaries on Aristotle's *Physics* and much more rarely is his *Physics*. The thirteenth-century philosopher Roger Bacon, however, can be regarded as an exception to this general tendency. The name of Avicenna and that of his *Physics* appear much more frequently in Bacon's works in natural philosophy than in those of the great majority both of his contemporaries and later commentators.¹

Bacon wrote two main works on natural philosophy: a commentary *per modum quaestionis* on the eight books of Aristotle's *Physics* (which is probably an early work dating from the 1240s)² and an independent treatise entitled *Communia naturalium* (a more mature work written between the early 1260s and the early 1270s).³ I have found a relatively good number of explicit mentions of Avicenna in both these works. As to the explicit references to Avicenna's *Physics* in particular, although there is significant overlap between the two works, the *Communia naturalium* offer richer and more interesting material. My present contribution concentrates on this latter work.

Bacon's *Communia naturalium* and Avicenna's *Physics* belong approximately to the same literary genre. They are treatises on Aristotle's natural philosophy but are not commentaries on Aristotle; that is to say, the topics covered

1 I wish to thank Silvia Donati for the suggestion of looking at Bacon and for providing me with a copy of the relevant texts.

2 This set of questions on Aristotle's *Physics* is edited by Delorme and Steele in fasc. XIII of the *Opera hactenus inedita Rogeri Baconi*. Another set of questions on the first four books only of Aristotle's *Physics* is ascribed to Bacon and edited in the *Opera hactenus inedita Rogeri Baconi*, fasc. VIII, by Delorme and Steele. Donati has recently questioned Bacon's authorship of this work. See Donati, *Pseudoepigrapha*, pp. 161–88. In any case, this work does not offer any relevant material for the present investigation, since Avicenna is mentioned only once in a question on *Physics* II about monsters and defects in elements (p. 127, line 30).

3 For the chronology of these two works, in addition to the Introduction to their editions by Delorme and Steele, see Easton, *Roger Bacon*, pp. 59–66, 111 and 188, and Hackett, *Roger Bacon*, p. 22.

in the two treatises are (for the most part) taken from Aristotle, but the presentation and discussion of this Aristotelian material are quite independent of those of the corresponding works of Aristotle. A major difference between Bacon's *Communia naturalium* and Avicenna's *Physics* lies in the variety of topics covered by these two works. Avicenna's *Physics* deals with the topics of the first four books of Aristotle's *Physics*: matter, form, nature, the four causes, motion, infinity, place, the void, and time.⁴ These topics are also discussed in the *Communia naturalium* and form a substantial part of this treatise (book I, parts 1–3). There are, however, two relevant additions to Avicenna's *Physics* in the *Communia naturalium*: book I, part 4, contains a section on the generation of natural things (from the most simple, such as the elements, to the most complex, that is, man), and book II is entirely devoted to celestial bodies.⁵ As Bacon explains in the prologue to the *Communia naturalium*, the goal of the treatise is to give a science *de communibus naturalibus* as contrasted with a science *de specialibus*—that is to say, a general science about natural things, which deals with aspects common to all natural things, rather than a special science focusing on particular aspects.⁶ Bacon then points out that the Aristotelian sources of a general science of natural things are not only Aristotle's *Physics*, but almost all natural works by Aristotle.⁷ More specifically, Bacon explicitly argues that Aristotle's general science of natural things is also found in the *De caelo* and in *De animalibus*.⁸ These two works of Aristotle are those that approximately correspond to the two main additions in the *Communia naturalium* to the topics from the *Physics*. It must be noted, however, that the impression one gets from a first reading is that the correspondence between Bacon's discussion in these two additions and its presumed Aristotelian sources is much looser than that in his discussion of the topics from Aristotle's *Physics*.

4 In this article, by 'Avicenna's *Physics*' I mean the parts of Avicenna's *Physics* known to Bacon, that is, the first two treatises of Avicenna's *Liber primus naturalium*, which were translated into Latin at Toledo at the end of the 12th century. The third and fourth treatises of the *Liber primus naturalium* (the third about atomism and infinity, and the fourth about the nature of bodies and their finiteness) were translated into Latin at Burgos at the end of the thirteenth century. See Avicenna, *Liber primus naturalium*, tr. 1, pp. 53*–54*, and tr. 2, pp. 2*–3*. On the Latin translations of Avicenna's *Book of the Cure*, see Bertolacci, *A Community*. On Dominicus Gundisalvi being the Toledan translator of Avicenna's *Physics*, see the contribution by Hasse/Büttner in the present volume.

5 Parts 1 and 2 of the first book of the *Communia naturalium* are edited in fasc. II of the *Opera hactenus inedita Rogeri Baconi*, parts 3 and 4 in fasc. III, and the second book in fasc. IV.

6 Bacon, *Communia naturalium* I, part 1, d. 1, c. 2, p. 3, line 10–p. 5, line 20. Bacon lists seven special sciences: perspective, astronomy, science of the light and the heavy, alchemy, agriculture, medicine, and experimental science (*ibid.*, p. 5, lines 21–5).

7 *Ibid.*, p. 3, lines 19–30.

8 *Ibid.*, p. 3, line 30–p. 5, line 13.

Although in the present paper I mainly concentrate on the topics of the *Communia naturalium* corresponding to Aristotle's *Physics* and on the explicit references to Avicenna on topics discussed in Aristotle's *Physics* (either from Avicenna's *Physics* or from other works of his), I also want to give a more comprehensive view of the overall presence of Avicenna in Bacon's treatise. For this purpose I have collected all the explicit mentions of Avicenna in the *Communia naturalium*. The Appendix to this article reports the complete list, divided by works of Avicenna. In this context I would just like to add a couple of general comments on that list.

The first comment is that, from a mere quantitative point of view, if one takes into account the substantial topical overlap between Avicenna's *Physics* and Bacon's *Communia naturalium*, the references to Avicenna's *Physics* are disappointingly few and are trumped by references to Avicenna's *Metaphysics*, which is the most often quoted Avicennian text. The fact that the explicit references to Avicenna's *Metaphysics* are numerically dominant, however, does not allow the conclusion that Roger Bacon is particularly interested in Avicenna's metaphysical doctrines. Indeed, many of the references to Avicenna's *Metaphysics* do not deal with specifically metaphysical topics.⁹ Much more significant from a doctrinal point of view is the comparison between the *Physics* and the two works *De animalibus* and *De anima* taken together. Unlike the quotations from Avicenna's *Metaphysics*, which are a mixed bag, those from the *De animalibus* together with those from *De anima* have a stronger thematic unity (namely, animate things)¹⁰ and they are more numerous than those from the *Physics*. One provisional conclusion that can be drawn from these quantitative data is that in Bacon's view Avicenna has more authority as a life-scientist than as a physicist.

The second comment about the list in the Appendix is that despite their small number, the explicit references to Avicenna on topics from Aristotle's *Physics* are significant. They do suggest that Bacon pays a good deal of attention to Avicenna's discussion of topics from natural philosophy and that he has a very high consideration of Avicenna's views. Given the limited scope of my investigation so far, restricted as it is to explicit references only, I cannot at

9 See Appendix, entries (2), (5), (6), (7), (8) and (9) under *Metaphysica*. Amos Bertolacci has suggested to me a very attractive way to make sense of the frequent quotations of Avicenna's *Metaphysics* in the *Communia naturalium*. In his view, rather than a digression into non-physical topics, these quotations might be a sign of Bacon's keen perception of the hierarchical structure of the system of sciences in Avicenna, where metaphysics stays at the top, and many physical (as well as logical and mathematical) themes are dealt with again in metaphysics, in order to receive their final foundation there. On the hierarchical structure of the system of sciences in Avicenna, see Bertolacci, *The Reception*, c. 7.

10 The only reference to Avicenna's *De anima* that is at odds with this general theme is entry (2) under *De anima* in the Appendix.

present draw much more definite conclusions on the significance and influence of Avicenna's natural philosophy on Bacon. This would require a more in-depth and systematic comparison between Avicenna's and Bacon's reception of Aristotle's natural philosophy, which remains a future research project.¹¹ In the rest of this article, I will try to substantiate my general suggestion about Bacon's respect for Avicenna's views by presenting in detail two major cases from my collection of explicit references: (1) the distinction between particular nature and universal nature, and (2) the nature of substantial change.

2 Particular Nature and Universal Nature

In my extensive investigation of *Physics* commentaries of the years 1250–70, I have often come across the distinction between particular nature and universal nature.¹² In the vast majority of these commentaries this distinction is simply taken for granted, without being explicitly defined. In a very first approximation, the particular nature is the specific nature of a natural body, e.g., the specific nature of water, whereas the universal nature is a sort of trans-specific nature, a nature somehow common to all natural bodies or a nature that permeates the whole physical world. Commentators usually appeal to a universal nature over and above the particular natures to account for phenomena or assumptions that cannot be accounted for by particular natures. In the *Communia naturalium* Bacon gives a standard example: the natural motion downward of water belongs to it in virtue of its particular nature, but the universal nature may prevent water from its natural motion in some circumstances, typically those circumstances in which the natural downward motion of water would give rise to a void space.¹³ The general idea behind this example is that the universal nature is responsible for the preservation and the order of the universe as

11 I do not know of any study specifically devoted to the influence of Avicenna's natural philosophy on Bacon's. Important cases of this influence, however, are pointed out in the recent literature on Bacon. In addition to the contribution of Weill-Parot on the Avicennian sources of Bacon's notion of universal nature (see below, n. 16), see also Rodolfi, *Dicitur materia propriissime et strictissime*, pp. 90–92, on the influence of Avicenna on Bacon's notion of matter, and Hackett, *Motion, Time and Aevum*, pp. 194–5, on the influence of Avicenna on Bacon's account of time.

12 See, for example, Trifogli, *Liber tertius*, p. 118 (S, q. 41, (RC2a)); Trifogli, *Liber quartus*, pp. 142–4 (S, q. 14); pp. 147–8 (S, q. 20); pp. 154–5 (S, q. 30); pp. 159–60 (S, qq. 38–9); p. 380 (G1, q. 12, (RD3), (RD4)–(RD5)), and p. 384 (G1, q. 14, (RC1b)).

13 Bacon, *Communia naturalium* I, part 2, d. 3, c. 7, p. 92, lines 23–9: 'Corpus enim naturale vacuum non permittit, quia vult habere medium naturale, et ideo quando aqua est in vase perforato inferius, non descendit si orificium obstruatur, set hoc non est ex natura particulari aque, quia ex hac descendit, set ex natura universali que vacuum non sustinet, quia natura corporalis non sustinet divisionem corporum naturalium.'

a whole rather than of the particular bodies contained in it, and so this universal nature sometimes acts against particular natures to avoid *inconvenientia* for the whole universe, such as the existence of the void.¹⁴

A relevant question is that of the origin of the distinction between particular nature and universal nature. This distinction cannot plausibly be traced back to Aristotle. Aristotle's *ex professo* discussion of nature in *Physics* II makes it sufficiently clear that the only nature he considers is what roughly corresponds to Bacon's particular nature. Indeed, Aristotle identifies the nature of a natural substance with its substantial form, and the only substantial form considered by Aristotle is the specific form, that which defines the *species specialissima* like the nature of water in Bacon's example.¹⁵ The expression 'universal nature' does not appear at all in Aristotle. However, it does appear in Avicenna, and this did not escape the notice of Bacon, who explicitly refers to Avicenna as the authority for this distinction.

In the *Communia naturalium* Bacon appeals to the distinction between particular and universal nature in the discussion of two issues: (1) the role of the intentional species in the generation and corruption of substances in the first part of book I (d. 2, c. 2 *De diversitate agentium faciencium species*, p. 21, lines 19–23), and (2) the order of priority and posterity between a universal and its particulars (for example, whether Socrates is prior by nature to man, and whether man is prior by nature to animal) in the second part of book I (d. 3, c. 7 *De universalibus*, p. 92, lines 14–15). In both cases Bacon refers to a passage from Avicenna's *Metaphysics* VI, chapter 5, which he regards as the *locus classicus* for the distinction between universal nature and particular nature. Although Avicenna talks of particular and universal nature in other passages too, Bacon's main motivation for taking the passage of *Metaphysics* VI as the fundamental one seems to be that in that passage Avicenna gives what looks like an explicit definition of the distinction between universal and particular nature. Unlike most of his contemporaries, who simply apply the distinction without clarifying its origin and its nature, Bacon wants to find both an authoritative origin of this distinction and an explicit definition of it, and he thinks that he finds both in the passage from Avicenna's *Metaphysics*. This is clear evidence of the importance that Bacon ascribes to Avicenna as natural philosopher: it is Avicenna, in Bacon's view, to whom we should turn for understanding the fundamental notion of Aristotelian natural philosophy, the notion of nature.¹⁶

14 On the appeal to a universal nature in the medieval discussions about the void, see Weill-Parot, Retour sur "l'horreur du vide".

15 Aristotle, *Physics*, II, c. 1, 192b8–193b21. See also the commentary by Charlton in Aristotle, *Physics. Books I and II*, p. 88.

16 On Bacon's notion of universal nature and its Avicennian origin, see also Weill-Parot, Retour sur "l'horreur du vide", pp. 16–28.

Despite Bacon's confidence in tracing the origin of his distinction between universal and particular nature back to Avicenna, the question of whether Bacon gives a faithful reading of Avicenna's distinction does arise, and, as I shall argue, this question should be given a negative answer. More precisely, there are some ingredients of Avicenna's distinction that find a correspondence in Bacon's distinction, but taken as a whole Bacon's reading goes far beyond what Avicenna said or meant. In order to corroborate my negative assessment of the correctness of Bacon's reading of Avicenna, I will first present and compare the passage containing Avicenna's original definition (text T1 below) and that containing Bacon's interpretation of it (text T2 below) as he presents it in his discussion about the relationship between a universal and its particulars in the chapter *De universalibus* from the second part of the first book of the *Communia naturalium*; I will then look at the contexts in which these two passages appear.

(T1) (i) Intelligo autem per naturam particularem virtutem propriam regiminis unius individui, et (ii) intelligo per naturam universalem virtutem infusam in substantias caelorum, (iii) quasi unam rem et gubernantem universitatem generationum; tu autem postea scies haec omnia. (iv) Motus autem qui tendit in infinitum est unus per continuationem, sicut nosti in naturalibus, et etiam intentio naturae quae est in illo motu non est ipsemet motus, in quantum est iste motus, sed intentio est ibi durabilitas, et haec durabilitas est una intentio cuius esse pendet ex rebus quarum numerus conceditur esse sine fine.¹⁷

(T2) (i) Natura dupliciter est: universalis et particularis, ut Avicenna docet 6° *Metaphisice*. (ii) Universalis est virtus regitiva universi diffusa in substantias celorum per omnia corpora mundi, (iii) et est in quo omnia corpora conveniunt, et per quam omnia salvantur quadam generali perfeccione et salute, (iv) et hec natura universalis est natura corporalis que per secundum genus, quod est corpus, designatur ... (v) Natura particularis est virtus regitiva speciei cum suis individuis, et ideo hec est duplex, scilicet, virtus regitiva speciei et virtus regitiva individui, quia in omni generatione quidem fit una species et similiter unum individuum, quia individuum non est sine specie, nec e converso.¹⁸

There are two major differences between texts T1 and T2:

One is about the notion of particular nature. According to Avicenna in T1 (i), it is the nature of a single individual (e.g., the nature of Socrates),¹⁹ accord-

17 Avicenna, *Philosophia prima*, VI, c. 5, p. 335, lines 52–63. The numbering in this and other passages quoted below is mine.

18 Bacon, *Communia naturalium* I, part 2, d. 3, c. 7, p. 92, lines 14–20 and p. 93, lines 5–9.

19 The Arabic Avicenna offers the same reading, as I can gather from the English translation by Marmura and the Italian translation by Bertolacci. The English translation reads: 'By "particular nature," I mean the power whose governance is specifically confined to one

ing to Bacon in T2 (v), it includes both the nature of a single individual and that of its species (e.g., both the nature of Socrates and that of man).

The other difference is about the notion of universal nature. The initial sentence of Bacon's explanation, i.e., T2 (ii), can be regarded as a faithful paraphrase of Avicenna's definition of the role of the universal nature in T1 (ii)–(iii): a nature that governs the whole universe and is diffused throughout the celestial region. However, the following two sentences of Bacon's explanation, i.e., T2 (iii)–(iv), do not find a correspondence in T1. In my view, it is clear that in T2 (iii)–(iv) Bacon wants to explain Avicenna's claim in T1 (iii) that the universal nature is *quasi una res*. Bacon's explanation is that the universal nature is a nature common to all bodies; more precisely, it is the 'corporeal nature', which corresponds to the second genus, that is, the genus of body. The ordering of the genera to which Bacon refers here is that defined in the Porphyrian tree by different degrees of universality, where the genus of substance occupies the first place, i.e., it is the most general genus, followed by the genus of body. According to Bacon, then, the universal nature is the form of the body, the *forma corporeitatis*, which all bodies have in common.²⁰ The *forma corporeitatis* is a central notion of Avicenna's metaphysics and so it is significant that Bacon thinks of this form as the candidate for being the *quasi una res* to which Avicenna refers.²¹ This identification of the universal nature with the form of the body, however, is clearly not intended by Avicenna. Indeed, in T1 (v) Avicenna picks up again the notion of unity to provide an explanation of this notion, but he associates it not with a form or a thing of some sort common to all corporeal substances but with the motion of the heavens. The relevant sense of unity, according to Avicenna, is the unity of continuity, which is one of the senses of 'one' distinguished by Aristotle in *Metaphysics* V.²² The circular motion of the

individual; and, by "universal nature," I mean the power that emanates from the substances of the celestial entities as one thing, it being the one that governs the totality of what is in the world' (Avicenna, *The Metaphysics*, pp. 226–7). The Italian translation reads: 'Intendo per "natura particolare" la potenza a cui è specificamente dato di governare un individuo unico. Intendo, invece, per "natura universale" la potenza che emana nelle sostanze delle realtà celesti come una cosa unica e che governa tutto ciò che è soggetto a generazione' (Avicenna, *Libro della guarigione*, pp. 558–9).

- 20 Bacon's explanation of the Avicennian notion of universal nature in the other passage from the first book of the *Communia naturalium* in which he mentions Avicenna on this point (part 1, d. 2, c. 2) is less detailed, but seems to be in agreement with that in T2: 'Et ex ordinatione divina et ex lege nature universalis, que intendit salutem totius mundi, quam Avicenna sexto *Methaphisice* vocat naturam diffusam in substantiam celorum et omnes partes universi, que est natura in quo conveniunt omnia, accidit quod substantie quanto nobiliores sunt, tanto magis artantur ad speciei solius generationem' (p. 21, lines 19–24).
- 21 On Avicenna's *forma corporeitatis*, see McGinnis, *Avicenna*, pp. 41–4 and 54–5.
- 22 Aristotle, *Metaphysics*, V, c. 6, 1015b36–1016a17.

heavens is one in the sense of continuous, being eternal (e.g., the daily rotations of the last sphere follow one another endlessly without interruption).

Turning now to the respective contexts in which texts T1 and T2 are located, the discrepancy between Avicenna's original distinction between particular and universal nature and Bacon's interpretation of it appears even more radical.

The context of Avicenna's text T1 is a discussion of finality in nature. At the beginning of this discussion the motion of the heavens and the cycle of generation and corruption of corporeal substances are both mentioned as apparent counterexamples to the claim that every motion or change is for the sake of an end.²³ The reason for this seems to be that since they both are endless, they do not occur for the sake of an end. Avicenna rejects this negative suggestion. He points out that the essential end of nature is that of preserving the specific natures of corporeal substances, and the endless cycle of generation and corruption of substances in the sublunar world is ordered to the preservation of the specific natures, so that it is an end of nature only in an accidental or secondary sense; that is to say, this endless cycle is not an end in itself, but ordered to a further end. For example, the essential end of nature is the preservation of human nature; but since no individual man is eternal and human nature can only be preserved in an individual man, this essential end can be achieved only by one man begetting another.²⁴ It is this contrast between an individual substance and its specific nature that leads Avicenna to the distinction between particular nature and universal nature. The particular nature is responsible for a single individual; this particular nature does not explain the endless cycle of generation and corruption, because the particular nature achieves its end once any individual is produced. We should then posit also another kind of nature to account for this endless cycle: a universal nature understood as something that is responsible for the preservation of each specific nature. Since in Aristotle's cosmology, it is the eternal motion of the heavens that is ultimately responsible for the preservation of each specific nature through an endless cycle of generations, it is the power of the heavens to be subject to an eternal motion that Avicenna identifies with the universal nature. From the context of text T1 it is clear, therefore, that Bacon's inclusion of both the nature of an individual and a specific nature under the particular nature is in open contrast with the line

23 Avicenna, *Philosophia prima*, VI, c. 5, p. 326, lines 55–61.

24 *Ibid.*, p. 334, lines 31–42: '... individua generata quae sunt infinita, non sunt fines essentialis naturae. Nam finis essentialis naturae, verbi gratia, est ut sit substantia quae est homo vel equus vel palma, et ut illud esse sit stabile esse; hoc autem fuit impossibile in uno individuo designato ... Postquam autem hoc prohibitum fuit in individuo, remansit in specie. Prima igitur intentio naturae est ut permaneat natura humana et alia huiusmodi vel individuum perpetuum non designatum, et illa intentio est causa perfectiva actionis naturae universalis. Ad hoc autem ut hoc unum permaneat in esse, necesse est ut sint individua post individua sine fine. Igitur infinitas individuorum numero erit accidentalis ...'

of thought that leads Avicenna to distinguish particular and universal nature. Although the universal nature that Avicenna has in mind is not strictly speaking a specific nature, it is closely related to a specific nature, in the sense that it is the nature responsible for the preservation of each specific nature.

The context of Bacon's text T2 is a discussion of universals. Bacon intends to argue for the claim that a universal is posterior by nature to any of its particulars. He remarks that in his *Physics* Avicenna holds the contrary view that a universal is prior by nature to its particulars. But, he adds, Avicenna does teach the truth on another occasion, namely in his *Metaphysics*, when he distinguishes between universal nature and particular nature. This is the text T1 that I have quoted above.²⁵

Bacon's reference to Avicenna's *Physics* is to the first chapter of the first treatise of the *Liber primus naturalium*, where Avicenna argues that a specific nature is naturally prior to its individuals as well as to common and general natures, i.e., to the natures above the *species specialissima* in the Porphyrian tree; for example, the specific nature *man* is prior by nature to both Socrates and animal.²⁶ There is no need to go into more details here: Avicenna's discussion in the *Physics* is substantially parallel to that about the finality of nature in the passage of the *Metaphysics* that leads to the distinction about universal nature and particular nature. Let us see in some detail instead how Bacon uses Avicenna's distinction about nature in support of his view that a universal is posterior by nature to its particulars.

25 Bacon, *Communia naturalium* I, part 2, d. 3, c. 7, p. 92, lines 4–15: 'Set jam patent quedam difficultates magne et utiles valde in Logicalibus, Naturalibus, et Methaphisicis. Una est de prioritate universalis ad particulare secundum naturam. Nusquam enim sunt tot autoritates contrarie. Aristoteles enim dicit in primo *De Anima* quod universale aut nihil [naturale ed.] est aut posterius est, et in 16° *De animalibus* dicit contrarium, et in primo *Phisicorum* et in multis aliis locis, loquitur de hac contrarietate, et Avicenna primo *Phisicorum* similiter loquitur, sed in sexto *Methaphisice* docet veritatem per quam cum adjutorio istius divisionis patet quid tenendum est. Natura dupliciter est, universalis et particularis, ut docet Avicenna 6° *Methaphisice* ...'

26 Avicenna, *Liber primus naturalium*, tr. 1, c. 1, p. 8, line 53–p. 9, line 66: 'Debemus ergo incipere in docendo a principiis rerum communium, quia res communes magis notae sunt quantum ad rationes nostras quamvis non sint <magis> notae quantum ad naturam, hoc est quia non sunt res quas natura intendit ut perficiat esse in ipsis: non enim exigitur a natura facere <esse> animal absolute vel corpus absolute, sed ut sint naturae specialium et, cum natura specialis habuerit esse in singularibus, fiet aliquod individuum. Ergo hoc intendunt ut naturae specialium faciant esse aliqua individua in sensibilibus, non autem intenditur hoc individuum expresse signatum, sed in natura particulari quae propria est ipsi individuo quia, si intenderent hoc individuum expressum, destrueretur esse et ordo eius quando destrueretur individuum vel quando desineret esse. Iterum si intenderetur natura communis et generalis, esse et ordo eius perficeretur cum fieret, sicut cum fieret corpus qualicumque modo vel animal qualicumque modo.'

Having split Avicenna's notion of particular nature into that of individual nature and that of specific nature, Bacon works with three different relations of priority and posterity by nature, in other words, three kinds of natural order, defined by (i) the individual nature, (ii) the specific nature, and (iii) the universal nature respectively. The most relevant case for the comparison with Avicenna is how this tripartite distinction is applied to the case of the relation of natural order between a universal and the individuals in which it is instantiated, e.g., the natural order between man and Socrates. Now, in this case it is evident that Socrates is prior to man in the natural order defined by the individual nature, while man is prior to Socrates in the natural order defined by the specific nature.²⁷ But what about the natural order defined by the universal nature? To this question, too, the answer is straightforward if we adopt Avicenna's understanding of the universal nature. As we have just seen, the universal nature of Avicenna is closely connected to specific natures: indeed the essential end of Avicenna's universal nature is to preserve the specific natures, so that, for example, man and not Socrates comes first in the order defined by the universal nature. The answer of Bacon, however, is different. He maintains that Socrates and more generally an individual is prior to its universal in the order defined by the universal nature. The reason that Bacon gives for this is that the ontological status of an individual is stronger than that of a universal, since an individual is an absolute thing, whereas a universal is something relative, being the agreement (*convenientia*) between individuals.²⁸ It is not surprising that Bacon's assessment of the order of priority between individual and universal is ultimately based on some assumptions about the ontological status of universals. What is indeed surprising is that in his assessment Bacon departs not only from Avicenna's original notion of universal nature but also from his own interpretation of that notion as the form common to all bodies (the *forma*

27 Bacon, *Communia naturalium* I, part 2, d. 3, c. 7, p. 94, lines 14–23: 'Set si comparemus universale ad sua propria particularia in quibus est et multiplicatur, ut hominem ad hunc hominem et illum, et animal ad hoc animal et illud, et corpus ad hoc corpus et illud, et substantiam ad hanc substantiam et illam, et sic de omnibus, oportet quod universale sit prius secundum naturam que est virtus regitiva speciei universalis tam secundum intentionem illius nature quam secundum operationem, quia principaliter operatur universale et intendit. Set secundum operationem et intencionem nature, que est virtus regitiva individui, est individuum prius omnino.' Note that, in this passage, by 'nature that is power that governs a universal species' (see my italics) Bacon means the specific nature as one of the two kinds of particular nature that he has distinguished in T1 above (the other kind being the nature of an individual)—the nature of man, in his example—and not the universal nature.

28 Ibid., lines 23–30: 'Si vero loquamur de natura universalis que est virtus regitiva universi, illa intendit et operatur individuum primo et principaliter, de qua natura dicitur in libro *Sex Principiorum*: Natura occulte operatur in rebus, generato isto homine, generatur homo. Et hujus causa est quod unum individuum excellit omnia universalis de mundo. Nam universale non est nisi convenientia plurium individuorum.'

corporeitatis) that we have found in T2; for the form common to all bodies in so far as common is somehow universal and, nonetheless, it represents a concrete constituent of physical entities. The universal nature to which Bacon appeals here, on the other hand, seems to be a sort of abstract principle of ordering things in an ontological hierarchy, in which individuals come first.

Whether Bacon has a unitary or at least consistent view about universal nature is an important question, which, however, is outside the scope of the present contribution.²⁹ What is relevant here is that none of the three contexts in which Bacon appeals to the universal nature—namely (i) the universal nature that preserves the ordering of the whole universe by preventing the coming into being of a void space, (ii) the universal nature that is common to all bodies, being the form of body, and (iii) the universal nature that primarily intends and produces individuals rather than universals—has a correspondence in Avicenna. This suggests that he may not be interested in Avicenna's original position or that he is ready to distort it for his own doctrinal purposes. It is significant, however, that Bacon explicitly turns to Avicenna in his search for 'the truth of the matter' about the universal nature and the natural order between universals and particulars in Avicenna. Clearly, Bacon regards Avicenna as the *auctoritas* on these issues.

3 Substantial Change (Generation and Corruption)

When Aristotle defines motion as the act of what is in potency in so far as it is in potency (*actus entis in potentia secundum quod in potentia*) in *Physics* III, he assumes that this definition applies to a substantial change too, so that changes like the coming into being of water starting from air and the concomitant corruption of air into water are taken to be motions according to this definition.³⁰ In *Physics* V, however, Aristotle introduces a more restrictive sense of the term 'motion' such that when 'motion' is taken in this strict sense a substantial change is not a motion. Aristotle gives a number of requirements that a change must satisfy for being a motion in the strict sense and points out that a substantial change does not satisfy any of them.³¹ Among Latin commentators, however, the most popular requirement for being a motion in the strict sense that a substantial change does not satisfy is one that is not explicitly mentioned by Aristotle in *Physics* V nor is supplied by Averroes in his exegesis of Aris-

29 To my knowledge this question has not yet been addressed in the literature on Bacon's physics. However, a very illuminating contribution on his discussion of universals in the *Communia naturalium* is offered by Crisciani, Universal and Particular.

30 Aristotle, *Physics*, III, c. 1, 200b32–201a15.

31 Ibid., V, c. 1, 225a20–c. 2, 225b11.

total's arguments:³² the requirement is that a motion must be successive and so take time, whereas a substantial change occurs suddenly and so is instantaneous. A substantial change consists in matter's losing one substantial form and acquiring another, but the acquisition and loss of a substantial form happen instantaneously, not gradually or successively. More precisely, according to this common view, a substantial change taken strictly, as the acquisition or loss of a substantial form, is instantaneous; however, insofar as it involves not only the acquisition or loss of a substantial form, but also a qualitative change in the accidental dispositions accompanying such a form, then it is a temporal and gradual process.³³

It is not easy to trace with certainty the origins of this common view about the non-temporality of substantial change. The fact that in the collection of *auctoritates* published by J. Hamesse the claim 'Motus est transmutatio successiva quae fit in tempore, sed mutatio [i.e., generatio et corruptio] est transmutatio subitanea quae fit in instanti' appears among the *auctoritates* from Aristotle's *Physics* V strongly suggests that this view reflects a common reading of Aristotle's discussion in *Physics* V.³⁴ It is also very likely that one major source of this common reading is Averroes' commentary. In addition to offering a detailed exegesis of Aristotle's own arguments against the view that substantial change is a motion, Averroes also adds another argument, which, in his view, Aristotle left to his attentive reader to formulate. This argument appeals to the requirement that a motion in the strict sense must be such that its initial and final states are opposites or contraries between which there are intermediate stages (*opposita mediata/contraria mediata*); a substantial change, however, does not satisfy this requirement, given that its initial and final stages are a privation and the corresponding habit (i.e., contradictories), which do not admit of intermediate stages.³⁵ This argument is very close to an argument for the claim that a substantial change is instantaneous: for the condition that there are intermediates between the initial and final state of a change is the crucial one for the temporality of a change. Thus, Latin commentators found in Averroes' commentary

32 Averroes, *Physica*, V, t. c. 8–10, fols 212ra–216ra.

33 This view of substantial change is found in Averroes and endorsed by the most important 13th-century Latin commentators: Albert the Great, Thomas Aquinas, Giles of Rome. For reference to some of the relevant texts, see Donati, *Pseudoepigrapha*, p. 180, n. 83.

34 Cf. Hamesse, *Les Auctoritates*, p. 152, no. 150. This *auctoritas* is left by the editor as *locus non inventus*.

35 Averroes, *Physica*, V, t. c. 9, fol. 214va: 'Et quia manifestum est per se quod transmutatio quae est motus in rei veritate est inter opposita mediata et non est medium in transmutatione quae est de privatione in habitum, quia inter privationem et habitum non est medium, dimisit destruere hanc divisionem, quia est manifesta. Et quia vera contraria mediata inveniuntur in tribus praedicamentis, necesse est ut motus sit in tribus praedicamentis. Sed ipse non complevit hanc declarationem hoc modo et quasi dimisit perscrutationem diligentem.'

on *Physics* V an argument substantially equivalent to an argument against the temporality of substantial change.

This common view in the Latin tradition is held by Avicenna too. Whether and to what extent Avicenna had an influence on the Latin tradition is an interesting question but is left open in this paper. It requires more extensive investigation. What can be said at this stage is that distinctive of Avicenna compared to the Latin tradition is the central place that he gives to the temporal requirement in his reading of Aristotle's definition of motion. Avicenna appeals to this requirement at the very beginning of his discussion of motion in chapter 1 of his second treatise, when he presents the passage of Aristotle's *Physics* III leading to the definition of motion. In his paraphrase of that passage, Avicenna replaces Aristotle's definition of motion as the act of what is in potency in so far as it is in potency with the following one: motion is a coming out/passage from potency to act (*exitus de potentia ad effectum*).³⁶ Immediately afterwards, he specifies that one kind of coming out from potency to act occurs suddenly and another kind does not occur suddenly (*alius fit subito et alius non subito*).³⁷ He then adds some remarks that make clear the relevance of this distinction:

(T3) (i) Nulla enim categoria est quae non habeat exitum de potentia sua ad suum effectum, aut in *substantia* sicut exitus hominis ad effectum postquam fuerit in potentia, aut in *quantitate* sicut exitus augmentabilis ad effectum de potentia, aut in *qualitate* sicut exitus nigredinis ad effectum de potentia, aut in *ad aliquid* ut exitus patris de potentia ad effectum, aut in *ubi* sicut quod elevatur sursum in effectu post potentiam, aut in *quando* sicut exitus antiqui ad effectum de potentia, aut in *situ* sicut exitus stantis ad effectum de potentia, similiter in *habere*, similiter in *agere et pati*. (ii) Sed intellectus in quo convenerunt antiqui in usu appellandi motum non est ille in quo conveniunt omnes isti modi exeundi de potentia ad effectum, sed ille est qui est modus exeundi non subito sed gradatim, et hic non convenit nisi certis categoriis, sicut qualitati, quia habens qualitatem in potentia possibile est ut procedat ad effectum paulatim donec perveniat ad illum; similiter habens quantitatem in potentia. Et nos declarabimus postea quae sunt categoriae in quibus possibile est cadere hunc exitum de potentia ad effectum, et in quibus non est possibile cadere.³⁸

In part (i) of text T3, following Aristotle's unrestricted view about motion in *Physics* III, Avicenna admits that motion understood as any coming out from potency to act (i.e., without specifying whether this coming out occurs suddenly or successively) exists in all categories and in particular in the category of substance. Immediately afterwards, however, in part (ii), he anticipates what he

36 Avicenna, *Liber primus naturalium*, tr. 2, c. 1, p. 147, lines 7–13. See also id., *The Physics*, pp. 107–8.

37 Id., *Liber primus naturalium*, tr. 2, c. 1, p. 148, line 14.

38 Ibid., p. 148, lines 16–32.

takes to be Aristotle's conclusion in *Physics* V about the temporal requirement for being a motion. Avicenna points out that in its commonly accepted sense the term *motion* signifies not any coming out from potency to act but only a successive or gradual one, and motion taken in this common sense does not exist in all categories.³⁹

At the very end of T3 Avicenna announces that he will deal with this topic later. He does this in chapter 3, about the question asking in what categories motion exists (this chapter corresponds to Aristotle's discussion of this issue in *Physics* V, c. 1 and 2). The first category that Avicenna considers is that of substance. He devotes to it an unusually long discussion: it takes up about five pages of the edition.⁴⁰ He presents four main arguments in support of the claim that there is no motion (in the strict sense) in the category of substance. As was to be expected from his initial remarks in chapter 1, the first and most fundamental argument, in his view, is based on the assumption that motion must be a temporal process, and shows that a substantial change occurs suddenly:

(T4) Et dicemus quod hoc quod dicimus, quod in *substantia* est motus, est dictio impropria quia in hac categoria non cadit motus.

Natura enim substantialis, cum destruitur, destruitur subito, et cum generatur, generatur subito, et non invenitur inter eius potentiam puram et eius effectum purum perfectio media, quia forma substantialis non recipit magis et minus ...⁴¹

Text T4 presents only the beginning of Avicenna's argument for the claim that a substantial change occurs suddenly. It shows that to establish this claim Avicenna appeals to a crucial property of a substantial form: such a form is, as it were, 'punctual' in the sense that it does not admit 'the more and the less', i.e., degrees of completeness or perfection. Aristotle explicitly ascribes this property to substance in the *Categories*, and illustrates this property with examples that contrast substantial forms with qualities, like whiteness: whiteness admits

39 Avicenna's definition of motion as *exitus de potentia ad actum non subito* was criticized by Aquinas as being circular in two respects: firstly because *exitus* is a kind of motion; secondly because *non subito* is a temporal determination, and time in turn is defined by motion. See Aquinas, *In Physicam*, III, *lectio* 2, p. 144b. On the circularity problem see McGinnis in this volume.

40 Avicenna, *Liber primus naturalium*, tr. 2, c. 3, p. 187, line 14–p. 193, line 17. For the English translation, see id. *The Physics*, pp. 136–41. On Avicenna's discussion, see Hasnawi, *Le mouvement et les catégories*, pp. 119–22, and id., *Le statut catégoriel*, pp. 607–22.

41 Avicenna, *Liber primus naturalium*, tr. 2, c. 3, p. 187, lines 14–19. 'We say: Motion is said to be in [the category of] substance [only] metaphorically. Indeed, motion does not occur in this category, because when the substantial nature corrupts and comes to be, it does so all at once, and so there is no intermediate perfection between its absolute potentiality and absolute actuality. That is because the substantial form is not susceptible to increase and decrease ...' (Id., *The Physics*, p. 136).

of degrees of intension and remission so that a white thing can be more or less white than another white thing, while a man cannot be 'more man' than another man.⁴² The rest of Avicenna's first argument (which follows the quote in text T4) is devoted to proving the claim that a substantial form does not admit 'the more and the less'.⁴³

Bacon's view about substantial change is utterly different from that of Avicenna and from the standard medieval Latin interpretation, since he maintains that a substantial change is temporal and not instantaneous, just as a qualitative change is.⁴⁴ Like Avicenna himself, Bacon gives a central place to this issue, devoting to it the first three chapters of the fourth part of the first book of his *Communia naturalium*, the part about the production of things (generation). He raises this issue at the very beginning of this part:

(T5) In hac igitur parte hujus primi libri naturalis voluminis, incipio a generatione, que est motus principalis in naturalibus. Set multa dubitabilia sunt circa eam. Est autem generacio *exitus materie de potencia ad actum* sive exitus generabilis de non ente ad ens, hoc est, de ente in potencia ad esse actuale ... Et nichil aliud est exitus de potencia materie nisi quod sic promoveatur in terminum generacionis, unde illud quod fuit in potencia postea fit in actu, sicut Aristoteles determinat in fine octavi *Methaphisice*. Set *an subito an successive sic promoveatur dubitacio est*, quia ponitur ab omnibus quod forma substantialis inducitur tota in instanti.⁴⁵

The fact that in text T5 Bacon uses Avicenna's definition of motion as coming out from potency to act rather than Aristotle's definition (the act of what is in potency in so far as it is in potency) is a clear indication, in my view, that Avicenna's discussion of substantial change had a strong influence on Bacon. Another clear indication of this is that Bacon's main line of argument in favour of the temporality of substantial change consists in showing that substantial forms do admit 'the more and the less', that is, in rejecting the fundamental premise of Avicenna's main argument in favour of the non-temporality of substantial change in text T4. Bacon devotes the whole second chapter of the fourth part to proving the claim that substantial forms admit of degrees of intension and remission, just like qualities.⁴⁶ Having established this claim, Bacon then concludes from it in chapter 3 that substantial change occurs successively and

42 Aristotle, *Categories*, c. 5, 3b33–4a9.

43 Avicenna, *Liber primus naturalium*, tr. 2, c. 3, p. 187, line 19–p. 188, line 31.

44 On Bacon's discussion of the temporality of substantial change in the *Communia naturalium* and others of his works, see Donati, *Pseudoepigrapha*, pp. 179–87.

45 Bacon, *Communia naturalium* I, part 4, d. 1, c. 1 p. 240, line 8–p. 241, line 3.

46 *Ibid.*, c. 2, p. 242, line 22–p. 245, line 13.

in time, just like the other three main kinds of change distinguished by Aristotle (alteration, increase and decrease, and locomotion).⁴⁷

In the entire lengthy discussion of the temporality of substantial change Bacon never mentions Avicenna explicitly, except at the very end, when he deals with the contrary *auctoritates*. Bacon first considers and replies to some apparently contrary claims in Aristotle,⁴⁸ and then passes to Avicenna. And it is with the reply to Avicenna that Bacon concludes his discussion of the temporality of substantial change. This is again, I think, clear evidence that Avicenna's treatment of this issue in his *Physics* had a dominant influence on Bacon: Avicenna is both the implicit starting point and the explicit end point of Bacon's discussion.

The nature of Bacon's reply to Avicenna is very original. Bacon does not try to reduce the doctrinal contrast between his view and that of Avicenna. He is very clever in this: the contrast between the two views is so radical that any attempt of reconciliation on doctrinal grounds is bound to fail. On the other hand, Bacon wants to have Avicenna on his side or at least not on the contrary side. To achieve this, Bacon denies that Avicenna himself is a supporter of the view that substantial change is instantaneous. According to Bacon, Avicenna reports the opinion of others and not his own when he argues against the temporality of substantial change:

(T6) Si vero dicatur quod Avicenna dicit 3^o *Physicorum* quod substantia corrumpitur et generatur subito, et quod non est motus nec successio in ea, et nec suscipit magis nec minus, et hoc nititur declarare, dicendum quod in prologo libri *Sufficiencie*, qui est de omnibus partibus philosophie, cujus liber *Physicorum* est una pars, dicit quod in isto libro *Sufficiencie* sequitur opiniones aliorum per totum, et non est secundum ejus sententiam, et ideo non est mirum si aliqua falsa contineantur, sicut in libris quos recitat Algazel de logicalibus, naturalibus, et methaphisicis, ad imitationem libri Avicenne, de quibus Algazel in prologo librorum illorum asserit quod omnia que recitat in eis sunt secundum opinionem aliorum, in quibus dicit multa contineri que vult reprobare et aliter exponere in libro suo *De controversia philosophorum*.⁴⁹

What I have reported in text T6 is only the beginning of the very long reply given by Bacon to Avicenna. Bacon's reply is well known to experts on Avicenna and his reception in the Latin West, since it shows that Bacon knew the Preface to the *Sufficiencia*, a preface that had a very limited circulation in the Latin West. It seems that only Bacon and most probably Albert the Great knew

47 Ibid., c. 3, p. 245, line 16–p. 246, line 5.

48 Ibid., p. 246, line 5–p. 248, line 15.

49 Ibid., p. 248, lines 15–28.

it.⁵⁰ In this context, it is important to underline the motivation of Bacon's appeal to the Preface to the *Sufficiencia*. Bacon's crucial claim in text T6 is that in the *Sufficiencia* Avicenna follows in all cases (*per totum*) the opinions of others, and does not express his own view (*secundum eius sententiam*), so that it is not surprising that the *Sufficiencia* contains some false views, and according to Bacon the view of the non-temporality of substantial change is one of these false views. It is in the Preface to the *Sufficiencia* that Bacon finds evidence for his crucial claim about Avicenna's lack of endorsement of the views presented in that work. The strongest evidence comes from a passage of the Preface, quoted by Bacon, where in Bacon's reading Avicenna maintains that he has determined the pure truth of philosophy in his book *Philosophia orientalis* and not in the *Sufficiencia*.⁵¹ Bacon concludes from his reading of this passage that Avicenna is simply the *recitator* but not the *auctor* of the views that he presents in the *Sufficiencia*.⁵²

It is also significant that with his appeal to the Preface of the *Sufficiencia* Bacon is not just happy to solve the contrast with Avicenna, but he also takes this occasion to show his very high consideration of the Arabic philosopher, whom he rates as the wisest philosopher after Aristotle (*Sapientissimus enim philosophorum post Aristotelem*).⁵³

Finally, I will mention without going into details another case in the *Communia naturalium* in which Bacon tries to reduce the contrast between his view and that of Avicenna by questioning Avicenna's authorship of the conflicting

50 The Latin translation of Avicenna's Preface is edited in Birkenmajer, Avicennas Vorrede, pp. 314–20. An English translation and a study of its contents can be found in Gutas, *Avicenna*, pp. 29–34, 41–6 and 109–15. On Bacon's quotations of Avicenna's Preface, see Birkenmajer, Avicennas Vorrede, pp. 308–11, Bouyges, Roger Bacon, pp. 312–15, and Salman, Algazel et les Latins, pp. 103–27. On the hypothesis that Albert the Great knew Avicenna's Preface as well as some basic information about its transmission, see Bertolacci, Albert the Great.

51 Bacon, *Communia naturalium* I, part 4, d. 1, c. 3, p. 248, line 29–p. 249, line 7: 'Ceterum Avicenna dicit in eodem prologo quod postea voluit facere librum *Dependencium*, quod sit glosa hujus libri *Sufficiencie*; ex quo patet quod non est confisus in isto libro. Set precipue hoc manifestum est ex eodem prologo, ubi postea dicit hec verba: "est autem alius liber preter hos duos in quo posui philosophiam secundum id quod ejus est in natura et secundum id quod exigit opinio pura, non observando semitam aut partem ad quam declinant participes in arte, neque formidando a suarum ictibus lancearum, hoc quod fuit in aliis formidatum, et hic est meus liber in *Philosophia Orientali*".'

52 Ibid., p. 249, lines 14–23: 'Et ideo non debent Avicenne ascribi que recitantur in libro *Sufficiencie*, quia recitator est ibi sentenciarum philosophie vulgarum, absque eo quod determinet in eo quid sit tenendum et quid non; quod in libro *Dependencium* fecit, et maxime in *Philosophia Orientali*, ubi puram philosophie veritatem determinavit. Et ideo per libros Avicenne de philosophia vulgaris nunquam debet argui tanquam per auctoritatem Avicenne, quia ipsemet eis suam denegat auctoritatem tanquam aliorum sentenciarum recitator.'

53 Ibid., p. 249, lines 7–8.

view, this time on account of the defective Latin translation, which—in his opinion—does not convey faithfully Avicenna's thought. This case appears in Bacon's discussion about the unity of time. The discussion is centered around the traditional problem of how to account for there being only one time, given the assumption that time is an accident of motion (or equivalently, motion is the subject of time) and there are many motions.⁵⁴ After reporting and rejecting the opinion of Averroes⁵⁵ and that of Bonaventure,⁵⁶ Bacon also reports the opinion of Avicenna:

(T7) Tercia opinio imponitur Avicenne, secundum ejus translatores in 4° *Phisicorum*; ibi enim scribitur quod tempus est accidens uni motui, et tamen est mensura plurium, sicut longitudo ulne est accidens soli ulne, et tamen mensurat infinitas alias longitudoines pannorum equales et subjectas.⁵⁷

In text T7 Bacon clearly refers to Avicenna's solution to the problem of the unity of time in tr. 2, c. 13 of his *Liber primus naturalium*,⁵⁸ although he does not give a faithful and complete report of Avicenna's solution. The example of the ell (*ulna*) does not appear in Avicenna, although it may be vaguely suggested by an analogy that Avicenna puts forward between time-measurement and extension-measurement.⁵⁹ Furthermore, Avicenna makes two main points about the subject of time: the first point is that the subject of time is only one

54 For a more detailed presentation of this problem, see Trifogli, *Oxford Physics*, pp. 238–9.

55 Bacon, *Communia naturalium* I, part 3, d. 1, c. 6, p. 160, line 15–p. 161, line 34.

56 *Ibid.*, p. 161, lines 1–29. On Averroes' and Bonaventure's opinions on the issue of the unity of time, see Trifogli, *Oxford Physics*, pp. 240–6 and 257–61.

57 Bacon, *Communia naturalium* I, part 3, d. 1, c. 6, p. 162, line 29–p. 163, line 2. The Latin term *ulna* signifies an ell, i.e., a forearm, and derivatively the length of a forearm. In Bacon's example, an ell is a measure of the length of clothes (*pannorum*). This is a standard example. See also Kilwardby, *On Time*, q. 5, p. 12, lines 8–11; English translation, p. 30.

58 Avicenna, *Liber primus naturalium*, tr. 2, c. 13, p. 353, line 55–p. 357, line 102.

59 *Ibid.*, p. 356, line 95–p. 357, line 102: 'Temporis ergo eius esse pendet ex uno motu et mensurat illum, et mensurat etiam ceteros motus quos impossibile est esse absque motu corporis efficientis tempus suo motu, nisi in intellectu, et hoc est sicut mensura quae est in uno corpore <...>, et mensurat etiam quod est ei oppositum et aequidistans ei. Sed quia mensurat duo corpora, cum ipsum sit unum singulare, non oportet tamen ob hoc ut pendeat a duobus corporibus, sed possibile est ut pendeat ab uno quod mensurat et mensuret aliud etiam a quo non pendet.' The Arabic Avicenna does not present relevant differences. In McGinnis' translation: 'Hence, the existence of time is dependent upon a single motion that it measures and, equally, the rest of the motions whose existence would be impossible without the motion of the body that, through its motion, produces time (except in the act of the estimative faculty). That is like the measure existing in some body that measures [that body] as well as whatever is parallel and juxtaposed to it. Its being a measure—that is, its being one and the same thing for two bodies—does not require that it depend upon two bodies. It might depend on only one of them, measuring it as well as the other one that it is not dependent upon.' (Avicenna, *The Physics*, p. 252).

motion; the second is that the motion that is the subject of time is the motion of the heavens. Bacon does not explicitly ascribe this second point to Avicenna, but seems to consider it as a corollary of Avicenna's opinion rather than part of the opinion itself.⁶⁰ He does ascribe to Avicenna the first point, which is indeed the fundamental one in Avicenna's solution, and one on which Bacon utterly disagrees. Bacon argues at length against this point when he rejects Averroes' opinion and maintains that the subject of time is each and every motion, not just one motion.⁶¹ In text T7, however, Bacon suggests that this view about the unity of time based on the unity of the motion that is its subject comes to be associated to Avicenna as a result of an inaccurate translation of his work. This view reflects how the translator interprets Avicenna's view rather than Avicenna's own view.⁶² Bacon's speculation, however, does not seem to be right. As I can gather from McGinnis' English translation of the Arabic text, there are no relevant differences between the Arabic and the Latin Avicenna.⁶³

4 Conclusion

While the in-depth analysis of two main case-studies that I have carried out in this paper has revealed that there are some divergences between the views of the two philosophers, it has also provided clear evidence of the influence that Avicenna's natural philosophy had on Bacon. For it has shown that it is to Avicenna that Bacon turns in his analysis of two crucial notions of Aristotle's physics, that is, the notion of nature and that of change. It is in Avicenna that Bacon finds an explanation of the distinction between universal and particular nature, a distinction that he thinks is extremely important to deal with a number of specific issues but about which Aristotle himself says nothing. And it is again in Avicenna that Bacon finds a definition of change as passage from potency to act that is much more explicit and clear than the original Aristotelian definition (the act of what is in potency in so far as it is in potency) and is ready to adopt it.

60 Bacon, *Communia naturalium* I, part 3, d. 1, c. 6, p. 163, lines 2–4.

61 See above, n. 55. After rejecting the opinions of Averroes, Bonaventure, and Avicenna, Bacon gives an extensive presentation of his own (highly original) solution to the problem of the unity of time at p. 163, line 31–p. 168, line 10. On Bacon's solution and its reception in some 13th-century English commentators, see Trifogli, *Oxford Physics*, pp. 246–56.

62 In the discussion about time, Bacon considers a similar 'apologetic' strategy also in connection with some views of Averroes with which he disagrees. For example, he comments as follows on Averroes' view that the existence of time depends on the soul: 'Mirum est valde quomodo Averroes cecidit in errorem de tempore quod sit in anima, cum ipse fuerit multum literatus homo; set aut mala translacio et vicium translacionis fuit causa huius erroris apparentis, aut ipse hic erravit.' (*Communia naturalium* I, part 3, d. 1, c. 6, p. 158, lines 27–30).

63 See the texts quoted in n. 59.

Moreover, Bacon's interpretation of the obscure passage of Avicenna's *Metaphysics* about the universal nature in terms of another Avicennian doctrine, that of the *forma corporeitatis*, provides a significant indication of the high rank of Bacon as 'Avicennian scholar'. Bacon appears to apply to Avicenna a kind of exegetical technique ('to explain Avicenna by means of Avicenna') that looks remarkable, and witnesses to his deep knowledge of Avicenna's thought.⁶⁴

Finally, it is well known that Bacon's optics owes much to Avicenna's *De anima*, which is a special branch of his natural philosophy.⁶⁵ This result combined with those reached by the present investigation about the influence of Avicenna on Bacon's understanding of the notions of nature and of change makes it likely that Bacon is drawing silently on Avicenna's natural philosophy more often than we can see at the present stage of this research.⁶⁶ Accordingly, a more in-depth and extensive investigation of the influence of Avicenna's physics on Bacon—not restricted, like the present one to the explicit quotations of Avicenna in Bacon's *Communia naturalium*, and which examines a wider range of works by Bacon—looks like a very promising project.

Appendix

Explicit References to Avicenna in the *Communia naturalium*⁶⁷

Physica

- (1) Book II: about Avicenna's calling the powers of matter 'virtutes' and 'vires' (I, part 2, d. 2, c. 4, p. 82, line 2).
- (2) Book I: about the relation between universal and particular (I, part 2, d. 3, c. 7, p. 92, line 10).
- (3) Book I: about the claim that nature only comes to a halt when something complete is produced (I, part 2, d. 3, c. 7, p. 93, lines 26–8).
- (4) Book IV: about the unity of time (I, part 3, d. 1, c. 6, p. 162, line 29–p. 163, line 2).
- (5) Book not specified [book IV]: about the view that there is no void space (I, part 3, d. 2, c. 2, p. 190, lines 4–5).
- (6) Book III: about the view that substantial changes are instantaneous (I, part 4, d. 1, c. 3, p. 248, lines 15–18).
- (7) Book IV: about the view that there cannot be two simultaneous times or instants (I, part 4, d. 1, c. 4, p. 256, lines 2–4).

⁶⁴ I owe this remark about Bacon as Avicennian scholar to Amos Bertolacci.

⁶⁵ See Tachau, *Vision and Certitude*, pp. 3–26.

⁶⁶ I am grateful to Dag Nikolaus Hasse for this remark.

⁶⁷ In the list below the references to Avicenna are divided into groups corresponding to the works of Avicenna as mentioned by Bacon. Within each group, the references are listed in the order in which they appear in the *Communia naturalium*.

Metaphysica

- (1) Book I: about the order between mathematical sciences, natural sciences and metaphysics (I, part 1, d. 1, c. 1, p. 1, lines 10–15).
- (2) Book VI: about the distinction between universal and particular nature (I, part 1, d. 2, c. 2, p. 21, lines 19–23; part 2, d. 3, c. 7, p. 92, lines 14–19).
- (3) Book II: about the relation of a universal to a particular (I, part 2, d. 3, c. 7, p. 96, lines 10–12).
- (4) Book not specified [book V]: about the view that the intellect produces universality in the things (I, part 2, d. 3, c. 10, p. 103, lines 5–8; p. 105, lines 26–30).
- (5) Book X: about claim that the love of future happiness is more influential in man than the other ends (I, part 2, d. 5, c. 2, p. 128, lines 26–8).
- (6) Books IX and X: about the resurrection of the bodies (I, part 3, d. 1, c. 6, p. 161, lines 10–14).
- (7) Book III: about the view that a bodily angle is a body (II, part 2, c. 2, p. 343, lines 22–3).
- (8) Book IX: about the view that there are nine heavens (II, part 4, c. 2, p. 388, lines 3–5; c. 3, p. 390, lines 1–3).
- (9) Book IX: about the view that stars are animate (II, part 4, c. 9, p. 410, lines 27–9).

De animalibus

- (1) Book IX: about the claims (i) that the semen of the mother is the matter and the semen of the father is an efficient cause, and (ii) that the semen of the father is the matter of the spirits (I, part 2, d. 5, c. 1, p. 121, line 28–p. 122, line 4).
- (2) Book XVIII: about the view that monsters occur in plants (I, part 2, d. 5, c. 4, p. 136, lines 7–9).
- (3) Book VIII: about the view that the passion of the soul can be so strong to produce persistent physical effects (I, part 3, d. 1, c. 1, p. 140, lines 29–33; II, part 4, c. 6, p. 399, line 34–p. 400, line 13).
- (4) Book not specified: about the generative power of animals (I, part 4, d. 2, c. 2, p. 275, line 33– p. 276, line 12).
- (5) Books III and IX: about the generation by propagation (I, part 4, d. 2, c. 3, p. 278, line 24–7; p. 278, line 34–p. 279, line 8).
- (6) Book not specified: about the generation of man and in particular about the affinity between parents and offspring (I, part 4, d. 2, c. 4, p. 279, lines 24–31; p. 280, line 30; p. 281, line 28).
- (7) Book not specified: about memory and estimative power (I, part 4, d. 3, c. 7, p. 300, lines 30–32).
- (8) Book XVIII: about the generation of monsters (I, part 4, d. 4, c. 1, p. 303, lines 9–19).

De anima

- (1) Book I: about the location of the estimative power in the brain (I, part 1, d. 2, c. 1, p. 17, lines 7–10).

- (2) Book V: about the view that artefacts are essential for the happiness of man and that future happiness is the final cause of virtue (I, part 2, d. 5, c. 2, p. 127, lines 5–21).
- (3) Book IV: about the view that the passion of the soul can be so strong as to produce persistent physical effects (I, part 3, d. 1, c. 1, p. 140, lines 29–33; II, part 4, c. 6, p. 399, line 34–p. 400, line 13).
- (4) Book I: about the four parts of the vegetative soul (I, part 4, d. 3, c. 6, p. 298, lines 5–7).
- (5) Book I: about the different nature of the soul in the stars and in the bodies here below (II, part 4, c. 9, p. 410, lines 27–33).

Alkimia

- (1) Reference to a treatise by Avicenna about alchemy in ten books (I, part 1, d. 1, c. 2, p. 7, lines 18–21).
- (2) Book not specified: about the view that there are 145 kinds of mixture (I, part 4, d. 2, c. 2, p. 275, lines 9–13).

Logica

- (1) Book not specified: about the view that the intellect produces universality in the things (I, part 2, d. 3, c. 4, p. 103, lines 5–8; p. 105, lines 26–34).
- (2) Book I: about the claim that there is another universal in addition to the five universals distinguished by Porphyry (I, part 2, d. 3, c. 4, p. 107, lines 34–7).

Ars medicine

- (1) Book I: about the generation by propagation (I, part 4, d. 2, c. 3, p. 278, lines 20–24).

Prologus libri Sufficiencie (Liber dependencium, Philosophia orientalis)

About Avicenna's following common opinions and not the truth in the *Sufficiencia* (I, part 4, d. 1, c. 3, pp. 248–50 passim).

Work not specified

- (1) About the category of habit (I, part 3, d. 1, c. 8, p. 180, lines 10–11).
- (2) About the view that the intellectual soul is incorruptible (I, part 4, d. 3, c. 1, p. 282, lines 3–9).

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Follower or Opponent of Aristotle? The Critical Reception of Avicenna's Meteorology in the Latin World and the Legacy of Alfred the Englishman¹

Jean-Marc Mandosio

Long reputed one of the weakest aspects of ancient science, the part of natural philosophy called 'meteorology'² has caught the attention of a few scholars in recent years.³ More recently still, early modern meteorology has also begun to raise some interest.⁴ As to medieval meteorology, the Latin translations of Aristotle's *Meteorology* and a few scholastic commentaries have been critically edited,⁵ but apart from scattered research concerning its Latin and vernacular transmission,⁶ the most comprehensive studies to date were dedicated to Arabic and Hebrew meteorology.⁷ This science is very far from being considered a major field in the history of natural philosophy nowadays,⁸ in stark contrast with the opinion which prevailed for centuries.⁹ Meteorology had a universal

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- 1 Unless otherwise noted, the translations of Latin texts are mine. For the Arabic text of Avicenna's *Meteorology*, I used Silvia Di Donato's provisional French translation (see below, n. 329). A decade ago I wrote (in nominal collaboration with Carla Di Martino) a paper which addressed some of the topics developed here: La 'Météorologie' d'Avicenne. References to it shall be mostly limited to the correction of significant errors. I wish to thank Gad, Dag and Amos, Silvia, Irene and Cristina for their support, suggestions and discussions.
 - 2 Not to be confused with meteorology as it is popularly known today, centred upon weather forecasting. See Mandosio, *Meteorology*.
 - 3 See Lewis (transl.), *Alexander of Aphrodisias: On Aristotle Meteorology 4*; Freudenthal, *Aristotle's Theory of Material Substance*; Wilson, *Structure and Method*, and Viano, *La matière des choses*.
 - 4 See Martin, *Renaissance Meteorology*. A distant precursor was Henninger's *Handbook of Renaissance Meteorology* (1960).
 - 5 See Bibliography.
 - 6 See in particular the works of Joëlle Ducos.
 - 7 See Lettinck, *Aristotle's Meteorology*, and Fontaine, *The Reception of Aristotle's Meteorology*.
 - 8 A telling example: in Ackrill's *New Aristotle Reader*, only three pages (158–60) out of 580 are dedicated to the *Meteorologica*.
 - 9 Here is for instance how the Franciscan Bernardino Trevisan, who taught philosophy at the university of Ferrara in the last decade of the fifteenth century, presented the meteorological science to his readers: 'In the book *On Meteors*, [Aristotle] explains shooting stars, [celestial] blazes and comets, and establishes the causes of rain, snow, hail, dew, hoar frost, of the sea and its saltness, of spring, well and pond waters, of the Milky Way, of the halo and

appeal, not because it was highly speculative, but on the contrary because it explained the most concrete aspects of the natural world—and it did it scientifically, by inserting even the most peculiar facts and phenomena into the global theoretical frame of Aristotelian physics. The fascination this science exerted, far beyond scholastic circles, is testified by the fact that the first work by Aristotle ever translated into French (by Mahieu le Vilain, between 1290 and 1302) was precisely his *Meteorologica*.¹⁰

The present article discusses a key aspect of the history of this science: the reception of Avicenna's Meteorology in the Latin West, which was both partial and distorted. For a whole century, before the work was fully translated in Burgos around 1280, only two small portions of it were available in Latin. One, dealing with minerals (*De mineralibus*), had a huge historical significance, for it was presented as a work by Aristotle; while the other, dealing with floods (*De diluviis*), appeared as a supplement to Plato's *Timaeus*. The translators of these excerpts considered Avicenna as an 'imitator' of the two great philosophers. This obliterated the perception of what differentiates Avicenna's work from Aristotle's *Meteorologica*. But from mid-thirteenth century onwards, the peculiarities of Avicenna's views on these matters began to appear, and this perception was fueled by the growing influence of Averroes, who insisted on Avicenna's unfaithfulness towards Aristotle. The complete translation of Avicenna's work on meteorology came too late: it remained largely unnoticed, and therefore Averroes' and Albert the Great's opinion on the Avicennan contribution to that science remained authoritative for a very long time.

1 Avicenna's Meteorology and Aristotle's *Meteorologica*

In order to appreciate the scope and limits of the critical reception of Avicenna's meteorological conceptions, a quick survey of his treatment of the subject will show how it stands in regard to the works of Aristotle.

The matters addressed by Aristotle in the *Meteorologica* are dealt with by Avicenna in the fourth and fifth parts¹¹ of the second section¹² of Avicenna's

the rainbow, of earthquakes, of thunder, of mines and the possibility of alchemy, of winds and their oppositions, of coction and crudity'; a knowledge 'so useful and valuable that everyone, master or servant, patrician or plebeian, shall frequently confirm the wonderful questions lucidly solved by Aristotle' (*Opus in quatuor libros meteorologicos Aristotelis*, written between 1494 and 1500 [MS Bologna, Biblioteca comunale dell'Archiginnasio, 1664, fol. 1]). For the Latin text, see Mandosio, *Filosofia, arti e scienze*, pp. 329–30.

10 Aristotle, *Les Météores*, ed. Edgren.

11 *Fann*, sometimes translated as 'topic' or 'discipline', literally means 'part'.

12 *Ġumla*, literally 'grouping' or 'compendium', a term which corresponds to the Latin scholastic notion of *summa*.

Book of the Healing or *of the Cure* (*Kitāb al-Šifāʾ*). *The Healing*, defined by Avicenna as a ‘comprehensive book which contains all the sciences of the ancients, even music’¹³, is an encyclopedia—i.e. a complete course on the main areas of knowledge—divided into four sections which deal respectively with Logic, Natural Philosophy, Mathematics and Metaphysics.¹⁴ The second section, on Natural Philosophy (*al-Ṭabīʿiyyāt*), written by Avicenna between 1022 and 1024,¹⁵ is in turn divided into eight parts—*Physics*,¹⁶ *On the Heavens and the World*,¹⁷ *On Coming-to-be and Passing Away*, *On Actions and Passions of Elementary Qualities*, *On Minerals and Lofty Impressions*, *On the Soul*, *On Plants*, *On Animals*—, which correspond roughly to the divisions of the Aristotelian course on natural philosophy. Concerning meteorology, though, there is an important difference, for the traditional order of Aristotle’s books is considerably altered. The contents of *Meteorologica* IV are addressed by Avicenna in the fourth part (*On Actions and Passions of Elementary Qualities*), while those of *Meteorologica* I–III are dealt with in the fifth (*On Minerals and Lofty Impressions*). Avicenna gives no explanation for this reversal of order, but it is well known that, since Antiquity, the commentators of Aristotle were embarrassed by *Meteorologica* IV, whose contents did not fit well with the rest of the work.¹⁸ As a matter of fact, at the end of book III, Aristotle delineated the principles of the generation of minerals, and concluded: ‘So much for a general account of these bodies; we must now take each kind separately and examine it in detail’¹⁹. But this program is not met in book IV, which deals with the effects of the active and passive qualities of the four elements upon mixed inanimate bodies. This discrepancy led Alexander of Aphrodisias to think that book IV was misplaced, did not belong to *Meteorologica* and should instead come after

13 Avicenna, *Letter to Kiyā*, in Gutas, *Avicenna*, p. 57.

14 As noted by Gutas (*Avicenna*, p. 105), Avicenna also uses the word *ḡumla* to designate the whole work. For the sake of clarity, and following a long-established tradition, I prefer to call *The Healing* an encyclopedia since it expounds the complete ‘circle of knowledge’, and to keep the term ‘section’ for the compendia which compose it. Gutas’ argument against labelling *The Healing* an encyclopedia, based on the conception that ‘an encyclopedia is a collection of unrelated and disparate articles’ which ‘does not have the organic unity and coherent approach of a *summa*’ (ibid.), is not decisive: see for instance Hegel’s *Enzyklopädie der philosophischen Wissenschaften*.

15 See Gutas, *Avicenna*, p. 107.

16 For the sake of clarity, again, I differentiate ‘Physics’ as a part and ‘Natural Philosophy’ as a whole, although the same Arabic term is used for both, as in Greek.

17 Not to be confused with a pseudo-Avicennan work bearing the same title.

18 See Baffioni, *Il IV libro dei Meteorologica di Aristotele*; Rubino, *Il IV libro dei Meteorologica di Aristotele fra filosofia e filologia*; Besnier, *Les Météorologiques*, pp. 214–18 (useful for the account of the ancient tradition, but ill-informed as far as Avicenna and his translations are concerned, p. 216), and Schoonheim, *Les Météorologiques*, pp. 223–8.

19 Aristotle, *Meteorologica*, III, 6, 378b.

On Coming-to-be and Passing Away.²⁰ Avicenna doesn't exactly follow Alexander's advice, however, for *On Actions and Passions* begins with two chapters (on 'the order of the four elements' and 'the general disposition of seawater') dealing with topics which belonged to books I and II of Aristotle's *Meteorologica*.²¹ Put together, they delineate the material frame of the sublunar world, inside which all the phenomena described in the four books of Aristotle take place. Furthermore, they are preceded by a prologue, modeled upon Aristotle's own prologue to the *Meteorologica*, in which Avicenna recapitulates the parts of Natural Philosophy already completed and those which remain to be expounded. Thus it is clear that he considers the contents of Aristotle's book IV as an integral part of a threefold exposé, comprising *On Actions and Passions*, *On Minerals* and *On Lofty Impressions*.²² Accordingly and out of convenience, the whole formed by the fourth and fifth parts of Natural Philosophy, as presented in *The Healing*, will from now on be referred to as 'Avicenna's Meteorology'.

The new order emphasises the logical progression of the course on natural philosophy. First comes the discussion of the general concepts of that science (*Physics*). Then Avicenna discusses the principles of cosmology and the difference between the four elements and the incorruptible celestial substance, whose properties and motion govern the sublunar world (*On the Heavens and the World*). The description of the sublunar world proper begins, with the four elements and their mutual transformations (*On Coming-to-be and Passing Away*); after which Avicenna examines the properties of inanimate 'mixed' bodies, first in regard to heat and cold, dry and moist (*On Actions and Passions of Elementary Qualities*), then in regard to the different areas of the sublunar world, from the earth up to the sphere of fire (*On Minerals and Lofty Impressions*). Finally come the parts dedicated to the animate mixed bodies. They begin with the general concepts concerning the soul, with particular emphasis on the human soul, in which the different sorts of soul, from the vegetative to the rational, are combined (*On the Soul*). Then the living substances are discussed, from the simpler (*On Plants*) to the more complex (*On Animals*). Thus Avicenna puts more or less into practice the rule he stated at the beginning of the *Physics*: 'Common things must first be known in order to know the specific things'²³.

Avicenna explains in his Prologue to *The Healing*, written after the work was completed, that he did not closely follow the order of Aristotle's works on physics and metaphysics. He seems to regret his failure to do so, saying that he was 'mostly unsuccessful in pursuing a course parallel to the systematic

20 Alexander of Aphrodisias, *On Aristotle Meteorology 4*, I, p. 65.

21 See Hasnawi, Avicenne et le livre IV des *Météorologiques* d'Aristote, pp. 135–7.

22 Di Martino's account (I 'Meteorologica' di Avicenna) is superficial and mostly inaccurate.

23 Avicenna, *The Physics of The Healing*, I, 1, 3, p. 5.

treatises and the memoranda of Aristotle, the paradigmatic master in this discipline'²⁴; but this is obviously a precaution of language—as Avicenna himself recalls, *The Healing* was somewhat 'accommodating to [his] Peripatetic colleagues'²⁵—, for in another passage he admits that he did it on purpose:²⁶ 'There is nothing of account to be found in the books of the ancients which we did not include in this book of ours; if it is not found in the place where it is customary to record it, then it will be found in another place which I thought more appropriate for it'; furthermore, 'to this I added some of the things which I perceived through my own theoretical analysis, especially in physics and metaphysics'²⁷. Thus, as Gutas concludes, 'Avicenna presents himself not as an anti-Aristotelian despite himself ... but as a conscious reformer of the Aristotelian tradition'²⁸.

This applies perfectly to his treatment of the meteorological science. Let us take a closer look at the contents of Aristotle's *Meteorologica*, putting aside book IV. Here is a summary of the first three books:

- I, 1. The scope and subject matter of meteorology, and its place in the system of natural philosophy.
- I, 2. Material and efficient causes of all that happens in the sublunar world.
- I, 3. The disposition of air and fire in regard to the celestial sphere; clouds and water are not formed from aether.
- I, 4. Shooting stars and other phenomena caused by heat.
- I, 5. Chasms (i.e. aurora borealis) and other coloured phenomena appearing in the sky.
- I, 6–7. Comets.
- I, 8. The Milky Way.
- I, 9. Winds, clouds and mist.
- I, 10. Dew and hoar frost.
- I, 11. Snow.
- I, 12. Hail.
- I, 13. Winds, rivers and springs.
- I, 14. Changes in the distribution of sea and land; floods.

24 Id., Prologue to *The Healing*, p. 45.

25 Ibid., p. 44.

26 The assertion made by Avicenna's disciple Ġūzġānī in his own Prologue to *The Healing*, according to which Avicenna was constrained to write the parts on physics and metaphysics—except the books on plants and animals—'without having available any book to consult, but by relying solely upon his natural talents' (in Gutas, *Avicenna*, p. 32), is rightly dismissed by Gutas as an apologetic stance (ibid., pp. 114–15).

27 Avicenna, Prologue to *The Healing*, p. 43.

28 Gutas, *Avicenna*, p. 115.

- II, 1–3. The sea and its nature.
- II, 4–6. General theory of winds.
- II, 7–8. Earthquakes.
- II, 9. Thunder and lightning.
- III, 1. Hurricanes, typhoons, firewinds and thunderbolts.
- III, 2–5. Haloes and rainbows.
- III, 6. Mock suns and rods; the generation of minerals.

The internal logic of the whole is not apparent. Only book I follows a discernible order. It starts with the phenomena which take place in the higher regions of the sublunar sphere (4–8), and descends from there to the lower regions (9–12) and to the surface of the earth (13–14). In contrast, the topics discussed in books II and III seem haphazardly assembled.²⁹ Here is, by comparison, the table of contents of Avicenna's *Meteorology*, with the corresponding Aristotle's chapters:

The Fourth Part of Natural Philosophy. *On Actions and Passions of Elementary Qualities*

Prologue [→ *Meteor.* I, 1]

1. *On the Order of the Four Elements* [→ *Meteor.* I, 3]
 2. *On the General Disposition of Seawater* [→ *Meteor.* II, 1–3]
- [The other chapters correspond roughly to *Meteor.* IV]

The Fifth Part of Natural Philosophy. *On Minerals and Lofty Impressions*

Book I. *On That which Happens upon the Surface of the Earth* [= *On Minerals*]

1. *On the Generation of Mountains*
2. *On the Utility of Mountains, and on the Generation of Clouds and Dew* [→ *Meteor.* I, 9–10, 13]
3. *On Water Springs* [→ *Meteor.* I, 13]
4. *On Earthquakes* [→ *Meteor.* II, 7–8]
5. *On the Generation of Minerals* [→ *Meteor.* III, 6]
6. *On the Condition of Climates and Lands* [→ *Meteor.* I, 14]

Book II. *On the Inanimate Beings and Events which Take Place above Earth* [= *On Lofty Impressions*]

1. *On Clouds and Things which Resemble Them* [→ *Meteor.* I, 3, 9–12]
2. *On the Principles upon which the Knowledge of the Efficient Cause of the Halo, the Rainbow, etc., Should Be Based*

²⁹ Aristotle's *Meteorologica* is one of the 'memoranda' (*hypomnemata*) less tightly composed than his 'systematic treatises', according to the distinction Avicenna recalled in the Prologue to *The Healing*.

3. *On the Halo and the Rainbow* [→ *Meteor.* III, 2–6]
4. *On Winds* [→ *Meteor.* I, 13; II, 4–6]
5. *On Thunder and Lightning* [→ *Meteor.* II, 9; III, 1], *Shooting Stars, Revolving Fires and Comets* [→ *Meteor.* I, 4–7]
6. *On the Remarkable Events Happening in the World* [i.e. ‘floods’] [→ *Meteor.* I, 14]

Since Avicenna does not explain the organisation of his account of meteorology, its underlying logic must be inferred from the way he divides and distributes the subject matter, for which no explicit definition is given. The book titles and chapter headings partly supply this lack of information. It is unclear whether they were actually written by Avicenna. According to his disciple Ġūzġānī, at the very beginning of the composition of the work, ‘the Master wrote down the main topics’ in two days, ‘from his memory and by heart’, after which ‘he would examine each topic and write the commentary on it’³⁰. In all probability, this outline consisted of a list of sections and subsections; but Ġūzġānī, who acted as ‘editor’ of *The Healing*, may have meddled with them in order to adjust them to the final text, and they also may have been modified by later copyists and editors.³¹ Whatever the case, we must make do with book titles and chapter headings as they are now.

Meteorology, thus, is the science which deals with ‘inanimate beings and events’, happening or taking place either ‘upon the surface of the earth’ (book I) or ‘above earth’ (book II). The inscrutable arrangement of Aristotle’s *Meteorologica* is replaced by a simple, twofold division of the subject matter of this science, according to the area of the sublunar world where the phenomena under examination take place. The layered disposition of the four elements was described in the first chapter of *On Actions and Passions*, and Avicenna follows their order from the bottom up.

The phrase ‘inanimate beings and events’ deserves a closer scrutiny. Its equivocity reflects the epistemological status of the subject matter of meteorology, which is, to some extent, ontologically undetermined.³² Everything that exists in the sublunar world is mutable and transient. Being of a ‘simple’ nature, the four sublunar elements are clearly defined, but their very essence implies that they are unstable and ever transforming into one another. As a consequence, the existence of their ‘mixed’ compounds is also temporary and precarious. These compounds are of two kinds: some of them are animate, others are not. The presence of a soul gives the animate ‘mixed’ bodies the obvious

30 Ġūzġānī, *The Life of Ibn Sina*, in Gutas, *Avicenna*, p. 110.

31 Amos Bertolacci confirmed to me, during the 2015 Avicennan conference held in Pisa, that the question has never been studied.

32 See Mandosio, *Meteorology and Weather Forecasting in the Middle Ages*, pp. 171–2.

status of substantial ‘beings’, but what of the inanimate ones, those that are dealt with in meteorology? The objects this science discusses are also of two kinds: some are ‘beings’, while others are mere ‘events’³³. There are no precise criteria to differentiate them, for all inanimate mixed bodies, in their actual existence, are accidentally generated by the four elements and the two exhalations, ‘moist’ and ‘dry’, which result from the intermingling and degradation of the elements. But these exhalations as such are little more than a prime matter, i.e. a mere potentiality: they have to be submitted to heat and cold, and mixed with preexisting inanimate mixed bodies, to become either ‘beings’ or ‘events’, according to their dispositions.

The inanimate mixed ‘beings’ proper, those which have a definite form, are the minerals, generated through a process of ‘agglutination’ and ‘congelation’ of the two exhalations: as such, they are the subject matter of book I of the fifth part; for, as Avicenna shows throughout this book, everything that happens ‘upon the surface of the earth’ depends on minerals. Due to the existence of giant mineral agglomerations, i.e. mountains (I, 1), there are clouds (I, 2) and water springs (I, 3); in other words, mountains are the efficient cause of the water cycle. Earthquakes (I, 4) and the generation of minerals (I, 5) are two very different consequences of dry or moist ‘exhalations’ being imprisoned underground. The perpetual and extremely slow changes in the distribution of land and seas also depend ultimately on the natural properties of the element earth, which is the main constituent of minerals (I, 6). Minerals are ‘beings’, that is, bodies which are mostly solid and relatively stable, and which may even have, in the case of metals and stones (the ‘perfect’ mixed bodies in the Scholastic language), a ‘specific form’, whose existence is Avicenna’s main argument against the possibility of alchemical transmutations, as he explains in chapter 5.³⁴

What now of the inanimate mixed entities (called ‘imperfect’ by the Scholastics) which are not ‘beings’ but ‘events’? Most of the topics dealt with in Meteorology, apart from minerals, should fall into this category, be it clouds, dew, springs, earthquakes, haloes, rainbows, winds, thunder, lightning, and so on. None of them has a ‘specific form’: they exist only as ‘events’ which just ‘happen’ and do not last. Springs and rivers, of course, look stable and would not be considered ‘events’, but this is only due to the fact that the gushing and flowing of water—which is in itself an ‘event’ and not a ‘being’—is regulated by the mineral conducts and reliefs, which make springs and rivers keep their location and shape for extended periods of time. (The case of the ocean is different, for its bulk, or ‘general disposition’, is roughly equivalent to the layer of the element water, as Avicenna explains in *On Actions and Passions*, chapter 2.)

33 In the medieval scholastic tradition, a similar distinction is made between ‘perfect’ and ‘imperfect’ mixed bodies.

34 See below, n. 138.

In some instances, notably haloes and rainbows, we are confronted with mere optical illusions, which lack even the fleeting existence of clouds and rain. Thus, all the meteorological phenomena which take place above earth are, properly speaking, ‘lofty impressions’ (*āṭār ulwiyya*) or ‘events’ (*aḥdāt*), even though the title of book II calls them, rather imprecisely, ‘inanimate beings and events’.

Book II is very clearly structured. It begins with watery ‘impressions’ such as clouds, rain, snow, hail and dew (II, 1),³⁵ followed by the optical phenomena caused by the presence of moisture in the air, mainly haloes and rainbows (II, 3). These phenomena, especially the rainbow, being notoriously difficult to understand, Avicenna provided an introductory chapter ‘on the principles upon which the knowledge of the efficient cause of the halo, the rainbow, etc., should be based’ (II, 2): these principles are those of the theory of vision, placed here because this topic had not yet been dealt with in *The Healing*.³⁶ After the watery ‘impressions’, confined to the lower region of air, come the dry or smoky ‘impressions’, that is, winds (II, 3), and then the fiery ‘impressions’ such as lightning and thunder, shooting stars, comets and the like (II, 5). Avicenna ordered his whole treatise according to the four elements, on an ascending scale: earth (book I), water, air, fire (book II). The final chapter (II, 6) deals with what he calls ‘the remarkable events happening in the world’, i.e. ‘floods’, a flood being defined as the breaking of the balance between the four elements, when one of them triumphs over the others, so that there may be not only water floods, but also earth, air or fire floods; when that happens, the whole sublunar world is nearly destroyed, but then everything starts anew, thanks to the natural order established by divine providence. This cataclysmic account serves as a conclusion to the whole exposé on meteorological matters, which started at the beginning of *On Actions and Passions* with the description of ‘the order of the four elements’.

All in all, the only topic addressed by Aristotle in *Meteorologica* I–III but left aside by Avicenna is the Milky Way (*Meteor.* I, 8), which the latter considers as a celestial, and not meteorological, phenomenon.³⁷

Avicenna’s *Meteorology* is not by any means a commentary on Aristotle. The subject matter of Aristotle’s *Meteorologica* is reshaped, reworked and com-

35 The treatment of these ‘impressions’ in this chapter is different from that of book I, chapter 2. There they were examined in regard to mountains (as a consequence of the existence of mountains), while here they are examined in regard to air, as watery ‘exhalations’ being evaporated or condensed, heated or frozen, according to the airstreams they meet.

36 The theory of vision, not to be confused with the mathematical theory of optics, is presented at length in the sixth part of *Natural Philosophy* (*On the Soul*), where, following Aristotle but greatly expanding his succinct account, Avicenna expounds the different kinds of perception. Here he explains just what is necessary for a correct understanding of the phenomena under scrutiny.

37 See Lettinck, *Aristotle’s Meteorology*, p. 82.

pleted by Avicenna, for his aim is not to present what the Philosopher or his followers said but to give a detailed account of the science itself. The section *On Minerals and Lofty Impressions* is also remarkable for its method, which gives a primary role to empirical observation and factual demonstration, often used to contradict what Avicenna's predecessors may have asserted. In the Prologue to *The Healing*, he writes that, in the whole work, he 'sought to ... indicate every passage where ambiguity may occur, and solve it by setting forth clearly the correct answer to the extent of [his] ability'³⁸. The two most striking examples of this procedure, as far as meteorology is concerned, are Avicenna's treatment of the vexed question whether the equatorial zone is habitable or not (I, 6), and of the rainbow theory (II, 3).

On the first question, Avicenna declares boldly that the opinion of 'the ancient Peripatetics' is wrong. They considered the equatorial zone unfit for life, due to excessive heat (*Meteor.* II, 5, 362b); but this is not true, for 'trustworthy men have also described the countries which are placed upon the equator'³⁹, as for instance Ceylon, an island located just a few degrees below the equator, which is full of people and prosperous cities. The problem, then, is not to prove that the equatorial zone is habitable—this factual evidence (*qiyās*)⁴⁰ needs no further demonstration—, but to ascertain *why* it is temperate instead of being hotter than the tropical zone as Aristotle presumed. A more convincing explanation than the Aristotelian one is thus necessary, and Avicenna found it in Geminus of Rhodes' astronomical treatise, *Introduction to the Phenomena* (first century BC).⁴¹

On the rainbow theory,⁴² Avicenna candidly says: 'Concerning the rainbow, I know some things and I have no certainty about others, and what has been said about them does not satisfy me'⁴³. What he knows for sure, from personal experience, is that the rainbow is an optical effect, which appears when the sun shines behind the observer, and a patch of moist air stands between him and a dark background such as a cloud or a cliff. Thus the rainbow is not, as the Peripatetics believed (*Meteor.* III, 4, 373b), a consequence of the reflection of light—the modern concept would be 'refraction'—upon the cloud itself when it is about to rain.⁴⁴ The way Aristotle explained the order of the colours in the rainbow is also inaccurate, but much more embarrassing: 'As for the colours, I have reached no certainty about them, I haven't ascertained their

38 Avicenna, Prologue to *The Healing*, in Gutas, *Avicenna*, p. 42.

39 Avicenna, *Ma'ādīn*, I, 6, p. 26.

40 Ibid.

41 See Mandosio, Latin technique, 2011–12, pp. 120–22. See also below, p. 514.

42 See Boyer, *The Rainbow*, pp. 77–9; Mandosio, Latin technique, 2012–13, p. 135.

43 Avicenna, *Ma'ādīn*, II, 3, p. 47.

44 Ibid., pp. 50–52.

cause, and I am not convinced by what has been said [by others before me], for it is nothing but falsity and stupidity⁴⁵. What Aristotle said about these colours (*Meteor.* III, 4, 374b–375a) doesn't stand to reason: 'As for the separation of these colours from one another, so that one side [of the rainbow] be red and another be crimson, and that between them there be a [green] separation, it makes no sense⁴⁶. Avicenna finds especially unconvincing Aristotle's optical demonstration of a natural progression from red to green to crimson, which is supposed to explain why this order is perceived in the rainbow. He admits, at least rhetorically—since in *The Healing* he wanted to appear 'more accommodating to [his] Peripatetic colleagues' than he really was⁴⁷—, that something may have eluded him in the Aristotelian explanation: 'I understand nothing of what our friends the Peripatetics brought forward concerning these colours and these separations; and perhaps there is somebody who might understand it and make it comprehensible⁴⁸. For his part, being unable to find any valid explanation, he concludes: 'This is what I know about the rainbow; and what is left [unanswered] on the subject, you must ask it to someone else⁴⁹.

Avicenna's rather ambiguous attitude towards Aristotle and the Peripatetics in *The Healing* gave rise to two divergent, and equally tendentious, interpretations, both represented in al-Andalus: Ibn Ṭufayl (1110–85) maintained that, in this work, Avicenna undertook to interpret the contents of Aristotle's books 'proceeding according to Aristotle's doctrine and following the method of his philosophy'⁵⁰, while for Ibn Sab'īn (d. 1270) *The Healing* 'is full of fumbings and opposes Aristotle'⁵¹.

2 'The Foremost Imitator of Aristotle': Alfred the Englishman and the *De mineralibus*

2.1 Avicenna and the 'Lost' Work by Aristotle

In agreement with Ibn Ṭufayl's contemporaneous views, Avicenna's Meteorology was first introduced to Latin scholars, in the second half of the twelfth century, under the assumption that the author was a very faithful heir of Aristotle, so much so that it was possible to exhume from Avicenna's writings a long

45 Ibid., p. 50.

46 Ibid., p. 54.

47 See above, p. 463.

48 Avicenna, *Ma'ādīn*, II, 3, p. 55.

49 Ibid., p. 56.

50 Gutas, *Avicenna*, p. 123.

51 Ibid., p. 126.

lost work of the Philosopher. This ‘discovery’ was made by Alfred of Shareshill (or Sareshel), also known as Alfred the Englishman.

Very little is known about his life.⁵² He went to Spain and stayed in Toledo, long enough to study the Arabic language and Greco-Arabic philosophy under a learned Jew whom he calls ‘my master Salomon Avenraza’ (Ibn Ezra?), otherwise unknown although he describes him as ‘both a very famous Jew and the foremost among modern philosophers’⁵³. His field of expertise was natural philosophy, the subject matter of all his known works. He entered the circle of Gerard of Cremona and translated two ‘Aristotelian’ works from Arabic into Latin: a selection of excerpts *On Minerals (De mineralibus)* taken from Avicenna’s *Meteorology*,⁵⁴ and Nicholas of Damascus’ compilation of Aristotle’s and Theophrastus’ works *On Plants (Liber de vegetabilibus)*.⁵⁵ Later on, he commented upon at least three works from the Aristotelian natural philosophy corpus. Only two of these commentaries are extant: *Meteorologica*⁵⁶ and *On Plants*;⁵⁷ the third, *On Coming-to-be and Passing Away*, mentioned in the commentary on *Meteorologica*,⁵⁸ is now either lost or still buried among strings of

52 See Otte, *The Life and Writings*, and Burnett, Shareshill [Sareshel], Alfred of. See also Bäumker’s and Long’s introductions to their critical editions. Controversial questions shall be discussed later.

53 ‘... magister meus Salomon Avenraza, et Israelita celeberrimus, et modernorum philosophorum praecipuus ...’ (*Alfredi commentarius*, III, p. 51; see Appendix 1, §i). On his role in Alfred’s studies, see below, n. 228.

54 There are three editions of this translation, by Holmyard and Mandeville (henceforth H/M), Anawati (chapter 3 only), and French, none of which is acceptable. On Holmyard and Mandeville’s work, see below, n. 114. Poortman rightly describes their edition of the Latin text as ‘shockingly insufficient’ (*The Latin Translation*, p. 467), but French’s edition, made more than seventy years after theirs, managed to be even worse. A confusing habit has prevailed of calling the *De mineralibus* by the title of its first chapter, *De congelatione et conglutinatione lapidum*. A new, critical edition has been provided by Rubino.

55 *Liber Aristotelis de vegetabilibus et plantis, translatus ab Arabico in Latinum a magistro Alvredo de Sareshel*, ed. Poortman.

56 *Alfredi commentarius in IV libros Meteororum Aristotelis*, ed. Otte. After Vuillemin-Diem (Praefatio, p. 8), Steel notes that ‘the editor without any explanation forgot to publish the last part of Alfred’s annotations ... covering the end of book IV’ (*A Philological Diet for Philosophers*, p. 88). This may refer to Alfred’s glosses on the *De mineralibus* (see below, n. 197).

57 *Tractatus Alvredi super librum de vegetabilibus*, ed. Long. This commentary has only been partially preserved (see Long, Introduction, p. 130, and Poortman’s observation in *The Latin Translation*, p. 468).

58 ‘Why vapour and heat, which are invisible, produce a visible flame, we discussed it in the book *On Coming-to-be and Passing Away*.’ ‘Quare autem vapor et calor invisibiles flammam visibilem producant, in libro de generatione et corruptione discussimus’ (*Alfredi commentarius*, III, p. 49).

unexplored manuscript glosses.⁵⁹ He also wrote a treatise *On the Motion of the Heart* (*De motu cordis*),⁶⁰ considered as his last work, in which he mentions another of his writings, now lost: a *Book on Degree and Complexion* (*Liber de gradu et complexionem*).⁶¹ In his later years, between 1214 and 1222, he retired and became canon of Lichfield, a town near his native village of Shareshill. The date of his death is unknown.

The translations from Arabic were Alfred's first scientific works. They were part of the collective effort which gave birth, in the twelfth century, to the *translatio vetus*, the 'old' Latin translation of Aristotle's works—replaced in the 1260s by a 'new translation' (*translatio nova*) made directly from the Greek by William of Moerbeke.⁶² As regards *Meteorologica*, Alfred did more than translate a few chapters *On Minerals* from Avicenna: he put together the whole *translatio vetus*. The project was undertaken by Gerard of Cremona (1114–87), who, carrying out in Toledo a 'coherent program'⁶³, translated from Arabic—in addition to the *Physics*, *On the Heavens and the World* and *On Coming-to-be and Passing Away*—the first three books of the abridged version of *Meteorologica* made by Yahyā ibn al-Bīṭrīq,⁶⁴ and had just begun translating book IV when he stopped, near the end of chapter 1,⁶⁵ 'because he actually found it had been translated'⁶⁶ from the Greek by the Sicilian Henry Aristippus (d. 1162). Aristippus' translation⁶⁷ was completed by 1157, when his English friend Robert (of Crycklade?) came to visit him.⁶⁸ Robert probably took it with him when he went back to Oxford, and Alfred of Shareshill appears to have brought to Toledo a

59 On another conjectural commentary by Alfred on Aristotle's short treatise *On Sleep and Waking*, quoted by Ralph of Longchamp, see d'Alverny, *Les nouveaux apports*, pp. 876–7.

60 *Liber Alvedri de Sareshel ... de motu cordis*, ed. Baeumker.

61 'Senses indeed use judgment, as we taught in the book *On Degree and Complexion*.' 'Sensus enim utuntur iudicio, sicut in libro de gradu et complexionem docuimus' (ibid., X, p. 42).

62 *Meteorologica: translatio Guillelmi de Morbeka*, ed. Vuillemin-Diem.

63 See Burnett, *The Coherence*, esp. p. 261.

64 *Liber Aristotelis philosophi sapientis in factura impressionum superiorum quae fiunt in alto et inferius translatus a magistro Gerardo Cremonensi in Toletto*, ed. Schoonheim.

65 The fragment 'breaks off in the middle of a statement' (ibid., pp. xxxiv and 144–50).

66 'Quartum autem non transtulit eo quod sane invenit eum translatum.' This sentence appears in the catalogue of Gerard's works, *Commemoratio librorum*, compiled by his collaborators in Toledo after his death (ed. Burnett, *The Coherence*, p. 279). Burnett (ibid., p. 260) translates *sane* as 'surely' ('because he surely found it had already been translated'), as if Gerard's collaborators were guessing that this might be the reason why he stopped; but the word has the fully affirmative meaning of 'indeed, truly, really'. There is thus no point in repeating that Gerard stopped translating book IV 'for some reason or the other' (Burnett, *The Arabo-Latin Aristotle*, p. 102) or 'for an unknown reason' (Steel, *A Philological Diet*, p. 89), after Schoonheim who considered it 'a riddle' (Introduction, p. xxxiv).

67 *Quartus metheororum Aristotelis: translatio Henrici Aristippi*, ed. Rubino.

68 Steel, *A Philological Diet*, p. 91. Rubino (Einleitung, p. xxxviii) dates it from 'maybe around 1150', without explanation.

copy of this translation,⁶⁹ if this is really what happened, then it must have been Alfred who showed the translation to Gerard.⁷⁰ What lends credibility to this reconstruction is that Aristippus' translation had 'an exceptional fortune', contrary to his other works—a success which 'can only be explained through the fact that it was integrated in Alfred's edition' of the *translatio vetus* of Aristotle's *Meteorologica*, an edition to which 'all the 96 manuscripts' still extant go back.⁷¹ Alfred appears indeed as the actual editor of the composite Latin version of Aristotle's *Meteorologica*—titled *Libri metheororum* and known today as *editio Alfrediana*⁷²—, comprising Gerard's translation of the first three books, Aristippus' translation of book IV, and his own translation of three additional chapters 'on minerals' which he adapted from Avicenna's Meteorology. After its completion, the *editio Alfrediana* was revised, most probably by Alfred himself.⁷³ The revised version is known as the 'Vulgate'⁷⁴ because it is found in all extant manuscripts save one, in which the earlier version is luckily preserved.⁷⁵

Alfred took chapter 1 (*On the Generation of Mountains*) of Avicenna's book *On That which Happens upon the Surface of the Earth* and split it in two separate chapters:⁷⁶ *On the Congelation and Agglutination of Stones (De congelatione et conglutinatione lapidum)*⁷⁷ and *On the Cause of Mountains (De causa montium)*,⁷⁸ chapter 5 (*On the Generation of Minerals*) became *On the Four Species of Mineral Bodies (De quatuor speciebus corporum mineralium)*.⁷⁹ He appended these chapters to Aristotle's *Meteorologica* so as to fill the supposedly missing part on minerals, adumbrated at the end of book III but absent from book IV. Like Gerard of Cremona, he took al-Fārābī's *Catalogue of the Sciences* as a guideline for the works on natural philosophy to be trans-

69 Steel, *A Philological Diet*, p. 91.

70 Alfred was also aware of the Greco-Latin translation of *On Coming-to-be and Passing Away* by Burgundio of Pisa, which he used in his commentary on the treatise *On Plants* (see Judycka, *Préface*, p. 1).

71 Steel, *A Philological Diet*, pp. 90–91.

72 The phrase was coined by Rubino, *Einleitung*, p. xxxix.

73 *Ibid.*, pp. xxv–xxix and xxxvii–xl, and Steel, *A Philological Diet*, pp. 91–5; below, pp. 491–2.

74 The phrase was also coined by Rubino, *Einleitung*, p. xxv.

75 MS Reims, Bibliothèque municipale, 865; description in Rubino, *Einleitung*, pp. xxix–xxxvii.

76 This subdivision is not entirely arbitrary, for Avicenna explicitly says he is dealing with three different topics in this chapter: 'The first is the condition of the formation of stone, the second is the condition of the formation of stones great in bulk or in number, and the third is the condition of the formation of cliffs and heights' (Avicenna, *Ma'ādin*, I, 1, p. 3; transl. H/M, p. 18). Alfred did not translate this introductory statement. The first topic occupies most of Alfred's chapter 1, which also includes the second topic (made of a single sentence: *Ma'ādin*, I, 1, p. 6; transl. H/M, p. 26). Alfred's chapter 2 contains the third topic.

77 *Inc.*: 'Terra pura lapis non fit' (or 'non fit lapis').

78 *Inc.*: 'Montes vero quandoque fiunt ex causa essentiali'.

79 *Inc.*: 'Corpora mineralia in quatuor dividuntur species'.

lated.⁸⁰ Al-Fārābī stated that the sixth part of natural philosophy (the fifth being meteorology and the seventh botany) deals with minerals, that is, ‘the bodies which are composed of similar parts and are not themselves parts of bodies composed of dissimilar parts’—meaning that they are homogeneous substances but are not ‘homœomeric’ parts of living bodies, like bones for instance—, and that this corresponds to the ‘book on minerals’ (*kitāb al-ma ‘ādin*).⁸¹ The information went back to Damascius, Simplicius, Olympiodorus and Philoponus, who referred to such a work; Aristotle didn’t write it, but his successor Theophrastus produced two short treatises *On Stones* and *On Metals*, of which only the first has survived.⁸² As Heitz rightly suggested, the recurring mention of an Aristotelian ‘book on minerals’ reflects the habit of late ancient commentators ‘to ascribe a book to each part of Aristotle’s natural philosophy, regardless of the fact that such books actually existed or not’⁸³. The same applies to the Arab commentators, and to al-Fārābī as well. An additional factor which undoubtedly fueled Alfred’s conviction that Aristotle actually wrote a ‘book on minerals’ is the erroneous information found in the Arabic version of the prologue to the *Meteorologica* by Yahyā ibn al-Bīṭrīq, faithfully translated by Gerard of Cremona.⁸⁴ Instead of saying, as in the original Greek text: ‘After we have dealt with all these subjects [i.e. meteorological phenomena], let us see if we can give some account ... of animals and plants’⁸⁵, Aristotle declared in the Latin translation: ‘When we have finished our account of these things, we shall speak of minerals and animals’⁸⁶.

What kind of work was Aristotle’s ‘book on minerals’ expected to be? According to al-Fārābī, it should describe ‘the varieties of stones, the varieties of metals, and what belongs to each of their species’⁸⁷. This has led many a modern scholar to think that it belonged to the lapidary genre, in the vein of the

80 Burnett, *The Coherence*, pp. 261–2.

81 Al-Fārābī, *Énumération des sciences*, p. 90. As we saw above (pp. 465–7), Avicenna’s treatment of meteorology in *The Healing* implies that minerals are somehow ontologically different from meteorological ‘impressions’, since book I of the fifth part of his *Natural Philosophy* is dedicated to minerals and what depends from them, while book II deals with ‘lofty impressions’ as such. He doesn’t consider, however, that the difference is so great it justifies the severance of the ‘science of minerals’ from meteorology, as al-Fārābī does.

82 Complete list of references in Heitz, *Fragmenta Aristotelis*, p. 161; see the discussion by Sharples, *Sources on Physics*, pp. 170–72.

83 Heitz, *Fragmenta Aristotelis*, p. 161.

84 This fact has been noted—without acknowledging Alfred’s editorial role—by Martin, *Scientific Terminology*, p. 162.

85 Aristotle, *Meteorologica*, I, 1, 339a.

86 *Liber Aristotelis ... in factura impressionum*, I, 1, p. 4.

87 Al-Fārābī, *Énumération des sciences*, p. 90. The author’s distinction between stones and metals is blurred in both Gerard of Cremona’s and Dominicus Gundissalinus’ Latin versions, which speak respectively of *corpora mineralia* and *res minerales* without giving the details.

Greek ‘Damigeron-Evax’ or the Latin Marbode, following a literary tradition in which precious stones were listed with a description of their (imaginary) medical or magical properties.⁸⁸ There were indeed several books of this kind in Arabic purported to be by Aristotle, but they didn’t match the requisites in order to provide the expected sequel to the theory of minerals sketched by Aristotle himself in the last sentences of *Meteorologica*, book III, where stones and metals were distinguished as ‘two different kinds of [mineral] body’ corresponding to ‘two exhalations, one vaporous and one smoky’: stones are generated from ‘the dry exhalation’, metals from ‘the vaporous exhalation’⁸⁹. It is exactly the distinction alluded to by al-Fārābī. While at the end of book III Aristotle just gave the generic explanation of the natural production of stones and metals, the ‘book on minerals’ would examine how the different ‘varieties’ of stones and metals—such as ‘realgar, ochre, ruddle, sulphur’ or ‘iron, gold, copper’, cited as examples by Aristotle⁹⁰—are generated, and ‘what belongs to each of their species’, i.e. what their ‘specific differences’ are (to put it in Aristotelian terms).⁹¹

88 For a recent survey of this literature, see Freudenthal and Mandosio, *Medieval Hebrew Versions*, pp. 16–22.

89 Aristotle, *Meteorologica*, III, 6, 378a. Cf. Gerard of Cremona’s translation of Yaḥyā al-Biṭrīq’s abridged Arabic version: ‘The vapour we are talking about is two vapours, one of which is of the nature of fire, and its name is smoke; and the other is of the nature of moist, and its name is *alguaegi*. When it is hidden into the earth, two bodies are made out of it, two species ...’ ‘Vapor autem sicut diximus est duo vapores, quorum unus est ex natura ignis, et ejus nomen est fumus, et alter est ex natura humiditatis, et ejus nomen est *alguaegi*. Cum ergo occultatur in terra, sunt duo corpora facta ex eo, duae species ...’ (*Liber Aristotelis ... in factura impressionum*, III, 10, p. 140).

90 Aristotle, *Meteorologica*, III, 6, 378a. Cf. Gerard of Cremona’s translation, III, 10, pp. 140–42.

91 The latest editor of Gerard of Cremona’s translation of the *Catalogue of the Sciences* (al-Fārābī, *Über die Wissenschaften / De scientiis*), Franz Schupp, has a completely different understanding of this passage. He believes that the work al-Fārābī referred to was an actual book, ‘more of a magical than of a scientific-mineralogical kind’, in which ‘the occult properties of stones’ were examined (ibid., p. 251). Such an interpretation is arbitrary, for neither al-Fārābī nor his Latin translator spoke of any occult property whatsoever. If this view was correct, it would make the ‘book on minerals’ a mere lapidary, but contrary to what Schupp asserts, this sort of works was *not* ‘studied in connection with the *Meteorologica*’ in the Arab world (ibid.; see Freudenthal and Mandosio, *Medieval Hebrew Versions*, pp. 16–17: ‘Aristotle’s purpose in the *Meteorologica* was to provide a rational account of stones in terms of his theory of the two exhalations; the possible special properties of some stones were of little interest in this context, especially since these supposed virtues could not be explained within the framework of the theory. Much the same holds of the project of his student Theophrastus in his *De lapidibus*. Although Theophrastus mentions the supposed virtues of a few stones, their description is not the center of his interest. The Greek scientific tradition hardly comes into the history of lapidaries, even though several medieval lapidaries were ascribed to Aristotle in order to benefit from his authority.’). Furthermore, there is no evidence to support Schupp’s assumption on the supposed involvement of Gerard of Cremona in the translation

So Alfred the Englishman, guided by his philosophical instructor Salomon Avenraza (most certainly influenced by Ibn Ṭufayl's opinion on Avicenna's work), found in the Natural Philosophy of *The Healing* precisely the 'scientific-mineralogical' kind of exposé which one would expect to find in the Aristotelian corpus.⁹² In his commentary on Aristotle's *Meteorologica*, after quoting in full al-Fārābī's description of the fifth part of natural philosophy, which corresponds to *Meteorologica* IV, he adds that this book 'is considered by the philosophers as an introduction to the book on minerals rather than a meteorological book'⁹³. The addition of the three chapters 'on minerals' is therefore fully justified: they are not a mere complement to book IV but its most substantial part, to which the whole book as we have it serves only 'as an introduction'. Alfred's stance is singular, for his 'edition' of Aristotle's *Meteorologica* retains the traditional order of the books and places the translation of book IV after the translation of books I–III, thus disregarding Avicenna's reversal of order (with book IV coming before the three other books, as Alexander of Aphrodisias recommended); nevertheless, Alfred considers that books I–III and book IV pertain to two different sciences, one being meteorology proper (I–III), and the other the science of minerals (the sixth part of natural philosophy according to al-Fārābī), to which book IV belongs 'as an introduction'; but—here I reconstruct Alfred's probable reasoning—, given that Aristotle himself introduced the science of minerals at the end of book III, it is not improper to consider the whole formed by book IV and the 'book on minerals' as an extension of meteorology, and to maintain the unity of *Meteorologica*, with the addition of the three chapters *On Minerals*, now becoming an integral part of the *Libri metheororum*.

of this magical 'book on minerals': no such translation is mentioned in the list of Gerard's translations made by his colleagues after he died (see Burnett, *The Coherence*, pp. 276–81). It did not occur to Schupp that the reference to the Aristotelian 'book on minerals' was customary and could very well be made by al-Fārābī without it being actually available to him. For his part, the latest editor of the other twelfth-century Latin translation of the *Catalogue of the Sciences* made by Dominicus Gundissalinus, Jakob Hans Josef Schneider (Einleitung, pp. 84–5), confuses the 'book titled *On Minerals*' (*liber qui intitulatur 'De mineris'*) mentioned in this translation with Alfred of Shareshill's *De mineralibus*, which he believes to be an actual work by Avicenna (whereas, being a compilation of excerpts, it exists as such only in the Latin version made by Alfred). Of course, he is aware that 'al-Fārābī could not have known this work', for 'Avicenna was born thirty years after al-Fārābī's death'; therefore he thinks that the 'book on minerals' is only mentioned in Gundissalinus' translation but not in the original Arabic text, which he obviously failed to check.

- 92 Dag Nikolaus Hasse suggests that Dominicus Gundissalinus (d. after 1181), being an expert on Avicenna, may have played some part in the process. However, Alfred only acknowledges Avenraza's contribution.
- 93 'Unde et a philosophis introductorius in librum de mineralibus potius quam metheoricus iudicatur' (*Alfredi commentarius*, III, p. 52). I corrected the wrong reading *indicatur*.

Alfred picked from book I of the fifth part of Avicenna's Natural Philosophy only what fit his purpose of reconstructing the 'lost' sections of Aristotle's work. The two chapters he translated, *On the Generation of Mountains* and *On the Generation of Minerals*, appeared as the perfect follow-up to the last sentences of *Meteorologica*, book III, while all the chapters he left aside—*On the Utility of Mountains, and on the Generation of Clouds and Dew*; *On Water Springs*; *On Earthquakes*; *On the Condition of Climates and Lands*—corresponded to topics already dealt with by Aristotle.⁹⁴ This was a clever selection, which avoided any redundancy. The possibility that Alfred was not aware of their Avicennan origin⁹⁵ can safely be discarded: to my knowledge, no circulation of these chapters in the Arab-speaking world, either anonymously or under the name of Aristotle, has ever been recorded; and Alfred's reference, in his commentaries, to another chapter of Avicenna's *Meteorology*,⁹⁶ confirms that he knew where the text he translated came from.

2.2 Adaptation of the Avicennan Material

Alfred didn't merely translate Avicenna's two chapters: he adapted them, in order to make them more consonant with Aristotle's rather dry style of writing.⁹⁷ To do so, he condensed Avicenna's sentences, retaining only their most substantial elements. And he carefully expunged the many passages in which Avicenna referred to personal experiences, and gave names of people and places, sometimes with the date of the year, in order to assert that the specific or unusual phenomena under scrutiny had actually been seen, either by himself or by reliable witnesses.⁹⁸ If kept in the translation, this wealth of Persian names would unavoidably make the Latin reader suspect that the author was not Aristotle but an oriental writer. For example, Avicenna's early memories of the Jaiḥūn river (Amu Darya, the ancient Oxus) in his native Khorasan⁹⁹ become

94 See above, p. 464.

95 Maintained by Otte, Introduction, p. 24: 'Alfred translated the *De mineralibus* considering it part of the *Metheora*, unaware that it represented a work by Avicenna.'

96 The chapter on the rainbow (see below, 3.1).

97 A general remark on the citations from the *De mineralibus* in the following notes: neither Holmyard and Mandeville's nor French's editions can be uncritically quoted. I give a corrected text which does not pretend to be a definitive critical edition [now provided by Rubino], with references to the aforementioned editions. Only significant emendations are reported.

98 On the importance of empirical observation and factual demonstration in meteorology, see above, p. 468.

99 'In my childhood I saw, on the bank of the Jaiḥūn, deposits of clay which people use for washing their heads; subsequently I observed that it had become converted into a soft stone,

in Alfred's translation a generic and impersonal account.¹⁰⁰ However, in the eyes of a twelfth-century scholar, the near-omniscient Aristotle could very well refer to places as remote from Greece as Khorasan, Persia and Arabia, or even as specific as the cities of Jājarm and Jūzjānān, with respect to a relevant event such as the fall of a meteorite; to remain believable, though, such references had to be kept as generic as possible. Thus Alfred could not translate literally the passage in which Avicenna gave a very detailed report of the extraordinary 'event which happened in Jūzjānān in our own time': the fall of a heavy 'ferreous body' which 'fell from the sky' (a meteorite); for, to convince his readers that this was not a fantastic tale but a 'true' account based 'on unexceptionable evidence', Avicenna explained that 'when [the local people] investigated the matter they took possession of the object and carried it to the Governor of Jūzjānān', who 'wrote about it to the Sultan of Khorasan, contemporary with us', the Amir Abū I-Qāsim Maḥmūd ibn Sabaktakīn (Avicenna gives his complete honorary titles together with his name), 'who ordered him to send him the object or a part of it', which they did with great difficulty for the meteorite was nearly unbreakable, so much so that they couldn't make a sword out of it, as the Sultan had wished; 'all this', said Avicenna, 'was seen by my friend the lawyer', his disciple Abū 'Ubayd 'Abd al-Wāḥid ibn Muḥammad al-Ġūzġānī.¹⁰¹ This was certainly not something Aristotle could write. So Alfred kept only the name of the place where the meteorite fell, its weight and its generic description—'A piece of iron also fell near Jūzjānān, weighing one hundred and fifty pounds, which was so hard it was nearly unbreakable'—, and of course all the details concerning the Governor, the Sultan and Ġūzġānī were wiped out, the lengthy narration of the meteorite's vicissitudes being reduced to this: 'However, a part of it was sent to the king of Khorasan; when he ordered swords to be made from it, it proved intractable'¹⁰². One can hardly be more concise. Alfred's tidying-up

and that was in the space of approximately twenty-three years' (Avicenna, *Ma'ādin*, I, 1, p. 3; transl. H/M, p. 19).

100 'On the banks of the Jaiḥūn, an earth is also seen which is said to transform into stone in the space of twenty-three years' ('In ripis quoque Gion visa est terra quae dicitur in lapidem converti in spatio xxiii annorum', *De mineralibus*, 1; ed. H/M, p. 45; ed. French, p. 121, with the incorrect reading *in ipsis quoque Gion*). Another personal memory from Khorasan (*Coracen* in Latin) and its treatment by Alfred are discussed in Mandosio, *Humanisme ou barbarie?*, pp. 247–9.

101 Avicenna, *Ma'ādin*, I, 1, p. 6; transl. H/M, pp. 24–5.

102 'Cecidit quoque apud Gengagen frustrum ferri ponderis centum quinquaginta marcarum, quod pro duritia sua fere erat infrangibile. Missa erat tamen pars ejus regi Coracenis, qui cum praecepisset inde fieri enses, erat infabricabile' (*De mineralibus*, 1; ed. H/M, p. 47; ed. French, p. 123, with the incorrect reading *honorarum* instead of *marcarum*). *Gengagen* (Jūzjānān) is my correction, based upon the Burgos translation of Avicenna's *Meteorology*, of the forms, corrupted beyond recognition, found in the manuscripts and early modern editions used by Holmyard and Mandeville (*apud vergetos, apudragem*) and French (*apud*

operation also applied to a passage tightly related to the meteorite report, with its distinctive oriental tone: ‘I am told that many of the beautiful swords of the Yemen are made from this kind of iron only, and that the poets of the Arabs have described them in their poems’¹⁰³. Alfred translates drily: ‘Despite this, the Arabs say that the swords of the Yemen, which are excellent, are made from this kind of iron’¹⁰⁴.

The ‘deorientalisation’ of Avicenna’s mineralogy culminates with the appearance of a Greek word in Alfred’s Latin translation. Avicenna wrote that ‘the matter of malleable bodies is an aqueous substance united so firmly with an earthy substance that the two cannot be separated from one another’, and that it so happens because ‘this aqueous substance has been congealed by cold after heat has acted upon it and submitted it to concoction’¹⁰⁵. The sort of concoction (*inḍāğ*) considered here is boiling.¹⁰⁶ Alfred perfectly got the point, for he translates as follows: ‘And the matter of malleable things is an aqueous substance mixed with an earthy substance, so strongly that one cannot be separated from the other. And the substance of this water is congealed by cold after heat has acted upon it, which is *epsesis*’¹⁰⁷. Ἐψησις (‘boiling’) is the Aristotelian concept—one of the three kinds of concoction, with ripening (πέπανσις) and roasting (ᾠπησις)¹⁰⁸—which corresponds exactly to the action referred to by Avicenna. It is an interpretation rather than a translation of Avicenna’s text, since the plain translation of *inḍāğ* would have been *digestio* (‘concoction’); *epsesis* indicates that heat ‘boils’ the matter of malleable bodies before it is congealed by cold. How Alfred knew this Greek word is no mystery: it

lurgen). *Coracenis* should be the genitive form, more correct than *Coraceni*, of *Coracen* (Khorasan); Holmyard and Mandeville give only corrupted forms of this name: *corvices*, *Torati*, and even *cuidam*—a copyist’s desperate attempt to make some sense out of the incomprehensible name by writing *regi cuidam*, ‘to a certain king’; French’s edition, incredibly, has *Corant..ni*.

103 Avicenna, *Ma’ādin*, I, 1, p. 6; transl. H/M, p. 25.

104 ‘Dicunt tamen Arabes quod enses Iamenii, qui optimi sunt, de tali ferro fiunt’ (*De mineralibus*, 1; ed. H/M, p. 48; ed. French, p. 123). All the manuscripts and early modern editions of Alfred’s translation referred to by Holmyard and Mandeville carry corrupt readings of the word *Iamenii*: *Laniantii*, *Alamantii*, *Alemaniae*, *Alemanici*; *Alemamti* in French’s edition.

105 Avicenna, *Ma’ādin*, I, 5, p. 20; transl. H/M, p. 34. I prefer the literal translation ‘and submitted it to concoction’ instead of Holmyard and Mandeville’s ‘and matured it’, which is not exactly what Avicenna is saying.

106 See the detailed explanation in Mandosio, *Humanisme ou barbarie?*, pp. 251–2.

107 ‘Et materia ductilium est substantia aquea mixta cum substantia terrea mixtura forti, nec potest unum separari ab altero. Et congelatur substantia aquae illius cum frigore post actionem caloris in ipsa, quae est epsesis’ (*De mineralibus*, 3; ed. H/M, p. 50; ed. French, p. 126). Holmyard and Mandeville put several wrong readings in the main text of their edition: *liquabilium* instead of *ductilium*, *ut gelatur* instead of *et congelatur*, *obtesis* instead of *epsesis*; French has *optesis*.

108 Aristotle, *Meteorologica*, IV, 3, 380a (πέπανσις), 380b (ἔψησις), 381a (ᾠπησις).

appears, together with *pepansis* and *optesis*, in Henry Aristippus' Latin version of *Meteorologica* IV, translated from Greek, upon which Alfred wrote his commentary.¹⁰⁹ Aristotle explained at length the difference between the three concepts, so Alfred doesn't feel the need to define *epsesis*. An attentive reader could easily understand the sort of concoction described here, for when such a reader arrived at this sentence of the *De mineralibus* he had already read book IV, which came just before in the manuscripts. Furthermore, the information on those terms is synthesised in Alfred's commentary on *Meteorologica*: there¹¹⁰ he defines *epsesis* as concoction by 'moist heat' (*calidus humidus*),¹¹¹ *optesis* as concoction by 'dry heat' (*calidus siccus*),¹¹² and *pepansis* as concoction by a thing's 'own heat' (*calor proprius*).¹¹³ Alfred's commentary was written after he completed his translation, but they were often copied together. Now, some manuscripts containing the *De mineralibus* do not read *epsesis* but *optesis*. The latter is obviously a copyist's mistake. Both words appeared a few folios before, in *Meteorologica* IV; so a copyist might have wondered whether the word he had to copy now was *epsesis* or *optesis*, two forms so close in the Latin spelling they could easily be confused by someone who, in all probability, was not an expert in physical matters.

The presence of a Greek term, conceptualised by Aristotle, in a twelfth-century translation from Arabic made some modern scholars think, because of their preconceptions about the supposed ignorance of medieval translators, that the *De mineralibus* might actually be drawn from a lost work of the Philosopher. This hypothesis was eventually put to rest in 1927, when Holmyard and Mandeville edited Avicenna's original text.¹¹⁴ Its longevity confirms how well-de-

109 Id., *Quartus metheororum*, p. 11 (*pepansis*), 12 (*epsesis*), 14 (*optesis*).

110 Alfred of Shareshill, *Alfredi commentarius*, IV, p. 64.

111 Cf. Aristotle, *Meteorologica*, IV, 3, 380b: 'Boiling, as a general term, is concoction by moist heat of the undetermined material present in the moisture of a thing'; Aristippus' translation: 'Epsesis vero est ad totum quidem digestio a calore humido ejus quod inhaeret indefiniti in humido' (*Quartus metheororum*, p. 12).

112 Cf. Aristotle, *Meteorologica*, IV, 3, 381a: 'Roasting is concoction by extrinsic dry heat'; Aristippus' translation: 'Optesis quidem est digestio a caliditate sicca et aliena' (*Quartus metheororum*, p. 14).

113 Cf. Aristotle, *Meteorologica*, IV, 3, 380a: '... ripening is the concoction of the moisture in [bodies] by their natural heat'; Aristippus' translation: 'Est ... pepansis a naturali calore inhaerentis humidi digestio' (*Quartus metheororum*, p. 11).

114 See Holmyard and Mandeville, Introduction, pp. 1–8. However, the same preconception about Alfred's incompetence also affected them, to the point that they 'made no attempt to establish a Latin text', considering it a 'necessarily unproductive task' (*ibid.*, p. 13). They did not ask themselves how a translator who, as they believed, 'had not seldom misunderstood the original version' and maybe 'worked from a defective text' (*ibid.*) could possibly translate *indāḡ* with a Greek technical term which not only was correct, but expressed better than the Arabic word what Avicenna meant to say.

vised Alfred's forgery was. It is indeed a forgery, in that he knowingly adapted Avicenna's chapters so as to make them look as if they had been written by Aristotle. But to consider it just a forgery would be missing the point, for Alfred was genuinely convinced that Aristotle's lost work on minerals was embedded in Avicenna's *Book of the Healing*. In this respect, his careful 'deorientalisation' of Avicenna's chapters on the subject is more akin to a philological reconstruction than to the fabrication of fake authorship.¹¹⁵ He retained from the Arabic text all the elements he considered to be derived from (or compatible with) Aristotle's original work, lost as such but recognisable through the words of Avicenna—so much so that he could even correct Avicenna's wording when an Aristotelian concept wasn't properly rendered in Arabic: in this perspective, *indāġ* was only a slight mistranslation of *epsexis*. Alfred was wrong, of course, but his treatment of Avicenna's chapters is not that different from what modern philologists do when they try to retrieve lost works through indirect testimonies.¹¹⁶

All this makes sense only if one considers Avicenna as an 'imitator' of Aristotle, and that is precisely what Alfred of Shareshill did (as we shall see below). Had he been aware that Avicenna's aim was not to follow Aristotle but to express his own opinions, he certainly would have been more suspicious. Another factor which could induce him to believe that Avicenna's views on mineralogy faithfully reflected Aristotle's ideas was that, in these chapters, Avicenna did not say, as in other parts of his *Meteorology*, that he disagreed with the Peripatetics; actually, he based his exposé upon the very principles stated by Aristotle at the end of *Meteorologica* III and in other parts of his work, and he elaborated upon them, so that, as Alfred of Shareshill rightly noticed, Avicenna's mineralogy could be seen as the completion of Aristotle's mineralogy. It implied an excellent knowledge of the *Meteorologica*, both on Avicenna's and on Alfred's part,¹¹⁷ and obviously Alfred's addition of the 'retrieved' chapters could only take place after Aristotle's four books had already been translated into Latin.

115 See Mandosio, *Humanisme ou barbarie?*, pp. 245–6 and 262.

116 To take a well-known example, all the works of the Stoic philosopher Posidonius are lost; there are two editions of the extant fragments of his works: the 'minimalist' one, which contains only quotations explicitly ascribed to Posidonius (*The Fragments*, ed. Edelstein and Kidd), and the 'maximalist' one, which also includes passages where the name of Posidonius does not appear but that are supposed to convey his opinions (*Die Fragmente*, ed. Theiler). Alfred is typically an editor-translator of the 'maximalist' kind.

117 The editor of Alfred's commentary on the *Libri metheorum* notes that he 'demonstrated mastery of the subject' and that there is 'no example of an Aristotelian passage that Alfred misunderstood' (Otte, *Alfred of Sareshel's Commentary on the Metheora of Aristotle*, p. 71).

2.3 The Ascription to Aristotle of the Avicennan Material

Each time he refers to those three chapters in his own writings, Alfred ascribes them to Aristotle. The *De mineralibus* is mentioned twice in the commentary to *Meteorologica* IV, 7, 384a—a passage dealing with the liquefaction and solidification of compounds of earth and water, such as earthenware or stone:

1. He [Aristotle] also asserts, in the chapter *On Minerals*, that precious stones are first congealed by cold, then by dryness, and cannot be melted by heat.¹¹⁸

2. Therefore these stones melt, for in them is an oily moistness, as he [Aristotle] asserts in the chapter *On Minerals*, where he teaches their composition; and there are other stones which do not melt, the cause of which is shown in the same place.¹¹⁹

These quotations refer to two successive passages of chapter 3 (*On the Four Species of Mineral Bodies*), that is, Avicenna's chapter 5 (*On the Generation of Minerals*) of book I (*On That which Happens upon the Surface of the Earth*) of the fifth part of Natural Philosophy:

1. As regards the stony kinds of naturally-occurring mineral substances, the material of which they are made is also aqueous, but they have not been congealed by cold alone. Their congelation has, on the contrary, been brought about by dryness which has converted the aqueosity into terrestreity. They do not contain a live, oily humidity and so are non-malleable; and because their solidification has been caused mainly by dryness, the majority of them are infusible ...¹²⁰

118 'Ipse quoque in capitulo de mineralibus asserit lapides pretiosos primum frigiditate, postea siccitate congelari, et immo nec caliditate dissolvi' (*Alfredi commentarius*, IV, p. 68).

119 'Hii ergo lapides solvuntur, quoniam in eis est humor unctuosus, sicut ipse in capitulo de mineralibus asserit, ubi et eorum compositionem docet; suntque alii qui non solvuntur, cujus causa ibidem ostenditur' (ibid., p. 69).

120 Avicenna, *Ma'adin*, I, 5, p. 20; transl. H/M, pp. 35–6. The phrase 'live, oily humidity' means that humidity is 'alive', i.e. has a natural tendency to flow, until it is congealed, i.e. metaphorically 'dead'. The literal translation of the Arabic word *hayya* ('quick'), retained by Holmyard and Mandeville, doesn't work well in modern English—even though the archaic meaning of 'quick' as 'alive' has been preserved in the word 'quicksilver'. Therefore, 'live' seems more appropriate, and it also makes Alfred's Latin translation of the passage understandable: 'Lapidea vero de substantiis mineralibus materialiter sunt aquae; sed non congelantur aqua sola, sed etiam cum siccitate, quae alterat aquaeitatem ad terreitatem, et non est in eos humor vivus unctuosus, et ideo non ducuntur, et quia eorum coagulatio est ex siccitate, non solvuntur ut multum ...' (*De mineralibus*, 3). The text edited by Holmyard and Mandeville (p. 50) has the wrong reading *humor nimis unctuosus* ('too oily humidity') instead of *humor vivus unctuosus* ('live, oily humidity'); in French's edition (p. 126), this becomes a nonsensical *humor unius unctuosus*. Once more, Alfred perfectly got Avicenna's point; it is not to him that 'this passage proved very troublesome' (p. 34, n. 11), but only to the medieval copyists and to the modern editors who misread the Latin translation. French

2. Included in the group [of malleable bodies], however, are some which are still alive and have not congealed on account of their oily nature; for this reason, too, they are malleable.¹²¹

The *De Mineralibus* is also presented as an Aristotelian work in the commentary Alfred made on his own translation of the treatise *On Plants*, a work now known to have been compiled by Nicholas of Damascus at the turn of the second century C.E., but considered fully authentic in Alfred's times.¹²² The reference appears in a gloss upon a passage which discusses the difference between plants and inanimate bodies,¹²³ the latter being exemplified by minerals, called by Alfred, in typical Avicennan fashion, 'congealed' bodies:

He [Aristotle] determines how plants differ from congealed [bodies]. For plants are born, grow, are formed according to the seasons, and also die of old age ... Congealed [bodies] have none of these properties. However, some of them increase and do not grow [as plants do], while some of them always stay the same, as he says in *Meteors* and in the book *On Congealed [Bodies]*. In the second [chapter] of the latter, he indicates the cause of this.¹²⁴

The editor of Alfred's commentary writes: 'It is likely that Alfred had no particular passage in mind but was referring in general to the contents of *Meteorologica* IV, which deals with the qualities and properties of matter and with what

also has the impossible readings *ductuntur* instead of *ducuntur* and *terrestritatem* instead of *terreitatem*.

121 Avicenna, *Ma'ādīn*, I, 5, p. 20; transl. H/M, pp. 34–5. Here again, I replaced 'quick' with 'alive'. This is the Latin translation (*De mineralibus*, 3): 'Et erit exemplum a vivo quod nondum gelavit propter suam unctuositatem, et ideo est ductile' ('An example shall be [given] by the live [body] which has not yet congealed on account of its oiliness, and which for this reason is malleable'). Holmyard and Mandeville's edition (p. 50) has *alumen* ('alum', which was obviously a wrong reading and should never have been kept in the main text) for *a vivo*, which appears in some manuscripts, rather funnily, as *a vino*, 'by wine' (*ibid.*, pp. 34–5, n. 11). French's edition (p. 126) also has *a vino*. This sentence comes just before the previous quotation and follows the passage containing the word *epseisis*, discussed above.

122 Nicolaus Damascenus, *De plantis*, ed. Drossaart Lulofs and Poortman.

123 'Some maintain that plants have souls, because they have watched them being born, being fed and growing, be young and grow green, and perish through old age, on the ground that no soulless thing shares these experiences with plants' (Ps.-Aristotle, *On Plants*, I, 1, 815a). 'Quidam autem habere animas eas dixerunt, quia generari, nutriri, augeri, juventute virescere senioque dissolvi conspexerunt, cum nullum inanimatum haec cum plantis habeat communia' (*id.*, *De vegetabilibus et plantis*, p. 517).

124 'In quibus vegetabilia a congelatis differant determinat. Vegetabilia enim nascuntur, crescut, et secundum temporum habitudines constituuntur, senectute quoque intereunt ... Congelata vero nullam istarum virtutum habent. Quaedam tamen eorum augentur nec crescut, quaedam vero eorum semper uno modo permanent, ut ipse in metheoris et in libro de congelatis. In hujus etiam secundo causam hujus assignat' (*Tractatus Alvreidi super librum de vegetabilibus*, pp. 147–8).

we call chemical change¹²⁵. This is inaccurate, for Alfred actually had very specific passages of Aristotle's and Avicenna's works in mind.

First, he refers to both *Meteorologica* and *De mineralibus*, for there, he says, the Philosopher shows that some (but not all) minerals 'increase'. As regards *Meteorologica*, two passages are hinted at. In book I, chapter 14, Aristotle asserts that 'the interior parts of the earth, like the bodies of plants and animals, have their maturity and age', with the difference that living beings grow or decay as a whole, while 'the parts of the earth are affected separately, the cause of the process being cold and heat'¹²⁶. Thus, upon very long stretches of time, 'there is an increase in the number of places that have become dry land and were formerly submerged', and conversely, there are 'many places where the sea has encroached'¹²⁷. And in book IV, chapter 6, he describes the solidification of 'compounds of earth and water'¹²⁸. Avicenna, for his part, fully develops the indications contained in these two passages of Aristotle's work in chapters 1 (*On the Generation of Mountains*) and 6 (*On the Conditions of Climates and Lands*) of his book *On That which Happens upon the Surface of the Earth*. Alfred only refers, of course, to his translation of chapter 1, which he split into chapters 1 and 2 of the *De mineralibus*—or, as he calls it here, *De congelatis*, 'congealed' bodies being minerals in Avicenna's jargon.¹²⁹ In the first chapter (*On the Congelation and Agglutination of Stones*), Avicenna explains that 'stone is formed in two ways': 'through the hardening of clay and by the congelation [of waters]'¹³⁰.

125 Long, *ibid.*, p. 148. Strangely enough, in his Introduction (p. 131), Long expounds the theory alluded to by Alfred but does not establish any link with the gloss quoted above.

126 Aristotle, *Meteorologica*, I, 14, 351a. Cf. Gerard of Cremona's translation of Yahyā al-Bīṭrīq's abridged Arabic version: '... the essence of the earth is similar to the bodies of animals and plants, because it has an end and a term, just like the young and the old. Thus it diminishes and increases.' '... essentia terrae est similis corporibus animalium et plantarum, et quia habet finem et ultimum sicut juventutem et senium. Tunc minuitur et additur' (*Liber Aristotelis ... in factura impressionum*, I, 8, pp. 52–4).

127 Aristotle, *Meteorologica*, I, 14, 352a. Cf. Gerard of Cremona's translation: 'And I say ... that many places were once [covered] in fertile dew and later became sterile ... And if something like this happens somewhere, then it may happen anywhere. And the drying-up of deep places in the sea happens again, and [conversely] places which once were dry are drowned.' 'Et dico ... quod multa loca fuerunt in rore uberosa et facta sunt postea sterilia ... Et si accidit aliquid illius in aliquo locorum, tunc possibile est ut accidat in omnibus locis. Et accidit iterum in mari exsiccatio locorum profundorum. Et profundantur loca quae fuerunt exsiccata' (I, 8, p. 54).

128 Aristotle, *Meteorologica*, IV, 6, 383a–b. Cf. Aristippus' translation: 'coagulantur communium terrae et aquae' (*Quartus metheorum*, 6, p. 20).

129 This designation should not be confused with the habit of calling the *De mineralibus* by the name of its first chapter, *De congelatione et conglutinatione lapidum*.

130 Avicenna, *Ma'ādin*, I, 1, p. 3; transl. H/M, p. 18. 'Fiunt autem lapides duobus modis: conglutinatione et congelatione' (*De mineralibus*, 1, ed. H/M, p. 45; ed. French, p. 121, with *coagulatione* instead of *congelatione*).

Alfred calls the first process *conglutinatio* and the second *congelatio*; hence the title he gave to this chapter. Thus, according to Avicenna, stones are produced and increase, either when certain sorts of clay are dried,¹³¹ when certain waters form ‘congealed’ mineral concretions, or in certain places which possess ‘a mineralising, solidifying virtue’ that gradually petrifies things.¹³² And in the second chapter (*On the Cause of Mountains*), to which Alfred specifically refers in the gloss we are dealing with, ‘Aristotle’, i.e. Avicenna, ‘indicates the cause’ responsible for the fact that certain minerals increase while others ‘stay the same’. As a matter of fact, in this section Avicenna asserts that mountains are produced either by an ‘essential cause’ or by an ‘accidental cause’. The essential cause is a ‘violent earthquake’—nowadays it would be called volcanic activity—which ‘raises a part of the ground’, so that ‘a height is suddenly formed’¹³³. One accidental cause can be ‘the erosive action of winds and floods’, acting in such a way that ‘the part which suffers the action of the current becomes hollowed out, while that upon which the current does not flow is left as a height’; for ‘the earth is not uniform, some parts of it being soft and others stony’, and thus ‘the soft, earthy parts become hollowed out and the stony parts are left behind as elevation’¹³⁴. Another accidental cause, similar to that which produces stones, is the ‘agglutination of clay which slowly dried and petrified during ages of which we have no record’¹³⁵—and this is why, as Aristotle stated in *Meteorologica* I 14, there is dry land today where formerly there were seas or rivers.

These combined processes, which affect different types of minerals in different manners, are the causal explanation given by ‘Aristotle’ according to Alfred. On the one hand, stones increase by ‘agglutination’ of clay or by ‘petrification’. On the other hand, wind and water take away the soft parts of the earth, leaving the harder parts intact; thus the hard rock ‘stays the same’, and it becomes mountain not because it has increased (as new mountains suddenly formed by ‘violent earthquakes’ do), but because its softer surroundings have

131 Such as the clay from the banks of the Jaihūn river mentioned above (n. 100).

132 Avicenna, *Ma’ādīn*, I, 1, p. 4; transl. H/M, pp. 19–20. *De mineralibus*, 1, ed. H/M, p. 45–6; ed. French, p. 122 (with the aberrant reading *a virtute quadam lapidi ficcatura* instead of *a virtute quadam lapidificativa*).

133 Avicenna, *Ma’ādīn*, I, 1, p. 6; transl. H/M, p. 27. ‘Montes vero quandoque fiunt ... ex essentiali [causa], cum vehementi terrae motu elevatur terra et fit mons’ (*De mineralibus*, 2, ed. H/M, p. 48; ed. French, p. 124).

134 Avicenna, *Ma’ādīn*, I, 1, p. 7; transl. H/M, pp. 27–28. ‘Accidentali vero [causa], ut cum ex ventis vel ex aquae ductu accidit cavatio profunda, et fit paulatim, donec sit vasta profunditas; et tunc erit juxta eam magna eminentia ... Sunt etiam quaedam terrae molles et quaedam durae. Molles ergo aquae ductibus ventisque tolluntur, duraeque remanent, et sic fit eminentia’ (*De mineralibus*, 2, ed. H/M, p. 48; ed. French, p. 124).

135 Avicenna, *Ma’ādīn*, I, 1, p. 7; transl. H/M, p. 28. ‘Fit etiam generatio montium sicut generatio lapidum, quia aquae ductus adducit lutum unctuosum continue, quod longitudine temporis desiccatur et fit lapis’ (*De mineralibus*, 2, ed. H/M, p. 48; ed. French, p. 124).

been excavated by erosion; carried by wind and water, the soft earth is deposited at the bottom of rivers and seas, and these sediments are then susceptible of eventually drying up and becoming solid.

The references to the *De mineralibus* in Alfred the Englishman's commentaries give us a precious insight into the way in which he interpreted and linked together Aristotle's authentic or pseudepigraphic works and Avicenna's mineralogy. He sees the latter as perfectly coherent with the rest of the Aristotelian corpus.

2.4 The Role of Alchemy

For a modern reader, however, there is at least one element of the *De mineralibus* which doesn't fit at all with the historic Aristotle: it is the presence of alchemy. Avicenna refers twice to this controversial art in the chapters translated by Alfred: first as regards the nature of the 'substance used by those folk [the alchemists] who have lost their way amid their artful contrivances', 'which they call *virgin's milk*'¹³⁶; then as to the possibility of alchemical transmutations.¹³⁷ Avicenna negates the latter, on the ground that once metals have been naturally formed in the bowels of the earth, they belong to separate species (lead, iron, gold, etc.) and cannot lose their 'specific difference' to acquire another. The alchemists are able to 'produce excellent imitations'; but 'the essential nature [of metals] remains unchanged', for 'it is not in their power to bring about any true change of species'¹³⁸. It would only be possible to transmute a metal into another if 'the compound' which constitutes it (since a metal is not a simple body but an inanimate mixed body) could be 'broken up and converted into the composition of that into which its transformation is desired'—but this is a mere theoretical possibility, which cannot be put into practice.¹³⁹ Interestingly, Alfred's translation of this passage contains the Aristotelian concept of

136 Avicenna, *Ma'ādin*, I, 1, p. 4; transl. H/M, pp. 20–21.

137 Avicenna, *Ma'ādin*, I, 5, pp. 22–3; transl. H/M, pp. 40–43 (from 'There is little doubt that, by alchemy, the adepts can contrive solidifications ...' to the end of the chapter). 'Et artifices gelationem fere similem artificialiter faciunt ...' (*De mineralibus*, 3, ed. H/M, pp. 53–5; ed. French, p. 128–9). French has *sensibilem* instead of *similem*.

138 Avicenna, *Ma'ādin*, I, 5, p. 22; transl. H/M, p. 41. 'Quare sciant artifices alchimiae species metallorum permutare non posse, sed similia facere possunt ... Ceterum quod differentia specifica aliquo tollatur ingenio, ego non credo possibile' (*De mineralibus*, 3, ed. H/M, p. 54; ed. French, p. 129, with *naturae* instead of *metallorum*, *et enim* instead of *ceterum*, *alia* instead of *aliquo*): 'Therefore the artificers of alchemy should know that they cannot change metallic species, although they can make imitations ... Otherwise, I do not believe that it is possible to remove the specific difference by any contrivance'. This passage was and still is the most frequently quoted from Alfred's translation; see below, 3.2.

139 Avicenna, *Ma'ādin*, I, 5, p. 23; transl. H/M, p. 42.

‘prime matter’, which, as Holmyard and Mandeville noted, was not expressed by Avicenna ‘though perhaps this is implied’¹⁴⁰. The Latin version says: ‘This compound, thus, cannot be changed into another compound, unless perhaps it is brought back to its prime matter, so that it would be changed into something else than what it was before’¹⁴¹. Once more, Alfred makes the translation sound more Aristotelian than the original text.

Alchemy, of course, didn’t even exist in Aristotle’s times. It appeared in Egypt under the Roman Empire. So why didn’t Alfred expunge those passages from the ‘Aristotelian’ text he reconstructed? Because to him, as to all his contemporaries, they didn’t look at all anachronistic. Since its beginnings, alchemy had claimed to be extremely ancient.¹⁴² Its unquestioned antiquity is probably one of the reasons for its immediate success in the Latin world. It is not surprising, then, that Alfred kept the references to alchemy in his translation of the chapters on minerals, since he had no reason to doubt that Aristotle knew this art and had something to say about it.

This retention proved very important for the appreciation of alchemy in scholastic culture. Since Aristotle himself had discussed it, as Alfred’s translation demonstrated, the ‘question of alchemy’ (*quaestio de alchimia*) became a standard part of the commentaries on Aristotle’s *Meteorologica*, even after the *De mineralibus* had been reattributed to Avicenna by such authorities as Albert the Great and Roger Bacon.¹⁴³ We saw at the beginning of this article that, as late as the 1490s, ‘the possibility of alchemy’ still appeared as one of the topics addressed by Aristotle.¹⁴⁴ The challenge issued by Avicenna to the alchemists—

140 Ibid.

141 ‘Haec compositio igitur in aliam mutari non poterit compositionem, nisi forte in primam reducat materiam, et sic in aliud quam prius erat permutetur’ (*De mineralibus*, 3, ed. H/M, p. 55; ed. French, p. 129, with *in illa permutari* instead of *in aliam mutari, reducantur* instead of *reducatur*).

142 The earliest treatises preserved (in Greek), from around the first century, were ascribed to Democritus. While in Byzantium alchemy remained confined to esoteric groups, it became much more fashionable in the muslim world, even though the questionable results of so-called transmutations always raised the suspicion of fraud. It is also in the Arabic culture that Hermes Trismegistus, the legendary figure said to be older than Moses—to whom, incidentally, writings of alchemy were also ascribed—, became widely acknowledged as the founding father of alchemy (on the cultural context, see Van Bladel, *The Arabic Hermes*). In a preface frequently attached to the *Book on the Composition of Alchemy* (*Liber de compositione alchemiae*), also known as *Morienus*, which he supposedly translated in 1144—it is one of the earliest Latin translations of Arabic alchemical works—, Robert of Chester explained that Hermes Trismegistus, ‘after the Flood, was the first discoverer and discloser of all the arts and sciences, liberal as well as mechanical’ (‘Iste vero fuit Hermes qui, post diluvium, omnium artium et disciplinarum, tam liberalium quam etiam mechanicarum, primus fuit inventor et editor’, quoted in Lemay, *L’authenticité de la préface*, p. 6), including alchemy.

143 See below, 3.2.

144 See above, n. 9, the quotation from Bernardino Trevisan’s commentary on *Meteorologica*.

that is, the reduction of a metal to its prime matter as a prerequisite for its transmutation into another—was taken very seriously by the Latin exponents of this art.¹⁴⁵ It is noteworthy that Aristotle's authority never exerted such a heavy influence upon the alchemical debate outside the Latin world, simply because neither in Arabic nor Hebrew cultures was Avicenna's text attributed to him.¹⁴⁶

Although Avicenna was more than sceptical about metallic transmutations,¹⁴⁷ he retained the main features of the alchemical theory regarding the natural generation of metals from quicksilver and sulphur, mixed with the Aristotelian theory of the generation of minerals from the two 'exhalations'¹⁴⁸. Therefore he explains, throughout his chapter *On the Generation of Minerals* (which became chapter 3 of the *De mineralibus*), that the different species of metals are formed by quicksilver, issued from the 'moist exhalation', in combination with sulphur. Alfred, for his part, portrays the alchemists in a less contemptuous manner than did Avicenna. Instead of 'those folk who lost their way amid their artful contrivances', he only has the word *quidam ingeniosi* ('certain artificers').¹⁴⁹ The principal meaning of *ingeniosus* is 'ingenious craftsman'; it may also imply deception, but is not explicitly pejorative, as Avicenna's phrasing was.

Alfred's leniency towards alchemy was certainly encouraged by Avicenna's more nuanced or equivocal attitude, in the same passage, on some of its aspects. This 'virgin's milk' they use, Avicenna explains, 'is compounded of two waters which coagulate into a hard solid'; and he adds: 'This is an indication of the truth of this', i.e. the truth of the fact (which he mentioned just before) that, under certain conditions, water can become solid.¹⁵⁰ Alfred slightly misunderstood the whole sentence, and translated: 'There is a thing which certain artificers use when they want to coagulate a dried thing which is compounded of two waters; it is called virgin's milk, and its effect is most certain'¹⁵¹, i.e. it coagulates very well two waters into a dried thing. Then Avicenna went on: 'They have also many things which they use in liquefaction and coagulation which bear witness to the soundness of these judgments'¹⁵², still referring to his

145 See Newman, *Technology and Alchemical Debate in the Late Middle Ages*.

146 See Freudenthal, *Medieval Alchemy in Hebrew*.

147 The current opinion (see for instance Anawati, *Avicenne et l'alchimie*) according to which Avicenna had a more positive view of alchemy before writing *The Healing*, is based on his letter *On the Occult*, which is spurious 'quite beyond doubt' (Gutas, *Avicenna*, p. 459).

148 See also Hasnawi, *Avicenne et le livre IV des Météorologiques*, pp. 139–42.

149 See below, n. 151.

150 Avicenna, *Ma'ādīn*, I, 1, p. 4; transl. H/M, pp. 20–22.

151 'Est autem res qua utuntur quidam ingeniosi cum voluerint rem siccitam coagulare quae componitur ex duabus aquis, et dicitur lac virgineus, estque ejus effectus certissimus' (*De mineralibus*, I, ed. H/M, p. 46; ed. French, p. 122). French has the reading *lac virginis*, also attested in alchemical literature.

152 Avicenna, *Ma'ādīn*, I, 1, p. 4; transl. H/M, p. 22.

own ‘indication of the truth’ about liquefaction and coagulation. Once again, Alfred interpreted the sentence as a positive statement regarding the alchemists: ‘There are also many other things by which they coagulate and liquefy most certainly’, i.e. with proven efficacy.¹⁵³ Thus the Latin translation suggested that, according to ‘Aristotle’, the alchemists might be wrong in many instances, and even dishonest as to their claims regarding transmutations, but were nonetheless capable craftsmen who produced worthy results.

2.5 The Issue of the Two Colophons

We have seen that Alfred always refers to the *De mineralibus* as to a work by Aristotle. However, the standard colophon of his ‘edition’ of the *Libri meteororum* exists in two different versions, with and without Avicenna’s name:¹⁵⁴

A. Completed is the *Book of Meteors* by Aristotle, of which Master Gerard translated three books from Arabic into Latin, Henry translated the fourth from Greek into Latin, and Aurelius translated the last three chapters by Avicenna from Arabic into Latin.¹⁵⁵

B. Completed is the *Book of Meteors* by Aristotle, of which the utmost philosopher Master Gerard the Lombard¹⁵⁶ translated the first three books from Arabic into Latin, Henry Aristippus translated the fourth from Greek into Latin, and Alfred the Englishman of Shreshill translated the last three chapters from Arabic into Latin.¹⁵⁷

A is quite probably the earlier version of the colophon, for it is contained in the Reims manuscript, a thirteenth-century codex which, as Rubino demonstrated, is the only extant witness ‘directly derived’ from Alfred’s edition in its ‘pristine state’¹⁵⁸, prior to the publication of the revised, ‘vulgate’ edition of the *Libri meteororum*. Colophon B, for its part, preserved in many manuscripts,

153 ‘Sunt etiam multa alia quibus coagulant et liquefaciunt certissime’ (*De mineralibus*, 1, ed. H/M, p. 46; ed. French, p. 122).

154 I edited these two versions, leaving aside minor stylistic differences, from the rough list of fourteen manuscript colophons established by Rubino, *Einleitung*, pp. XL–XLI. The significant contrasts are underlined.

155 ‘Completus est liber meteororum Aristotelis, cujus tres libros transtulit magister Gerardus de Arabico in Latinum, quartum transtulit Henricus de Graeco in Latinum, tria vero ultima Aviceni capitula transtulit Aurelius de Arabico in Latinum.’

156 The city of Cremona is in Lombardy.

157 ‘Completus est liber meteororum Aristotelis, cujus tres primos libros transtulit magister Gerardus Lombardus summus philosophus de Arabico in Latinum, quartum transtulit Henricus Aristippus de Graeco in Latinum, tria ultima capitula transtulit Alvedus Anglicus [Sarelensis, Sarulensis or de Sareshulle] de Arabico in Latinum.’

158 Rubino, *Einleitung*, p. xvi and xxix (see above, n. 75).

clearly belongs to the ‘vulgate’ edition, for it remained remarkably stable and was transmitted with only minimal variants.

This implies that, at an early stage, Alfred or one of his collaborators acknowledged Avicenna as the source of the three additional chapters, and decided to erase his name afterwards, once the colophon was rewritten after the revision of the work, with more detailed information about the translators; what looks like a byname, *Aurelius* (which may be a wordplay on *Alvredus*, ‘Alfred’, assuming that it is not just a copyist’s misreading), was also replaced with Alfred’s real name. If, by hypothesis, B was the original version, then A would be an abridgement of it, with a corruption of *Alvredus* into *Aurelius* (which then, of course, could not be a byname), and the additional mention of Avicenna. But why would an abridged version of the colophon suppress so much information and introduce Avicenna’s name virtually out of nowhere? And who was better placed than Avicenna’s translator to give this information from the very start? Moreover, in colophon A Gerard is simply called ‘Master Gerard’ (*magister Gerardus*), while in colophon B he is designated as ‘the utmost philosopher Master Gerard the Lombard’ (*magister Gerardus Lombardus summus philosophus*). We know that Gerard was usually called *magister* in his mature years;¹⁵⁹ the superlative ‘utmost philosopher’ would be more fitting for a dead master, mourned by his collaborators as the ‘fount, light and glory of our clergy’¹⁶⁰. Besides, the hyperbolic title bestowed upon Gerard in colophon B is very similar to those that seemed to flow naturally out of Alfred’s pen: his master Salomon Avenraza is ‘the foremost among modern philosophers’ (*modernorum philosophorum praecipuus*), Avicenna is ‘the foremost imitator of Aristotle’ (*imitator Aristotelis praecipuus*).¹⁶¹

The fact that colophon A mentions Avicenna doesn’t imply that Alfred changed his mind about the authorship of the *De mineralibus*. The translation was made upon the assumption that the contents of Avicenna’s chapters initially came from Aristotle: we saw how Alfred both ‘deorientalised’ it by eliminating what he thought had been added by Avicenna, and ‘re-Aristotelised’ it by inserting into the Latin text some typically Aristotelian words and phrases, such as *epsexis* or *prima materia*. Therefore, to ascribe it to Avicenna in the colophon just meant he acknowledged that Aristotle’s chapters *On Minerals* had been preserved through the Persian philosopher’s works. The statement was ambig-

159 In two documents from 1174 and 1176 which ‘he attested ... as a canon of the cathedral’, he is mentioned as Gerard ‘called the Master’ (*dictus magister*), while a much earlier document from 1157 doesn’t bear this appellation (Burnett, *The Coherence*, pp. 252–3)—obviously because Gerard had not gained enough recognition at that time.

160 ‘Gerardus nostri fons, lux et gloria cleri’ (*Eulogium*, *ibid.*, p. 281; English translation on p. 256).

161 See Appendix 1, §i; below, n. 200. See also below, n. 198.

uous, though, for it seemed to imply that these chapters were not by Aristotle at all but simply ‘by Avicenna’. The switch to colophon B on second thought was therefore logical and in full accordance with Alfred’s reconstruction of the lost book of Aristotle.

In an earlier essay,¹⁶² I stated that ‘the idea according to which the text [of the *De mineralibus*] circulated first under Avicenna’s name and was attributed to Aristotle only in a second phase should be abandoned once and for all’. This remains true, in spite of colophon A, for the ‘vulgate’ version was so widely available that the general opinion among Latin scholars until the mid-thirteenth century was that its author was unquestionably Aristotle—an assumption fueled by Alfred’s explicit attribution of it to the Philosopher in his own commentaries, discussed above. We may assume that colophon A remained virtually unacknowledged until its casual rediscovery, which was the source of the attribution of the work to Avicenna by Albert the Great,¹⁶³ later confirmed by the conspicuous absence of these additional chapters from the new translation of Aristotle’s *Meteorologica* by William of Moerbeke.

2.6 Dating of Alfred’s Translation

If my interpretation of the two colophons is right, the problem of the dating of the *De mineralibus* may be solved. Nearly a century ago, Holmyard and Mandeville stated that ‘in round numbers, 1200 AD may be taken as the most probable time, with the proviso that it may have been two or three decades earlier or, less probably, a few years later’¹⁶⁴. Narrowing the focus, Otte suggested ‘the interval 1185–90 as the most likely period for Alfred’s translating activities in Spain’¹⁶⁵. Vuillemin-Diem and Rubino date the *De mineralibus* from ‘around 1190’¹⁶⁶, and Steel maintains that ‘Alfred made his translation of Avicenna, his edition of the *Metheora* and his annotation [i.e. his commentary] in the last decade of the twelfth century’¹⁶⁷. As for me, I argued, quite provocatively, that the *De mineralibus* had certainly been translated much earlier, namely ‘in the 1160s or soon afterwards’¹⁶⁸. A closer reconsideration of all the evidence—thanks notably to Rubino’s recent findings—shows that the translation was not so remote, but still rather far from the end of the twelfth century, for it was

162 Mandosio and Di Martino, La ‘Météorologie’ d’Avicenne, p. 416.

163 See below, pp. 507–8.

164 Holmyard and Mandeville, Introduction, p. 10.

165 Otte, *Alfred of Sareshel’s Commentary on the Metheora of Aristotle*, Introduction, p. 19.

166 Vuillemin-Diem, Praefatio, p. 8, and Rubino, Einleitung, p. XXXVIII.

167 Steel, A Philological Diet, p. 90.

168 Mandosio, Humanisme ou barbarie?, pp. 244–5. I didn’t say ‘around 1160’, as Steel recounts (A Philological Diet, p. 90).

completed during Gerard of Cremona's lifetime, i.e. before 1187. Inescapably, this conclusion is mostly based upon circumstantial evidence. But as one of Alfred's editors once noted, 'circumstantial evidence should not be despised' where 'proofs are scanty'¹⁶⁹.

To begin with, it may safely be argued that the various stages of elaboration of the earlier version of the *Libri metheororum* all took place before Gerard of Cremona passed away. The first stage had been his own translation of books I–III, which, according to his editor, 'may be considered as a work from his middle period'¹⁷⁰. Since Gerard was born in 1114 and settled around 1150 in Toledo, where he made more than seventy translations of scientific Arabic works over three decades, roughly from 1157 to 1187, his 'middle period' corresponds more or less to the 1170s. This suggestion is supported by the fact that he 'revised his translation after a certain time had passed', and that 'his improvements show a better understanding of particular Arabic words'¹⁷¹. It does not imply, however, that the first draft was written in the 1170s. If Gerard is the reviser, as Schoonheim assumes, all we can say is that this translation was not one of his latest works, for otherwise he wouldn't have had the time to revise and improve it before he died.

As to Aristippus' translation of book IV, completed by 1157, a credible hypothesis, as we saw,¹⁷² is that Alfred the Englishman brought it to Toledo from England and that at some time he showed it to Gerard, making him realise that there was no point in continuing a work which had already been done. This happened when Gerard had just begun translating book IV after completing the first three books. Thus the dating of the first draft of Gerard's translation and the dating of Alfred's involvement in the process, assuming that he actually was the person involved, should coincide. If we accept this scenario, we must also admit that Alfred had an agenda when he settled in Toledo. For if he took pains to bring a copy of Aristippus' translation to Spain, his interest in natural philosophy and especially meteorology necessarily predated his departure from England. Therefore we can assume that he went to Toledo precisely with the intention of deepening his learning in these subjects. And as a matter of fact, he became such an expert in the field that he not only completed and edited the *Libri metheororum*, but also produced the first Latin commentary ever written on these books. This agenda implies, in turn, that he already completed the

169 Poortman, *The Latin Translation*, p. 472. I do not agree with this editor, however, when he assumes that 'it does not seem necessary to survey once more the available data and the largely conjectural interpretations based upon them' (*ibid.*); for it cannot be said anymore that 'in spite of Alfred's eminence, we lack definite dates, a translating centre, or a school with which to connect him' (Otte, *Introduction*, p. 3).

170 Schoonheim, *Introduction*, p. xx.

171 *Ibid.*

172 See above, pp. 471–2.

first phase of his studies in England. Thus, in reconstructing his biography, we must keep in mind that he could not have undertaken his travel before, say, his twenties.

Once he arrived in Spain, he had to learn Arabic and to become acquainted enough with the works of al-Fārābī and Avicenna, and with the whole Aristotelian tradition as it was available in Toledo, to be able to discover that Aristotle's 'lost' work was preserved in the *Book of the Healing*. This certainly didn't happen in the blink of an eye. Before Alfred became respected enough in Gerard's circle as a natural philosopher and a translator to be entrusted with the edition of Aristotle's *Meteorologica*, he had to learn the trade. His test run, as it were, was the translation of the treatise *On Plants*. There are two versions of it. First he made 'a preliminary translation of a difficult Arabic text which he often failed to understand', and, as the editor of the work concludes, 'he had not yet acquired fixed habits' as a translator.¹⁷³ The clumsiness of this first translation is in stark contrast with the precision of the *De mineralibus*, which shows a real mastery of both subject and language. Then, in a second stage, revisions were made, giving birth to what has been called, starting from the manuscripts, a 'new translation' (*nova translatio*)—although, according to the editor, it isn't clear 'whether there ever was a definitely revised text', for some of the changes and corrections 'were due to a professional' likely to have been Alfred himself, while 'in many other instances' it seems that 'more than one reviser was involved'¹⁷⁴. However, Alfred wrote a dedication which appears only in the manuscripts containing the revised version:¹⁷⁵ a fact which implies that he had completed a 'new translation' (i.e. a revised version of his translation), better than the first and worthy to be sent to his 'much loved' (*dilectissimus*) friend 'Master Roger of Hereford'¹⁷⁶.

The first draft of the translation of *On Plants* clearly predated the translation of Avicenna's chapters on minerals. Therefore, the 'coherent program' of Gerard of Cremona and his collaborators, based on al-Fārābī's *Catalogue of the Sciences*,¹⁷⁷ was not implemented following a linear order. If it had been the case, when Alfred took over from Gerard the task of translating Aristotle's works on natural philosophy according to the list contained in the *Catalogue*, he would have started where Gerard stopped, that is, by completing the *Libri metheororum* (the fifth part of natural philosophy) with the 'lost' book *On Minerals* (the sixth part), and the next step would have been, most logically, to

173 Poortman, *The Latin Translation*, p. 490.

174 *Ibid.*, pp. 507–8.

175 *Ibid.*, p. 511.

176 *Liber de vegetabilibus et plantis*, *ibid.*, pp. 515–16. Poortman edited only the text of the first version, with the addition of the prologue to the *nova translatio*.

177 Burnett, *The Coherence*, pp. 261–2.

address the seventh part of natural philosophy, i.e. the science of plants, contained in ‘the book *On Plant[s]*’¹⁷⁸. Alfred did the opposite: he translated *On Plants* first, and *On Minerals* afterwards. This can be easily explained if we consider that it took time for him to find out that the missing book from the Aristotelian corpus was hidden in the pages of Avicenna’s *Healing*; thus *On Plants*, which was immediately available, was translated first. In the meantime, he duly perfected his skills as a translator. I would suggest, then, that the first draft of the *Liber de vegetabilibus* was produced after Alfred caused Gerard to stop translating *Meteorologica* IV, and before he adapted Avicenna’s chapters so as to complete the *Libri metheorum*: that is, not only while Gerard was still alive, but long before his demise.

This account is not at odds with the dedication of the ‘new translation’ of *On Plants* to Roger of Hereford, whose activities in England are recorded between 1176 and 1198. It is also compatible with Otte’s assumption—based precisely upon the dedication to Roger—that ‘the evidence points to the period 1185–90 as the earliest likely date for the translation of *De plantis*’¹⁷⁹, if by ‘translation’ we mean not the first draft but the *nova translatio*—a distinction of which Otte was unaware. A long time may have passed between the two stages. But the *nova translatio* was obviously sent to Roger from Spain, for it seems highly improbable that a revision of an Arabo-Latin translation would be made once Alfred had returned to England.

We now understand that the question of the dating of Gerard’s translation of *Meteorologica* I–III and of Alfred’s translation of *On Plants* is not a simple one, because in each case it was a two-step process. Therefore we must not consider self-evident, as everybody (including myself) did, that the making of the *editio Alfrediana* took place at a stretch. It was quite the opposite, actually. If the scenario I propose is correct, the process began long before the project was completed. A schematic presentation shall make it easier to grasp.

1. Alfred, still in England, learns about Aristippus’ translation from ‘Robert’¹⁸⁰.
2. He goes to Spain, bringing Aristippus’ translation with him.
3. He shows it to Gerard, who stops translating book IV. At this stage, the *Libri metheorum* include only the first draft of Gerard’s books I–III and Aristippus’ book IV; the ‘book on minerals’ is still missing.
4. Alfred translates *On Plants* (first draft).
5. He ‘discovers’ the book *On Minerals* and extracts it from Avicenna’s *Healing*. Once this adaptation is done, the *Libri metheorum* include the

178 Al-Fārābī, *Énumération des sciences*, p. 90.

179 Otte, Introduction, p. 4.

180 See above, pp. 471–2.

De mineralibus as their last part. At this stage, then, the earlier version of the *editio Alfrediana*—now preserved in the Reims manuscript and containing colophon A, with Avicenna’s name—is completed.

6. Some time after Gerard’s death, the *editio Alfrediana* is revised, most probably by Alfred himself, and this revised version—containing colophon B, in which Avicenna’s name does not appear—becomes the ‘vulgate edition’ of the *Libri metheororum*. As of today, only the emendations regarding Aristippus’ translation have been identified.¹⁸¹ An early testimony about such emendations appears in a thirteenth-century manuscript, which says that ‘the book by Aristotle translated by Henry Aristippus from Greek into Latin was corrected and divided into chapters by Master Alfred of Shareshill according to the commentary of al-Kindī’¹⁸². Putting aside the mention of al-Kindī, this note would be an interesting account of Alfred’s edition of the Latin version of *Meteorologica* IV; except that, in the manuscript, it was not applied to this work but to *On Coming-to-be and Passing Away*, which was actually translated from Greek but not by Aristippus¹⁸³—the translator was Burgundio of Pisa (1110–93).¹⁸⁴ It should not be dismissed, though, for obviously it was just a misplaced annotation: instead of inserting it where it belonged, that is, in the margins of the *Libri metheororum* which follow in the manuscript, the copyist wrote it in the margins of the wrong book.

A pending question is that of the revision of Gerard’s translation. Both the first draft and the revised version are found in the manuscripts; therefore the translation of books I–III began to circulate before any revision was made.¹⁸⁵ This strongly suggests that some years may have passed between the redaction of the first draft and the time when the translation was revised. Two possibilities, then, should be taken into consideration.

A. If Gerard was the reviser, as Schoonheim spontaneously assumes, a tempting hypothesis would be that he revised the Latin text of *Meteorologica* I–III in view of its inclusion into the edition of Aristotle’s completed work, that is, the first version of the *editio Alfrediana*. This would date the first draft from

181 Steel, *A Philological Diet*, p. 95.

182 ‘Liber Aristotelis translatus ab Henrico Aristippo de Graeco in Latinum, correctus et per capitula distinctus a magistro Alvredo de Sares. secundum commentum Alkindi super eundem librum’ (MS Baltimore, Walters Art Gallery, 66). I quote from Otte (Introduction, pp. 13 and 19). Strangely, Rubino doesn’t mention this annotation in her edition of Aristippus’ translation, in which she describes the manuscript (Einleitung, p. ix).

183 See Minio-Paluello, Henri Aristippe, p. 222, and Judycka, Préface, p. xxxiv.

184 See Vuillemin-Diem and Rashed, Burgundio de Pise.

185 Schoonheim, Introduction, pp. xxvi–xxvii.

his ‘middle period’ (roughly), and the revision from his later years. The *editio Alfrediana* would then be best defined as a collaborative work between Gerard and Alfred.

B. It may also be that the reviser was not Gerard but Alfred himself. Then he would have revised, some time after Gerard’s demise, both Gerard’s translation of books I–III and Aristippus’ translation of book IV—and also, perhaps, the *De mineralibus*—, in order to produce a ‘new’ (i.e. revised) translation, as he did for the *Liber de vegetabilibus*. This hypothesis is strengthened by what Alfred says about the two Latin translations of the Arabic word for ‘rainbow’¹⁸⁶.

Is it possible, now, to go beyond the reconstruction of the making of the *editio Alfrediana*, and to date more precisely its various stages? The only dated point of reference in my scenario is Gerard’s death. Before that, all we have is the relative chronology I pointed out. Neither the *Liber de vegetabilibus* nor the *De mineralibus* are objectively datable, apart from the fact that one was made before the other and that they both predate 1187. The same goes for the revised versions of the *Liber de vegetabilibus* and of the *Libri metheorum*, which may have been made at any time after Gerard’s death.

As regards the estimated life span of Alfred, the only established fact is that he was still alive around 1220, for he is unambiguously documented as living in Lichfield at that time.¹⁸⁷ He was certainly an old man then, but we don’t know how old. If we make him die in the 1220s and if we imagine that he was in his seventies—a reasonably acceptable longevity for a clerk of those times—he would have been born around 1150.¹⁸⁸ In this hypothesis, his travel to Spain did not take place before 1170 (for he could hardly be less than twenty when he went there), and he was in his late thirties when Gerard died. Giving him enough time to learn Arabic and study philosophy under the guidance of Avenraza, he probably made his translations between the late 1170s and 1187, if we accept this date as the *terminus ad quem* for the translation of the chapters on minerals.

What might be the earliest known quotation from the *De mineralibus*—apart from Alfred’s own commentaries—appears in a short work *On Meteors* (*De metheoris*), an abstract of the *Libri metheorum* ascribed to ‘Magister Salernus’, one of the founders of the medical school of Salerno, who probably died in 1167.¹⁸⁹ This made me suspect in the first place that the *De mineralibus* could not have been produced at the end of the twelfth century. On closer scrutiny, however, such an early dating is impossible, for not only the *editio Alfredi-*

186 See Appendix 1, nn. 362–4.

187 Otte, Introduction, pp. 10–11.

188 Long already suggested (Alfred of Sharesel’s Commentary on the Pseudo-Aristotelian *De plantis*, p. 128) that Alfred was ‘born in England toward the middle of the twelfth century’.

189 See Ausécache, Salernus, auteur d’un *De metheoris*?

ana was certainly not completed at that time, but even if it was it could not have been available in southern Italy so quickly. Therefore, either the attribution to Salernus is fanciful, or it is a case of homonymy.

To sum up, in my scenario the late dating generally accepted since Holmyard and Mandeville—roughly, the last decade of the twelfth century—can be accepted, but only insofar as it applies to the revised version of the *editio Alfrediana*, made after 1187.

2.7 Dating of Alfred's Commentaries

What now of the two extant commentaries written by Alfred? The earliest one may be the commentary on the *Liber de vegetabilibus*. It was composed once the *Libri meteororum* were completed, for it quotes them, as we saw above, including the *De mineralibus* (under the name *De congelatis*). This commentary shows acquaintance with Plato's *Timaeus*, 'with Aristotelian logic, at least a fragmentary knowledge of Aristotelian biology', and 'a passing familiarity with Greco-Arabic science, especially the writings of Avicenna'¹⁹⁰. There are some curious mistakes: a wrong reference to a treatise *On the Soul* which can be neither Aristotle's nor Avicenna's work,¹⁹¹ a confusion between Aristotle's *On the Soul* and his *Posterior Analytics*,¹⁹² and a passage in which Alfred quotes Avicenna's *On the Soul* II 3, about the senses of the shellfish, but speaks of it as if it were Aristotle's treatise.¹⁹³ According to the editor of the commentary, these citations which 'turn out to be paraphrases at best and wrongly attributed at worst' give the impression that Alfred is quoting from memory.¹⁹⁴ However, there is at least one passage considered by Long as an unfocused reference which is actually a perfectly good citation,¹⁹⁵ therefore we should not conclude too hastily that the awkwardness of this commentary is a sign of its being Alfred's first attempt at a personal scientific work. Long also remarks that, 'although he was attempting to explain Aristotelian science, [Alfred] continued to think like a Platonist'¹⁹⁶. I don't know if this proves anything as to the chronology of his commentaries. However, in the commentary on the *Libri meteororum*, his Aristotelian scholarship is consistent throughout.

190 Long, Alfred of Shareshel's Commentary on the Pseudo-Aristotelian *De plantis*, p. 140.

191 *Ibid.*, p. 150.

192 *Ibid.*

193 'Priorem objectionem solvit [Aristoteles] in libro *De anima*, dicens ...' (*ibid.*, p. 153).

194 *Ibid.*, p. 140.

195 See above, pp. 482–3.

196 Long, Alfred of Shareshel's Commentary on the Pseudo-Aristotelian *De plantis*, p. 141.

Alfred's commentary on Aristotle's *Meteorologica* dealt not only, as Otte believed, with the four books translated by Gerard and Aristippus, but with the whole *editio Alfrediana*, including the *De mineralibus*. Thus the extant glosses on the *De mineralibus*, which Otte edited in a fragmentary manner, are not sparse annotations made by Alfred independently from his commentary, but simply its last part.¹⁹⁷ This confirms that Alfred always considered the *Libri metheororum* as a whole, without making any distinction between the chapters he borrowed from Avicenna and the rest of Aristotle's work.

The only established fact concerning the chronology of Alfred's commentaries is that they were both written after the *editio Alfrediana* was completed, that is—in my scenario—after 1187. They were composed between the end of the 1180s and the first decade of the 1200s. This probably also applies to his lost commentary on Gerard of Cremona's translation of *On Coming-to-be and Passing Away*. As to what appears to be Alfred's last work, the treatise *On the Motion of the Heart*, it is dedicated to the 'great master' (*magister magnus*) Alexander Neckam (1157–1217).¹⁹⁸ This places the completion of the book between the 1190s, when Neckam was a professor at Oxford, and his death in 1217.¹⁹⁹ In all probability, Alfred wrote this book after he returned to England.

2.8 Avicenna, 'Imitator' of Aristotle (and Plato)

During his whole career as a translator and interpreter of Aristotelian works, Alfred used Avicenna mainly, if not exclusively, as a means to fill the gaps in the natural philosophy corpus of the Philosopher. This instrumental view of Avicenna is openly expressed in his commentary on Aristotle's *Meteorologica*, where Avicenna is portrayed as 'the foremost imitator of Aristotle', and 'truly the greatest of all philosophers (Aristotle excepted)²⁰⁰. It is a very high praise, even though it keeps Avicenna in the shadow of Aristotle. The word 'imitator' is to be taken quite literally here: it is because Avicenna imitated Aristotle

197 Alfred of Sareshel's Commentary on Avicenna's *De congelatione et conglutinatione lapidum*, ed. Otte. New edition by Rubino (The Commentary of Alfred of Shareshill on the Pseudo-Aristotelian *De mineralibus*).

198 Alfred of Shareshill, *De motu cordis*, Prologus, p. 1. Here is another instance of Alfred's hyperbolic way of praising, addressed this time to a colleague who was probably younger than himself.

199 Otte, Introduction, pp. 5–6. Burnett dates it 'most probably' from 1190–97 (The Introduction of Arabic Learning into British Schools, p. 50), but it may have been later, for Neckam could still be called a 'great master' even after the end of his tenure at Oxford.

200 '... imitator Aristotelis praecipuus, immo ipso Aristotele excepto, philosophorum maximus Avicenna' (see Appendix 1, §c).

so faithfully that the latter's lost work on minerals could be retrieved.²⁰¹ This makes Avicenna the greatest of the Aristotelians.²⁰²

To Alfred as to everybody else in his time, the greatest philosophers of all in absolute terms were not Aristotle and Avicenna but Aristotle and Plato, as he himself stated in his only personal work preserved outside the two commentaries, *On the Motion of the Heart*,²⁰³ in which Aristotle is omnipresent but Avicenna's name never appears. In the context of a commentary on Aristotle, however, Plato could be left aside, for the topic was limited to the transmission of Aristotelian philosophy. It is in this restricted sense that Avicenna was deemed 'the greatest'. To be second only to Aristotle was no small merit for an admirer of the Philosopher such as Alfred.

The habit of reading Avicenna's works together with Aristotle's as two expressions of the same doctrine could easily lead to mistakes: on this assumption, one could easily be confused with the other.²⁰⁴ When he wrote his commentary on the treatise *On Plants*, 'Alfred did not strictly differentiate between works of Aristotle and Avicenna that bore the same name (*De anima*) but were completely different', while 'in his later works [he] was more inclined to extensive verbal quotations'²⁰⁵. What motivates Alfred, however, is to understand and interpret Aristotle, not Avicenna. He doesn't seem to think that Avicenna might be an original thinker; or if he does, he has no interest in this possibility.

201 A similar view of Avicenna was shared by Gundissalinus and 'Avendauth', who stated in the preface to their translation of Avicenna's treatise *On the Soul*, made between 1152 and 1166, that 'in the book, the author ... has collected together what Aristotle said in his books *On the Soul*, *On Sense and What is Sensed*, and *On Intellect and What is Intellected*': 'in quo [libro], quicquid Aristoteles dixit in libro suo de anima, et de sensu et sensato, et de intellectu et intellecto, ab auctore ... esse collectum' (*Liber de anima seu sextus de naturalibus*, Prologus translatoris et divisio operis, ed. Van Riet, p. 4; transl. Hasse, *Avicenna's De anima in the Latin West*, p. 6).

202 Roger Bacon, who insistently reproduced Alfred's statement with a bit of amplification, understood it as meaning just that. He wrote: 'This is the opinion of Avicenna ...; therefore we know that it is the opinion of Aristotle, for he was the utmost and foremost imitator and defender of Aristotle, and the greatest of all philosophers after Aristotle.' 'Et haec est sententia Avicennae in *Metaphysica* et alibi; per consequens scimus quod est sententia Aristotelis, quoniam summus et praecipuus Aristotelis imitator et defensor fuit et maximus philosophorum post ipsum Aristotelem' (Roger Bacon, *De signis*, p. 57; quoted in Pinborg, Roger Bacon *On Signs*, p. 405). In his *Opus majus* (I, 9, pp. 20–21), Bacon explains the eminent position of Avicenna as 'foremost commentator and greatest imitator of Aristotle' by his having been 'the first to bring Aristotle's philosophy fully to light among the Arabs' ('Nam primus Avicenna revocavit philosophiam Aristotelis apud Arabes in lucem plenam ... Avicenna vero praecipuus Aristotelis expositor et maximus imitator ...').

203 'Praecipui quoque ... philosophi ..., ut Aristoteles, Plato ...' (Alfred of Shreshill, *De motu cordis*, X, 7, p. 40).

204 See above, p. 496.

205 Poortman, *The Latin Translation*, p. 471.

He takes from Avicenna's works what he needs and drops the rest. For instance, he doesn't care about Avicenna's modifications in the traditional order of Aristotle's books, and puts the chapters on minerals at the end of *Meteorologica*, in stark contrast to Avicenna's policy.²⁰⁶ This attitude is in keeping with the collective agenda carried on by the Toledan translators, aimed at updating Latin science and philosophy by making the Greek heritage available. A good knowledge of its Arabic transmission was indispensable, but mainly as a means to that end. As to Alfred, it is because he wanted to specialise in Aristotelian natural philosophy that he learned Arabic and read all the commentators available. In his commentary on *Meteorologica*, he enumerates the principal sources he consulted on the matter: four outstanding commentators of Aristotle are listed, while 'some others' of minor importance are left unnamed: two of these most notable interpreters are Greek (Alexander of Aphrodisias and a 'Tebustus' who must be Theophrastus), the other two being Avicenna and al-Fārābī.²⁰⁷ Avicenna, the greatest of all, comes first, before the Greeks themselves.

A striking parallel with Alfred's instrumental use of Avicenna as a means to complete the work of Aristotle is offered by the anonymous and undated translation of chapter II, 6 of the fifth part of Avicenna's Natural Philosophy, *On the Remarkable Events Happening in the World*, which became in Latin: *On Floods, Concerning Plato's Timaeus*, or *On the Floods in Plato's Timaeus*.²⁰⁸ As both titles imply, this translation was meant to be an elucidation of an intriguing aspect of Plato's dialogue, whose Latin version by Calcidius, made in the fourth century, was only partially preserved (up to 53c), together with Calcidius' commentary. Picking this chapter of Avicenna as if it were a commentary on Plato was a clever move; for the Persian philosopher's theory of 'remarkable events', i.e. cataclysms or 'floods', is actually an expansion of Plato's assertion that 'there have been and there will be many and diverse destructions of mankind, of which the greatest are by fire and water, and lesser ones by countless other means'²⁰⁹. Avicenna, in his usual systematic fashion, reduces the 'countless' causes of 'remarkable events' to the four elements themselves.²¹⁰ This chapter of the *Book of the Healing* was therefore a welcome addition to the *Timaeus* and

206 See above, p. 461.

207 '... Avicenna et Alexander et Tebustus, Alfarabius ceterique nonnulli ...' (see Appendix 1, §f).

208 *De diluviis in Thimeum [or in Thimeo] Platonis*, ed. Alonso Alonso. D'Alverny (*Avicenna Latinus: Codices*, p. 6) suggested that the translator could be Alfred the Englishman, because she perceived a strong stylistic similarity between the *De mineralibus* and the *De diluviis* (Les traductions latines d'Ibn Sina, p. 65). Michael Scot (~1170–~1232) has recently emerged as the most likely candidate (see in this volume the contribution by Hasse and Büttner, Notes on Anonymous Twelfth-Century Translations).

209 Plato, *Timaeus*, 22c.

210 See above, p. 467.

to its commentary by Calcidius. Just as Alfred the Englishman acknowledged that Avicenna's chapters on minerals brought Aristotle's brief indications on the subject to completion, the translator of the chapter on 'remarkable events' identified it as a full-fledged theory of floods and their consequences (namely, the possible extinction of life) based upon Plato's sketchy account. The only difference between the two operations is that the chapters on minerals were included in Aristotle's Latin version of the *Meteorologica*, while the chapter on floods was neither attributed to Plato nor appended to the *Timaeus*.²¹¹ This is easily explainable, for Avicenna's chapter could by no means be identified as a missing part of Plato's dialogue. Latin scholars were well aware that Calcidius' translation was incomplete, but the discussion of floods, which takes place in the very first pages, was fully preserved. There could be no such thing, then, as an *editio Alfrediana* of Plato's *Timaeus*. In both *On Minerals* and *On Floods*, however, Avicenna's *Healing* is exploited as a highly valuable source for achieving a better knowledge of the two chief philosophers.

3 How Avicenna's Disagreements with Aristotle on Meteorology Were Perceived in the Latin World

For a whole century, *On Minerals* and *On Floods* were the only parts of Avicenna's Meteorology available in Latin. However, to a certain extent, there was an awareness of Avicenna's disagreements with Aristotle on meteorological matters. I shall now examine if this led to a change in the conception of Avicenna as being an 'imitator' of Aristotle, and to some degree of recognition of his intellectual independence and originality.

3.1 The Colours of the Rainbow

The story begins, once more, with Alfred the Englishman. As one of his editors puts it, 'not only was he the first Western writer to have displayed an extensive knowledge of the *libri naturales*, especially the biological works, he was also the precursor of a long line of scholastic commentators on these texts, thus earning from a contemporary [David of Dinant] the epithet *dux naturae*'²¹², i.e. 'Guide (or Leader) of Nature'. His commentaries remained authoritative for a good part of the thirteenth century.²¹³ He was also one of the first medieval

211 For more information, see Mandosio and Di Martino, La '*Météorologie*' d'Avicenne, p. 420.

212 Long, Alfred of Shareshel's Commentary on the Pseudo-Aristotelian *De plantis*, p. 125.

213 See Long's and Otte's introductions to their editions of Alfred's commentaries.

scholars who professed an unrestrained admiration for Aristotle, ‘the greatest of all philosophers’, so wise and learned that he could hardly go wrong.

However, the question whether Aristotle’s philosophy might sometimes be uneven or inadequate is raised in Alfred’s commentary on *Meteorologica*, in relation to Avicenna’s attitude towards Aristotle. In his chapter on the rainbow,²¹⁴ Alfred declares candidly that he is ‘defeated’ because he cannot understand what Aristotle said about it (§b), and that even the great Avicenna, as a matter of fact, ‘admits and regrets that he doesn’t comprehend this chapter’ (§c). Their admission of ignorance is legitimated by the authority of Aristotle himself, according to whom he who does not understand is allowed to say so (§b). This position seems to be remotely drawn from the opening statements of the *Metaphysics*, on the acknowledgement of one’s wonder and ignorance as the beginning of philosophy.²¹⁵ After reviewing the topics upon which Aristotle’s text on the rainbow is enlightening (§d), Alfred asserts that ‘the least convincing’ part is the one which deals with ‘the causes of colours’ (§e), where the Philosopher tries to explain ‘how many colours may be produced in a rainbow’ (§d); it is unconvincing because ‘he doesn’t plainly determine their causes, although he doesn’t leave them untouched’ (§d).²¹⁶ Avicenna, for his part, said without mincing words that the whole passage made no sense at all.²¹⁷ Alfred tries to excuse Aristotle by saying: ‘I presume that he wasn’t ignorant’ of the causes of these colours, ‘since about the things he doesn’t know he is not afraid to say, on his own authority, that he doesn’t understand them’ (§e). The possibility that Aristotle could simply be mistaken is thus dismissed. In Alfred’s view, a true philosopher knows that he knows what he knows and that he doesn’t know what he is ignorant of, but it is inconceivable that ‘the greatest of all philosophers’ might have believed he knew a thing without actually knowing it. Therefore, if this chapter is unclear, it is probably not his fault. Alfred then recounts that he couldn’t find ‘anything plain and clear about [these colours] in Arabic’, and that all the commentators he read, Avicenna included, ‘expressed laboriously some things [on the subject] without coming close to the bright light of intellection’ (§f). Here again, despite his dissatisfaction with Avicenna which ‘saddens’ him (§c), he agrees with his opinion, since Avicenna acknowledged that the Peripatetics failed to make Aristotle’s explanations more intelligible, and confessed that he hadn’t been able to find a solution to the prob-

214 See Appendix 1.

215 See *ibid.*, n. 344.

216 Otte’s observation that ‘nowhere in Alfred’s commentary are there indications of doubt or disagreement with Aristotle’ (*Alfred of Sareshel’s Commentary on the Meteora of Aristotle*, p. 71) is thus inaccurate.

217 See above, pp. 468–9.

lem.²¹⁸ Alfred, thus, presents Avicenna and his fellow Peripatetics as people who, despite their eminence, were incapable of going further than Aristotle in scientific matters.

This is remarkably close to what Averroes (1126–98) wrote in his commentaries of Aristotle’s *Meteorologica*,²¹⁹ despite the obvious fact that Averroes’ stance regarding Avicenna is quite opposed to Alfred’s. As a general rule, Averroes denigrates Avicenna for being an arrogant fool who misunderstood and slandered Aristotle.²²⁰ Of course, he doesn’t miss the opportunity to do so concerning the colours of the rainbow. He concludes his account of the Peripatetic views on the subject in this manner: ‘So this is what results from the words of the interpreters whose books reached us. Avicenna blames them for that and says: “But our brothers the Peripatetics said nothing [i.e. nothing of value] on the disposition of the order of the colours”²²¹. Then Averroes reprehends Avicenna for his sterile and perfidious criticism of Aristotle, disguised as a criticism of his followers: ‘And this man says nothing on this subject, but expresses only doubts on what they said; and there isn’t any doubt that this criticism is really aimed against Aristotle, for he was the prince of Peripatetics’²²². The response is twofold. First Averroes concedes that Avicenna is right when he says that the writings of ‘the interpreters whose words reached us’ on this subject are unclear. There may be two reasons for that: either they were faithful to Aristotle’s conceptions ‘but the meaning thereof was corrupted, because of the translation or for another reason’; or ‘their intention was different’, in which case ‘they openly strayed from the intention of Aristotle’²²³. In both instances—and this is the second part of the argument—Avicenna had no right to blame Aristotle, ‘the prince of Peripatetics’, for the faults of his disciples

218 Ibid.

219 There is an Epitome and a Middle Commentary. The two works are mixed in the 16th-century Giunta edition, under the title *In libros Meteorologicorum expositio media*: Books I–III are taken from the Epitome (translated into Latin in the 15th century by Elia del Medigo) with interpolations taken from the Middle Commentary (also translated by Elia del Medigo), while book IV (translated by Michael Scot in the first decades of the thirteenth century) comes from the Middle Commentary. I quote from this edition.

220 See Cerami, A Map of Averroes’ Criticism against Avicenna.

221 ‘Et hoc est quod apparet ex dictis expositorum quorum libri pervenerunt ad nos. Et jam Avicenna carpit eos super hoc, et dixit: “Sed fratres nostri Peripateticorum nihil dixerunt de dispositione ordinis colorum”’ (Averroes, *In libros Meteorologicorum*, III, 2, 3, fol. 457v).

222 ‘Et iste homo nihil dicit de hac re, sed tantum dubitat super eos; et sine dubio haec reprehensio magis vere redit ad Aristotelem, nam ipse fuit princeps Peripateticorum’ (ibid., fol. 459r).

223 ‘Et si hoc voluerunt expositores quorum verba pervenerunt ad nos, sed diminuta fuit intellectio hujus, vel propter translationem, vel propter aliam causam, verum est; et si voluerunt illam aliam intentionem, jam declinaverunt ab intentione Aristotelis expresse’ (ibid., fol. 458r).

or the contingencies of textual transmission: he ‘should have pulled Aristotle out of the Peripatetics, and he should not have expressed his opinion so drastically’²²⁴. For what Aristotle himself wrote about the rainbow cannot be but perfectly clear and true, while Avicenna didn’t even have the guts to propose an alternative interpretation (‘this man says nothing on this subject, but expresses only doubts’). Now, if we compare this to what Alfred of Shareshill writes, the two commentators meet in their unmitigated admiration for the infallible Philosopher, whereas they consider the Peripatetics as intelligent but not always reliable people. It is only about Avicenna’s status that they differ: Alfred praises Avicenna as ‘the foremost imitator of Aristotle’, while Averroes dismisses ‘this man’ whom he doesn’t consider a true Peripatetic. Paradoxically, their irreconcilable viewpoints on Avicenna converge in that they both fail to acknowledge him as an original thinker.²²⁵

The date of composition of Averroes’ *Epitome* is unknown. The Cordovan philosopher wrote his commentaries on Aristotle roughly from the 1160s to the 1180s. Alfred doesn’t know of him—or at least he doesn’t mention him among the chief commentators of Aristotle.²²⁶ His position regarding Avicenna conforms to that of Ibn Ṭufayl,²²⁷ who died thirteen years before Averroes.²²⁸

The disagreement between Avicenna and the Aristotelians about the colours of the rainbow, mentioned only in passing by Alfred of Shareshill, raised no interest, to my knowledge, among the Latin scholars who read the latter’s commentary, probably for lack of concrete and substantial details. The first to quote from it seems to be Ralph of Longchamp—a contemporary of Alfred, who lived approximately between 1155 and 1215—in his own encyclopedic commentary, written in 1212–13, on *Anticlaudianus*, an epic poem by Alan of Lille (1120–1203). In a lengthy gloss on the rainbow, he notes that ‘the Commentator on the *Book of Meteors*’, Alfred the Englishman, ‘is not ashamed to say that he

224 ‘Et quomodocumque sit, Avicenna debebat extrahere Aristotelem a numero Peripateticorum, et non dicere sermonem sic absolute’ (ibid.).

225 On Avicenna being perceived in the Latin world as a commentator, see Bertolacci, *On the Latin Reception*.

226 The possibility that Alfred was aware of Averroes’ commentary on the treatise *On Coming-to-be and Passing Away*, written in 1172, is discussed by Judycka, *Préface*, pp. XLIX–L.

227 See above, p. 469.

228 Alfred’s Jewish ‘master’, Salomon Avenraza, certainly played a key role in his appreciation of the historic importance of Avicenna. Fortunately, we have an instance of Avenraza’s role as an adviser on the translation and interpretation of Arabic terminology. Alfred refers to him in his discussion of the Arabic name of the rainbow (*qaws quzah*), and says that he trusts him so much that he adopted his interpretation (see Appendix 1, §§h–j). Alfred gives no other example of his teachings, but the hyperbolic praise—‘the foremost among modern philosophers’—and the very title of ‘master’ he grants him, imply that it is mainly through Avenraza that he became acquainted with the Greco-Arabic philosophical tradition.

doesn't understand this chapter'²²⁹. Ralph doesn't even mention Avicenna and only reproduces Alfred's 'excuses'²³⁰. Thus, the readers of Ralph's work were not informed that both Alfred and Avicenna found the Peripatetic conception of rainbow colours unconvincing.

An intriguing feature of Ralph of Longchamp's commentary is that Avicenna is quoted on meteorological matters no less than four times, concerning topics completely alien to *On Minerals* and *On Floods*, therefore unavailable in Latin at the time. I imagined at first, rather foolishly, that Ralph might refer to some unknown summary of Avicenna's Meteorology.²³¹ The truth is much simpler: he attributed to Avicenna, by mistake, several passages he copied from the Latin version of Aristotle's *Meteorologica* I–III²³²—on the analogy between earthquakes and farts, both caused by an internal wind (§a), on the colour of clouds (§b), on the difference between rain and dew (§c), and on the softness of snow (§d). Ralph quotes loosely, but Gerard of Cremona's wording is easily recognisable. A closer examination of the first citation (§a) allows us to understand how Ralph was led to confuse Aristotle with Avicenna. It is a free adaptation of a passage from Alfred of Shareshill's commentary, mixed with the text of Gerard's translation. The obvious explanation is that Ralph took notes from a manuscript which contained, as was often the case, the Latin text of the *Libri metheororum* together with Alfred's glosses. This manuscript either had colophon A bearing Avicenna's name,²³³ or some other indication that the last three chapters were not by Aristotle but by Avicenna. Ralph duly noted that Avicenna was the author of a part of the work, and when he inserted the citations into his commentary of the *Anticlaudianus*, he attributed them indiscriminately to Avicenna.

Albert the Great (around 1200–80), who read Alfred of Shareshill's commentaries, discusses at length the theory of the rainbow in his own treatise on meteorology, *Meteora*, written around 1250. He too remains silent about Avicenna's criticism of the Aristotelian theory of rainbow colours, even though it was mentioned by Alfred. He quotes extensively, instead, from the summary

229 'Unde commentator super librum metheorum non erubescit dicere quia istud capitulum non intelligit' (Ralph of Longchamp, *In Anticlaudianum Alani commentum*, p. 241).

230 'Almost as an excuse, he says: "To promise the nature of everything is to know things as God does, and to consider oneself equal to the divine providence." Later on, he adds: "As Aristotle testifies, he who doesn't understand must not be afraid to say 'I don't understand'." 'Unde quasi se excusans dicit: "Omnium natura polliceri paria deo sentire est et divinae providentiae aequalem se profiteri." Postea subjungit: "Teste Aristotele non intelligenti non est pigritandum dicere non intelligo"' (ibid.). Ralph's citations are not literal; see Appendix 1, §§a–b and e.

231 Mandosio and Di Martino, La 'Météorologie' d'Avicenne, pp. 410 and 423.

232 See Appendix 2.

233 See above, p. 488.

of Avicenna's views on the rainbow made by al-Ġazālī (1059–1111). Albert believes him to be a faithful disciple of Avicenna; for al-Ġazālī's main work, the *Incoherence of the Philosophers* (*Tahāfut al-falāsifa*), especially aimed against al-Fārābī and Avicenna, was not available in Latin, while his uncritical account of Avicenna's philosophy, the *Intentions of the Philosophers* (*Maqāsid al-falāsifa*), had been translated in the twelfth century by Dominicus Gundissalinus and John of Spain, as though it reflected his own conceptions: hence the title, *Philosophia Algazelis*. Thus Albert rightly considers that al-Ġazālī 'expresses Avicenna's opinion throughout his *Physics*'²³⁴—the section of the *Intentions of the Philosophers* dedicated to natural philosophy. And he stresses that 'Avicenna's opinion [on the rainbow] expressed through the words of al-Ġazālī, his summarist, is wholly in agreement with what has been said before'²³⁵, that is, with Albert's own opinion, which in turn 'agrees nearly on everything' with that of Aristotle and Nicholas of Damascus.²³⁶ This wonderful consensus also applies to the colours of the rainbow: 'In order to make plain everything which precedes and follows', says Albert, 'we shall expound here, all at once, the cause of the colours of the rainbow, the cause of its shape, and the cause of the order of its colours according to our own opinion; and after that we will show that it agrees with al-Ġazālī's opinion, with Nicholas the Peripatetic's opinion, and with Aristotle's opinion'²³⁷. Of course, a reader of the *Philosophia Algazelis* who, like Albert, had no access to Avicenna's chapter on the rainbow from the *Book of the Healing*, still untranslated, could not see the blatant disagreement between him and the Peripatetics on that subject. Moreover, al-Ġazālī's summary of Avicenna's philosophy was not an abridgement of *The Healing* but a translation in Arabic of the *Book of Science* (*Dānešnāme*)—also known as *Philosophy for 'Alā' al-Dawla*—, originally written in Persian: a comprehensive but much less detailed work than *The Healing*, devoid of all the polemical hints the latter contains. In sharp contrast with the detailed study of the rainbow which occupies no less than two full chapters in *The Healing*, the *Book of Science* dedicates just a small paragraph to it, in the chapter *On the Effects Produced by Vapour in the Air*.²³⁸ No wonder, then, that the disagreement on the

234 'Algazel enim in physica sua ponens per omnia sensum Avicennae, de iride sic tradit: ...' (Albertus Magnus, *Meteora*, III, 4, 25, p. 201).

235 'Ecce sententia Avicennae per verba Algazelis sui abbreviatoris posita, quae cum superioribus omnino concordat' (ibid.).

236 'His, quae praedicta sunt, fere per omnia concordant Avicenna et Algazel et Nicolaus Peripateticus in dictis eorum' (ibid.).

237 'Ad evidenciam autem omnium praecedentium et subsequentium nos hic simul ponemus causam colorum iridis et causam figurae ejus et causam ordinis suorum colorum secundum nostram opinionem. Et ostendemus postea quoniam concordat cum opinione Algazelis et cum opinione Nicolai Peripatetici et cum opinione Aristotelis' (ibid., III, 4, 14, p. 190).

238 Avicenne, *Le Livre de science*, vol. 2, p. 49 (*Des productions venant de la vapeur dans l'air*).

colours of the rainbow was not discernible in al-Ġazālī's summary. However, neither Alfred of Shareshill's reference to Avicenna's 'admitting and regretting that he doesn't comprehend this chapter' of Aristotle's *Meteorology*, nor his insistence upon the fact that none of the Greek and Arabic commentators he knew had been able to throw 'the bright light of intellection' upon it, are acknowledged by Albert the Great.

3.2 Transmutations

As to the chapters on minerals added by Alfred the Englishman to the *Meteorologica*, the assumption that they were a genuine work by Aristotle implied that no contrast whatsoever with other parts of the Aristotelian corpus could be envisioned. In the wake of Alfred's commentaries, Adam of Bockenfield (or Buckfield), active around 1250, consistently refers to the *De mineralibus* as pertaining to Aristotle's works on natural philosophy, in his commentaries on the treatises *On Sense and Sensible Objects* and *On Plants*.²³⁹ He quotes Alfred's reference to the *De mineralibus* as *De congelatis*,²⁴⁰ and explicitly assigns the work to Aristotle when he discusses the possibility of transmutations: 'It should be understood in that respect that, just as animals do not transmute from one species into another, neither do minerals according to the truth, as Aristotle asserts at the end of the fourth [book] on *Meteors*'²⁴¹. Another passage refers to the *De mineralibus*: 'For what is most strongly mixed melts and dissolves with more difficulty, according to the nature of the mixture, as can be inferred from the fourth [book] of *Meteors*'²⁴². It is an allusion to the passage of the *De mineralibus* which states that 'the matter of malleable things is an aqueous substance mixed with an earthy substance, so strongly that one cannot be separated from

239 Adam of Bockenfield, *Glossae super De vegetabilibus et plantis*, I, p. 43; the passage from Adam's commentary on *De sensu et sensato* is quoted by the editor, p. 7. Moreover, Adam's commentary on the *Meteorologica*, understandably, 'included comments on the *De mineralibus* without distinguishing it from the rest of *Meteorologica* IV' (Martin, *Scientific Terminology*, p. 162).

240 Adam of Bockenfield, *Glossae super De vegetabilibus et plantis*, I, p. 52. See above, n. 124.

241 'Unde intelligendum est super hoc quod, licet animalia non transmutentur ab una specie ad aliam, nec etiam alia mineralia secundum veritatem, ut vult Aristoteles in fine quarti meteorum' (ibid., I, p. 114). See above, n. 138.

242 'Quod enim nobiliori mixtione miscetur cum difficultate majori dissolvitur vel resolvitur, quantum est in natura mixtionis, ut ex quarto meteorum haberi potest' (ibid., II, p. 162).

the other'²⁴³, a passage which in turn is based on what Aristotle wrote in book IV, chapter 6, about the criteria for solidification and melting or dissolution.²⁴⁴

Albert the Great appears to be the first Latin scholar who warned his readers that the last chapters of the *Libri meteororum* were spurious. He believed them at first to be a genuine part of *Meteorologica* IV. In his commentary on book II of Peter Lombard's *Sentences*, written in 1246,²⁴⁵ he stated, just like Adam of Bockenfield, that 'art does not transmute a substantial form into [another substantial] form', relying on the authority of Aristotle: 'for Aristotle says in the fourth book *On Meteors*: "The artificers of alchemy should know that species cannot be transmuted"'²⁴⁶. Some years later, after he completed his *Meteora*, following the order of the Aristotelian natural philosophy course as expounded by al-Fārābī,²⁴⁷ he addressed mineralogy in a work called *Mineralia*, written between 1250 and 1254. In the prologue to this work, he explains that he 'diligently searched' for Aristotle's book on minerals 'in several parts of the world', but all he could see of it were some excerpts²⁴⁸ (unfortunately he doesn't say what they were). Then he declares: 'And what Avicenna wrote on these matters in the third chapter of the first book he dedicated to them is insufficient'²⁴⁹. This shows that Albert not only knew that Avicenna was the author of the chapters on minerals assigned to Aristotle—in all probability, colophon A alerted him to Avicenna's authorship²⁵⁰—, but also that these chapters came from a larger work on minerals. Albert is correct about 'the first book': the *De mineralibus* was indeed excerpted from book I of Avicenna's *On Minerals and Lofty*

243 See above, n. 107. Long is right in saying that Adam refers to the *De mineralibus*, but the passage he mentions is wrong (*ibid.*, p. 162). His note on 'the problem of the translation of the *Meteorologica*' (p. 17) is inaccurate.

244 Aristotle, *Meteorologica*, IV, 6, *passim*. See Aristippus' translation: *Quartus meteororum*, 6, pp. 18–21.

245 The date of composition is given by Albert himself: 'Jam enim elapsi sunt mille ducenti quadraginta sex anni' (Albertus Magnus, *Commentarii in secundum librum Sententiarum*, VI, art. 9, p. 139).

246 'Item, ars non transmutat a forma substantiali in formam; quia dicit Aristoteles in quarto meteororum "Sciunt artifices alchimiae species transmutari non posse"' (*ibid.*, VII, art. 8, p. 134). For the quotation from the *De mineralibus*, see above, n. 138. The passage where this quotation appears in Albert's commentary is analysed by Newman, *Promethean Ambitions*, pp. 44–50.

247 See above, pp. 472–3.

248 'In hoc libro sicut in praecedentibus Aristotelis tractatum non vidi nisi per excerpta quaedam, quae diligenter quaesivi per diversas mundi regiones' (Albertus Magnus, *Mineralium libri quinque*, III, 1, 1, p. 59). 'De his autem libros Aristotelis non vidimus, nisi excerptos per partes' (*ibid.*, I, 1, 1, p. 1).

249 'Et haec quae tradidit Avicenna de his in tertio capitulo primi sui libri quem fecit de his, non sufficiunt' (*ibid.*).

250 Di Martino's redundant investigation into what she calls a 'small mystery' is pointless (I 'Meteorologica' di Avicenna, p. 45).

Impressions; but his reference to ‘the third chapter’ is wrong, since the chapter *On the Generation of Minerals* to which he alludes is actually chapter 5 of Avicenna’s book I, and it is only in Alfred of Shareshill’s Latin version that it became chapter 3 of the *De mineralibus*. Therefore, Albert believed that Alfred translated into Latin the whole first book of a treatise by Avicenna on minerals, which contained only three chapters. Where he got this information from remains to be found.

The shift of authorship from Aristotle to Avicenna opened the way to criticism on the issues dealt with in the *De mineralibus*: it was much easier to deem Avicenna’s opinions ‘insufficient’ than to question the validity of Aristotle’s philosophy. Thus, regarding alchemical transmutations, Albert now writes: ‘Considering everything that has been said, we can ask ourselves how valid is the saying that some attribute to Aristotle, while according to the truth it is by Avicenna, that is: “The artificers of alchemy should know that species cannot be changed, but that they can make imitations of them ...” Such is the opinion of Avicenna’²⁵¹. The same critical stance is adopted by Albert when he discusses the origin of the ‘essential forms’ (that is, the specific differences) of minerals: ‘Avicenna seems to say that sometimes an earthy virtue gives these forms [to minerals], and some falsely assign this saying to Aristotle’²⁵²; they do so because they don’t understand that, according to the true Aristotelian doctrine, such a virtue is incapable by itself of giving to a mineral its essential (i.e. substantial) form. Therefore it cannot be Aristotle’s opinion.

A probable echo of Albert’s statements can be found in a marginal note from a thirteenth-century manuscript now preserved in Madrid, containing the *editio Alfrediana* of Aristotle’s *Meteorologica*.²⁵³ Appended to the explicit (‘Here ends the *Book of Meteors*’),²⁵⁴ this note reproduces, with minimal variants, colophon B and its assertion that ‘Alfred the Englishman translated the last three chapters from Arabic into Latin’²⁵⁵. Then it adds: ‘However, it is said by some that the last three chapters were composed by Avicenna, and this is

251 ‘Ex omnibus autem his inductis possumus considerare utrum verum sit quod quidam Aristotelem dicunt dixisse, cum secundum rei veritatem dictum sit Avicennae, quod videlicet “Sciunt artifices alchimiae species permutari non posse, sed similia his facere possunt ...” Haec enim est sententia Avicennae’ (Albertus Magnus, *Mineralium libri quinque*, III, 1, 9, pp. 70–71).

252 ‘Quod autem Avicenna dicere videtur quod aliquando vis terrea dat huiusmodi formas, et quidam attribuunt hoc dictum falso Aristoteli’ (ibid., III, 1, 6, p. 67). On Avicenna’s ‘mineralising virtue’, see above, p. 484.

253 MS Madrid, Biblioteca nacional de España, 1428, fol. 171r; see Rubino, *Einleitung*, p. XIII.

254 ‘Explicit liber methedorum’ (ibid.).

255 ‘Istius libri, ut dicitur, tres libros transtulit magister Gerardus magnus philosophus de Arabico in Latinum, quartum vere transtulit Henricus Aristippus de Graeco in Latinum, tria ultima capitula transtulit Alfredus Anglicus de Arabico in Latinum’ (ibid.). See above, n. 157.

said especially of the last one, which begins there: “Mineral bodies ...”,²⁵⁶ in these chapters, many things are expressed which are literally opposed to what has been determined above in this book [Aristotle’s *Book of Meteors*]²⁵⁷. The description of ‘the last three chapters’, and especially the very last one, as discordant with the Aristotelian doctrine expounded in the rest of the *Meteorologica*, goes back to Albert’s *Mineralia* and to his discussion of *De mineralibus*, whose chapter 3 is specifically pointed out as ‘insufficient’.

The judgment of Albert the Great as to the spurious character of the *De mineralibus* was spectacularly confirmed when William of Moerbeke’s new translation of Aristotle’s *Meteorologica*, made from the Greek and thus devoid of Alfred the Englishman’s additional chapters,²⁵⁸ became available during the 1260s.²⁵⁹ However, not everybody agreed: some continued to assign them to Aristotle, and even when their Avicennan origin was accepted, scholars did not cease to be interested in a section that was so useful and seemed to fit so well in the general frame of the Aristotelian corpus.

The case of Roger Bacon (1214–94) is very interesting in this respect. In the 1240s, he believed, like everybody else at the time, that the *De mineralibus* genuinely belonged to Aristotle’s *Meteorologica*. He refers to it in his questions on Aristotle’s treatise *On Plants* (written between 1241 and 1246), in the passage where he examines ‘whether one species of plant can be transmuted into another’²⁶⁰. His answer is that only ‘Nature can transmute species, but not art’²⁶¹. He invokes the authority of Aristotle, who ‘touches on this in the fourth [book on] *Meteors*’ when he says that ‘The artificers of alchemy should know, etc.’; for it should be understood that by ‘artificers’ the Philosopher meant that ‘a thing cannot be transmuted by art according to species’, although ‘he does

256 *De mineralibus*, chapter 3 (*On the Four Species of Mineral Bodies*), *inc.*: ‘Mineral bodies are divided into four species’ (see above, n. 79).

257 ‘Dicitur tamen a quibusdam quod tria ultima capitula sunt composita ab Avicenna, et maxime dicitur hoc de ultimo capitulo, quod incipit ibi: “Corpora mineralia”; in quibus literaliter dicuntur multa contraria superius determinatis in hoc libro’ (MS Madrid, 1428, fol. 171r; Rubino, *Einleitung*, p. xiii; Vuillemin-Diem, *Praefatio*, p. 9).

258 The Latin translation by Michael Scot of book IV of Averroes’ Middle Commentary on *Meteorologica* pointed in the same direction, even though the absence of a commentary on the chapters ‘on minerals’ was not in itself a proof that they were not an authentic part of Aristotle’s work.

259 See Williams, *Defining the Corpus Aristotelicum*, pp. 38–40.

260 ‘Quaeritur utrum una species plantae in aliam possit transmutari’ (Roger Bacon, *Quaestiones supra De plantis*, p. 251). On Bacon’s argumentation regarding this question, see Newman, *Alchemical Debate*, pp. 22–4.

261 ‘Vel dicendum quod natura potest transmutare species, non tamen ars’ (Roger Bacon, *Quaestiones supra De plantis*, p. 252).

not deny that it can be by Nature²⁶², as the existence of plants changed into stone—also attested in the same book—plainly demonstrates.²⁶³ But in his works from the late 1260s, as for instance *On the Errors of Physicians* (*De erroribus medicorum*), Bacon acknowledges that the *De mineralibus* cannot be Aristotle's *Book on Minerals*: 'The *Book on Inanimate Bodies* [i.e. minerals in Bacon's jargon] is entirely missing, for the few chapters which were added at the end of [the book on] *Meteors* do not belong to the text of Aristotle, as it is known from another [i.e. William of Moerbeke's] translation'²⁶⁴. However, he disagrees completely with Albert the Great as to the conclusions which should be drawn from the disattribution of the *De mineralibus* to Aristotle, for in his eyes it does not at all diminish the value of these additional chapters.

He seems to say the opposite in one of his later works, the *Common Principles of Natural Things* (*Communia naturalium*), in which he warns against those who use the *De mineralibus* in order to assert Aristotle's authority. This passage belongs to a discussion of alchemy, a discipline heartily promoted by Bacon because it is prominently practical and 'experimental'. There he defines it as 'the science of all inanimate things made from the elements'²⁶⁵, that is, the science of minerals. Characteristically, alchemy is not for him, as for other scholars, a part or an application of the science of minerals; it is the science of minerals in itself. Bacon is convinced that both Aristotle and Avicenna 'patently expound' how the 'wonderful medicine, which teaches how basest metals may be purified so as to become gold and silver, is extracted from the spirit hidden into parts of plants and animals, and especially of men'²⁶⁶. This is apparently at odds with the refutation of alchemical transmutations from the closing section of the *De mineralibus*—a refutation endorsed by Bacon twenty years before, in his questions on *On Plants*. It is precisely why Bacon commands 'the fools' who 'abuse this authority' to 'remain silent': for they use 'against the truth' the dictum which appears 'at the end of the first translation of the [*Book of*] *Mete-*

262 'Et hoc tangit Aristoteles in quarto metheororum, "Sciunt artifices alkimiae, etc."; quia dixit "artifices", id est, per artem non potest transmutari res secundum speciem, et non negat quod non possit [*sic*] per naturam' (ibid., p. 252). The correct text should be 'non negat quod possit per naturam'.

263 'Item, quarto metheororum, planta convertitur in lapidem ...' (ibid., p. 251).

264 'Liber de corporibus inanimatis totaliter deficit, quia pauca capitula quae addita sunt in fine metheororum non sunt de textu Aristotelis, sicut ex alia translatione notum est' (Roger Bacon, *De erroribus medicorum*, p. 159).

265 'Post haec sequitur scientia de omnibus rebus inanimatis quae fiunt primo ex elementis, et haec est alkimia' (Roger Bacon, *Communia naturalium*, I, 1, 2 [*De numero et ordine scientiarum naturalium*], p. 7).

266 'Quia medicina mirabilis quae docet mundare metalla viliora, ut fiant aurum et argentum, extrahitur de spiritu occultato in partibus plantarum et animalium, et praecipue hominum, sicut Aristoteles et Avicenna et alii edocent evidenter' (ibid., pp. 6–7). See Newman, An Overview.

ors’—‘The artificers of alchemy should know that the species of things cannot be transmuted’—‘as though it were a saying of Aristotle, while nothing is by him from the beginning of this chapter: “Pure earth does not become stone, etc.”,²⁶⁷ but was added by Alfred’²⁶⁸.

Bacon’s point here is not that the *De mineralibus* is invalid because it is not by Aristotle and should not be used as an authoritative text anymore.²⁶⁹ His aim is to rebuke ‘the fools’ who consider it a mere refutation of alchemical transmutations, and who draw upon this wrong interpretation to assert, ‘against the truth’, that Aristotle was opposed to alchemy. For, he adds, ‘even if it were’ a saying of Aristotle, ‘they allege falsely’ what they think it means, for the sentence which states that ‘the species of things cannot be transmuted’ is followed by a restriction: ‘unless they are brought back to their prime matter’; but they are too ignorant to understand what it means.²⁷⁰ Otherwise they would have noticed that it coincides with a statement from Aristotle’s *Metaphysics*, where the Philosopher ‘says that a living thing cannot be produced from a dead one, unless it is brought back to its prime matter’²⁷¹. Therefore, the statements concerning alchemy in the *De mineralibus* are in accordance with Aristotle’s opinion, and much less opposed to the possibility of alchemical transmutations than ‘the fools’ believe, granted that the condition expressed (to bring a body back to its prime matter) is fulfilled. The difference with Bacon’s earlier position is that he, like the ‘fools’ he now dismisses, used to take the argument expounded in the *De mineralibus* as a refutation of artificial transmutations, which it is not.

Bacon does not explicitly name Avicenna as the author of the *De mineralibus*. He attributes its addition to ‘Alfred’, but he is obviously aware that Avi-

267 It is the incipit of the *De mineralibus* (see above, n. 77).

268 ‘Et taceant stulti qui abutuntur auctoritate illa in fine primae translationis meteororum, quam contra veritatem allegant, dicentes scriptum esse “Sciant artifices alkimiae species rerum transmutari non posse” ac si esset verbum Aristotelis, cum nichil sit a principio illius capituli, “Terra pura lapis non fit, etc.”, set additum ab Alveredo’ (Roger Bacon, *Communia naturalium*, I, 1, 2, p. 7).

269 This is how the text is read by Newman: ‘The Bacon of the 1260’s ... has demoted the document of “Alfred” to the domain of fools’, and ‘actually rejects the theoretical validity of the “*Sciant artifices*”’ (Alchemical Debate, p. 25).

270 ‘Quod si esset male allegant, cum sequatur “nisi fiat resolutio ad materiam primam”, quam ignorant’ (Roger Bacon, *Communia naturalium*, I, 1, 2, p. 7). The words *quam ignorant* do not belong to the citation from the *De mineralibus* but to Bacon’s own speech; see above, n. 141.

271 ‘De qua tamen Aristoteles in nono [*sic*] metaphysicae dicit quod “non fit ex mortuo vivum, nisi fiat resolutio ad materiam primam”’ (Roger Bacon, *Communia naturalium*, I, 1, 2, p. 7). Cf. Aristotle, *Metaphysics*, H, 5, 1045a: ‘If a living thing is generated from a dead one, it must first become the matter, and then a living thing’. The same passage was already mentioned by Bacon in the *Quaestiones supra De plantis* (p. 247) in relation with the *De mineralibus*; see Newman, Alchemical Debate, p. 23.

cenna wrote it, for the Persian philosopher is mentioned together with Aristotle throughout the passage. This is in keeping with Bacon's assumption of Alfred the Englishman's high esteem for Avicenna, to the point that he considered 'the opinion of Avicenna' to be as one with 'the opinion of Aristotle'²⁷². The statement comes not from one of his early writings, but from his *Greater Work* (*Opus majus*), completed in 1267. According to Bacon, the key to the comprehension of Aristotle's and Avicenna's conceptions of alchemy is the distinction between their exoteric and esoteric doctrines. Bacon is convinced that 'this science [i.e. alchemy] was transmitted by Aristotle, not in his public books'—and for this reason there is no work on alchemy in the standard Aristotelian corpus described by al-Fārābī and the like—'but in other special works he wrote called *On Inanimate Things*'²⁷³, i.e. *On Minerals*. The most important of these 'special works' not meant for the general public is 'the *Book of Secrets*', that is, the Pseudo-Aristotelian *Secret of Secrets*, which Bacon considered so quintessential that he produced his own edition of the work (largely rewritten to fit his personal conceptions) with a commentary.²⁷⁴ He also believes that Aristotle's conception of 'the practice of alchemy', presented in a cryptic manner in the *Secret of Secrets*, was expounded by Avicenna in 'a big volume dedicated to this science which is divided in ten books', that is, the Pseudo-Avicennan *De anima*, a combination of three eleventh-century Arabic works translated into Latin in the thirteenth century.²⁷⁵ These works, says Bacon, and many others of the same kind, 'are known to the wise'²⁷⁶. Since it is only in their esoteric writings that Aristotle and Avicenna 'patently expound' the alchemical practice, the latter's apparent rebuttal of alchemy in the *De mineralibus* takes a deeper meaning, which 'the fools' are unable to understand. Thus, in Bacon's case, the attribution of this work to Avicenna through Alfred the Englishman, instead of Aristotle, changed absolutely nothing, for in his eyes the two authors are equivalent, and equally authoritative. It remains true, of course, that Bacon's opinion on alchemy evolved considerably between the 1240s and the 1260s, from his initial scepticism to his conviction that it was one of the most excellent arts.

272 See above, n. 202.

273 'Haec enim scientia traditur apud Aristotelem non in libris vulgatis, ... set in aliis libris suis specialibus qui de rebus inanimatis intitulantur' (Roger Bacon, *Communia naturalium*, I, 1, 2, p. 7).

274 *Secretum secretorum, cum glossis et notulis*, ed. Steele. See Williams, Roger Bacon and the *Secret of Secrets*.

275 Ps.-Avicenna, *De anima*, ed. Moureau; Mandosio, Basilisks, Lettuce, and the Stone which is not a Stone, pp. 132–3.

276 'Et in libro secretorum et alibi in particulari docet de practica alchimiae, cujus sententiam exponit Avicenna in magno volumine de illa scientia quod in decem libris continetur. Et alii libri ejus et aliorum sunt plurimi qui sapientibus innotescunt' (Roger Bacon, *Communia naturalium*, I, 1, 2, p. 7).

In the course of the development of the scholastic debate on the possibility of alchemical transmutations, the original Avicennan statement which was limited to ‘the species of metals’—*species metallorum*, in Alfred’s translation—became ‘a general principle to be applied to the whole of Nature’, as Roger Bacon’s stance demonstrates.²⁷⁷ This generalising process was already at work in Adam of Bockenfield, who extended the question from mineral to animal species.²⁷⁸ Albert the Great omits the word ‘metals’ in his citations, probably because it was absent from the text of the *Libri meteororum* he had read.²⁷⁹ In any case, from then on, the discussion concerned ‘the species of things’ in general, as Bacon put it.

Even though he insists on the affinities between Aristotle and Avicenna, Roger Bacon is not unaware of their discrepancies; he even enumerates them in the *Opus majus*.²⁸⁰ In his view, they are a natural consequence of the progress of philosophy through time, a progress whose law is that ‘the followers always add something to the works of their predecessors, and they correct and change many things’²⁸¹. As a matter of fact, ‘Avicenna and Averroes corrected several sayings of Aristotle’²⁸². Progress, however, doesn’t necessarily result in advancement: for ‘Avicenna, who was the leader and prince of philosophy after Aristotle—as the Commentator [Alfred the Englishman] says regarding the chapter on the rainbow in Aristotle’s *Book of Meteors*, and as the works he [Avicenna] composed on the whole philosophy, based upon Aristotle, demonstrate—, said that he didn’t know the nature of the rainbow, as the above-mentioned Commentator admits’²⁸³. And it is no wonder that ‘Averroes, who is the greatest after them [both], often refutes Avicenna, just as the learned men of our time correct Averroes on several issues, not undeservingly, for without any doubt he was wrong in many ways, even though he excellently spoke on other issues’²⁸⁴. Thus, the multiple polemics raised by Averroes against Avicenna do not imply that Avicenna’s philosophy has become obsolete; he remains greater than Averroes, who benefited from his coming after him.

277 Newman, *Alchemical Debate*, p. 23.

278 See above, n. 241.

279 I concord with Newman, *Promethean Ambitions*, p. 46.

280 Roger Bacon, *Opus majus*, I, 6, p. 14.

281 ‘Nam semper posteriores addiderunt ad opera priorum, et multa correxerunt, et plura mutaverunt ...’ (ibid.).

282 ‘Et etiam Avicenna et Averroes plura de dictis ejus [Aristotelis] correxerunt’ (ibid.).

283 ‘Atque Avicenna dux et princeps philosophiae post eum [Aristotelem], ut dicit Commentator super capitulum de iride in libro meteororum Aristotelis, et opera in totam philosophiam ab eo digesta ab Aristotele hoc manifestant, dixit se naturam iridis ignorasse, sicut praedictus Commentator fatetur’ (ibid.).

284 ‘Et Averroes maximus post eos, sicut in multis redarguit Avicennam, sic et sapientes nostri eum in pluribus corrigunt, non immerito, quia proculdubio erravit in multis locis, quamvis optime dixit in aliis’ (ibid., p. 15).

3.3 Life in the ‘Torrid’ Zone and Human Spontaneous Generation

Other points of disagreement between Avicenna and Aristotle on meteorological matters came to the knowledge of the Scholastics independently from Alfred of Shareshill’s mediation. One of them is the question of the uninhabitability of the equatorial zone, addressed by Avicenna in book I, chapter 6 of his *Meteorology*, *On the Conditions of Climates and Lands*. Avicenna refuted Aristotle’s belief that the equatorial or ‘torrid’ zone is uninhabitable because it is too hot to sustain life.²⁸⁵ His argumentation is aimed at showing that the equatorial zone is not only inhabited (empirical demonstration), but also temperate (astronomical demonstration). In so doing, he adopts the conclusions of the Greek mathematicians Geminus of Rhodes and Ptolemy. The latter discussed with some reticence at first, in the *Almagest*, the uninhabitability of the equatorial zone, before accepting it in the *Tetrabiblos* and especially in the *Geography*.²⁸⁶ Now, Albert the Great is aware of this disagreement between Avicenna and Aristotle. In his treatise *On the Nature of Place (De natura loci)*, written shortly after 1248, he puts Avicenna and Ptolemy together as the main defenders of the thesis of the uninhabitability of the equatorial zone: ‘We should agree, it seems, with Ptolemy and Avicenna in saying that the “torrid” zone is not entirely torrid [i.e. too hot for life] but is inhabited’²⁸⁷, for ‘many great men who lived before our time’ have argued that people actually live there. ‘They say: “We saw with our own eyes many people who lived between the summer tropic and the equinoxial [circle]”’,²⁸⁸ and as a matter of fact ‘there are many cities in this climate’²⁸⁹; therefore ‘it appears that the place where, according to the ancients, the torrid [zone] was located, is inhabitable’²⁹⁰. Albert strongly disagrees, however, with the opinion of ‘some philosophers’ according to whom the equatorial zone ‘is

285 See above, p. 468.

286 Ptolemy, *Almagest*, II, 6, p. 83; id., *Tetrabiblos*, II, 2, pp. 120–22, and id., *Geography*, VII, 4. In the *Almagest*, Ptolemy mentions the opinion of Geminus—‘it is said that the regions beneath the equator could be inhabited, since the climate must be quite temperate’—, but observes that ‘what these inhabited regions are we have no reliable grounds for saying’; thus, ‘what people say about them must be considered guesswork rather than report’, for ‘up to now they are unexplored by men from our part of the inhabited world’.

287 ‘... consentiendum videtur Ptolemaeo et Avicennae, ut dicamus torridam non omnino esse torridam, sed esse habitatam’ (Albertus Magnus, *De natura loci*, I, 6, p. 11).

288 The ‘summer tropic’ is the tropic of Cancer, thus named because the sun enters the zodiacal sign of Cancer at the summer solstice; the ‘equinoxial circle’ is the equator.

289 ‘Dicunt enim illi quod “nos videmus multos homines oculis nostris, qui habitaverunt inter tropicum aestivum et aequinoctialem” ... Multas enim civitates ... constat nobis in climate illo esse’ (ibid.).

290 ‘... multis magnis viris, qui ante nostrum hoc tempus fuerunt, videtur quod locus ubi antiquis torrida esse videbatur sit habitabilis’ (ibid.).

the most temperate of all places'²⁹¹. His conclusion implies that the second opinion, just like the first, was also shared by Ptolemy and Avicenna: 'Such is, about these places, what was reported by Avicenna and Ptolemy in the *Book on the Division of Habitable Places*'²⁹². This title obviously corresponds to Ptolemy's *Geography*,²⁹³ but what about Avicenna? Albert couldn't know about his chapter *On the Conditions of Climates and Lands*, which had not been translated into Latin.

Albert's statements bear some similarity with Averroes' commentaries on book II of the *Meteorologica*, which, it seems, were not available in Latin at that time.²⁹⁴ Averroes says that both Ptolemy and Avicenna believed that the equator is inhabitable: 'Ptolemy, and those mathematicians [i.e. astronomers/astrologers] who follow him, think that it is possible to live beneath the equinoxial [circle]'²⁹⁵, and 'Avicenna followed them in this opinion'²⁹⁶. But Avicenna, on his own initiative, went so far as to say that the equatorial zone 'is more temperate or average than any other climate', and asserted once more that 'the opinion of the Peripatetics is contrary to the senses and to reason'²⁹⁷. This is inadmissible, so Averroes does his best to separate Ptolemy, the serious ancient scholar, from Avicenna's superficiality. His argumentation is especially tortuous and is comparable to his attack against Avicenna on the colours of the rainbow.²⁹⁸ In both cases, Averroes begins with an apparent concession. First he admits that the existence of people living in the torrid zone is an established fact: 'It seems possible that there can be life [literally, habitation] beneath the equinoxial [circle]; for we see that many lands are inhabited, over whose heads the sun passes'²⁹⁹—that is, where the sun passes straight overhead (at zenith) twice a year, at the vernal and autumnal equinoxes, when it crosses the celes-

291 'Et ideo dixerunt quidam philosophi locum illum [aequinoctialem] esse temperatissimum omnium locorum. Cui tamen dicto illorum non puto esse assentiendum' (ibid., p. 12).

292 'Et haec est de locis illis traditio Avicennae et Ptolemaei in libro de divisione locorum habitabilium' (ibid.).

293 In his annotation (ibid.), the editor only refers to the *Almagest*.

294 See above, n. 219.

295 The 'climates' or zones are both terrestrial and celestial: thus, the equatorial circle on earth corresponds to the equinoxial circle in the sphere of fixed stars.

296 'Ptolemaeus autem, et sequentes ipsum ex mathematicis, putant quod habitatio est possibilis sub aequinoctiali ... Avicenna autem jam secutus est eos in hac opinione' (Averroes, *In libros Meteorologicorum*, II, 2, fol. 438r).

297 'Et vidit [Avicenna] quod ille locus, scilicet qui est sub aequinoctiali, est magis temperatus seu medius omnibus climatibus, et putavit quod sermo Peripateticorum est contrarius sensui et rationi' (ibid.).

298 See above, pp. 502–3.

299 'Videtur esse possibile ut sit habitatio sub aequinoctiali; nam nos videmus multas terras habitatas in quibus vadit Sol super capita eorum' (Averroes, *In libros Meteorologicorum*, II, 2, fol. 438v).

tial equator. Then he observes that ‘the reasoning or induction’ by which it is inferred that those lands are inhabitable ‘does not give the truth’³⁰⁰. For, if it is indeed ‘manifest’ that ‘there can be life beneath the equinoxial [circle]’, ‘this life is not tempered, as Avicenna says, but is such as life can be in a climate over whose heads the sun passes directly’³⁰¹. Why is that? ‘Because those who live in these lands have a short life by necessity, and most of them are not natural’³⁰². Take for example the ‘Ethiopians’ (a generic name for the black dwellers of Africa): they live in the torrid zone, but ‘their life is not natural, their complexions stray greatly from human complexions, and they live in this place only by accident’³⁰³. In other words, they live by accident in a place which is uninhabitable by essence, and as a result their life span is shorter than the norm, and they have a different complexion than average humans (they are black).³⁰⁴ Consequently, ‘it is manifest that in such a place it is impossible that plants and animals can live permanently’³⁰⁵; and those who, like Avicenna, ‘think that life in such places is possible’, do not understand that it is impossible by essence, even though living beings happen to be there.³⁰⁶ Thus, for Averroes, the inhabitants of the torrid zone are in the same situation as, say, travellers or merchants who cross an inhospitable desert: their presence ‘by accident’ doesn’t make the land more hospitable. The difference is that the Ethiopians live there permanently, with the consequence that their ‘unnatural’ life—living permanently in a place unfit for permanent life—changes them into unnatural creatures. Therefore, when Aristotle says that ‘the places which are beneath the equinoxial [circle] are uninhabitable because of the excessive heat which reigns there’, his judgment ‘is true and firm’³⁰⁷, whatever evidence Avicenna may bring forth.

300 ‘Sed ista inquisitio seu inductio non dat veritatem’ (ibid.).

301 ‘Manifestum est quod sub aequinoctiali potest esse habitatio, sed non temperata, ut dicit Avicenna, sed secundum modum secundum quem est habitata in climate in quo Sol vadit directe super capita eorum’ (ibid.).

302 ‘Nam habitantia in illis terris sunt vitae brevis de necessitate, et ut plurimum non sunt naturalia’ (ibid.).

303 ‘Nam jam videmus manifeste homines versus quorum capita directe vadit Sol, et sunt Aethiopes ... vita eorum est non naturalis, et complexionones eorum exeunt a complexionibus humanis valde, et isti non habitant in isto loco, nisi per accidens’ (ibid., fol. 440v).

304 Leaving aside what a modern reader may think of the way Averroes describes African people, the argument is specious as far as Avicenna is concerned, for he didn’t speak of the ‘Ethiopians’ but of the inhabitants of Ceylon (see above, p. 468).

305 ‘Et manifestum est quod in tali loco impossibile est permanere plantas et animalia’ (ibid., fol. 439r).

306 ‘Sed ... non est possibile ut sit illa pars habitata. Et hanc causam nescivit aliquis eorum qui putant quod habitatio in illis locis est possibilis’ (ibid., fol. 438v).

307 ‘Aristoteles videt quod illud quod est sub aequinoctiali non est habitabile propter dominium caliditatis ibidem, et est verum et firmum’ (ibid., fol. 434r).

Averroes considers that he has duly ‘verified’ Aristotle’s argument, and that ‘what others have said about this besides him is imaginary’³⁰⁸.

Albert acknowledges the inhabitability of the equatorial zone as a fact. He is unaware of the questionable distinction made by Averroes between inhabitability by essence and by accident; but he concurs with him on the fact that the equatorial climate is not temperate. However, he assigns both opinions—the ‘torrid’ zone is inhabitable *and* temperate—to Ptolemy and Avicenna, while Averroes clearly separated them.

There was a way of knowing about Avicenna’s views on the matter in a direct manner, though, for they are alluded to in the *Canon of Medicine*. In the chapter dedicated to the effects of the different climates of the earth upon human health,³⁰⁹ Avicenna summarises his astronomical argumentation,³¹⁰ and concludes that ‘on the equinoxial line [i.e. the equator], there is no excessive heat such as that which the opposition [of the sun] around the revolution of [the zodiacal sign of] Cancer produces in inhabited places [i.e. those located around the tropic of Cancer]’³¹¹. This point is stressed by the mid-sixteenth-century editors of the *Canon*, Giovanni Costeo and Giovanni Paolo Mongiò,³¹² who review ‘the different opinions of learned men concerning the region which is called equinoxial’, upon which a ‘great controversy’ is raised: for, they explain, ‘some accept its inhabitability; some negate it; some think that it may indeed be inhabited, but with difficulty; and some say that a very comfortable life may be led there’³¹³. The first opinion was held by Ptolemy, who ‘thought that [the equinoxial region] is inhabitable, although he didn’t know yet that it is actually

308 ‘Declarata est igitur ex hoc verificatio viae secundum quod processit Aristoteles ... Illud autem quod dixerunt alii praeter ipsum de hoc est phantasticum’ (ibid., fol. 439r).

309 Avicenna, *Canon medicinae*, I, 2, 2, 8 (*De accidentibus aeris impressionibus, quae non valde cursui naturae existunt*). I quote from the 1595 reprint of the 1562 Giunta edition, containing Gerard of Cremona’s translation with Andrea Alpago’s emendations.

310 He refers the reader who would wish for a ‘certification’ of the topics addressed in this chapter to ‘the part on natural philosophy’, which may imply that the *Natural Philosophy of The Healing* was already completed when Avicenna wrote this part of the *Canon*, a work whose composition extended upon a very long period of time (from 1012 to 1024).

311 ‘In linea vero aequinoctiali, non est calor illius superfluitatis quam facit oppositio circa revolutionem capitis Cancrī in locis habitatis’ (ibid., p. 103).

312 On their editorial work, see Siraisi, *Avicenna in Renaissance Italy*, pp. 140–43.

313 ‘De ea vero regione quae aequinoctialis vocatur, variae sunt doctorum hominum opiniones, et quaestio non levis est excitata. Quum alii habitari ea posse admittant; alii negent; alii habitari quidem, sed incommode; alii vero coli summo commodo existiment’ (*Annotationes*, in Avicenna, *Canon medicinae*, p. 105).

inhabited³¹⁴; the second, obviously, is that of Aristotle;³¹⁵ the third is that of ‘the moderns’—such as Albert the Great—who ‘testify that it is indeed inhabitable, but with difficulty, because it is not temperate’³¹⁶; and the fourth opinion is held by ‘our author’, Avicenna, ‘who asserted that the equinoxial region is most temperate and hospitable to life’³¹⁷. Thus, Costeo and Mongiò retain the separation made by Averroes between the opinions of Ptolemy and Avicenna.

Of course, not every reader of Averroes was convinced by the Commentator’s rebuttal of Avicenna’s position on the inhabitability of the equatorial zone, as is shown by the letter written in 1514 by the Italian physician Giovanni Manardo or Mainardi (1462–1536) to the German humanist Jakob Ziegler (d. 1549), ‘on the fact that it is possible to live beneath the equinoxial [circle]’³¹⁸. Manardo explains that his attention was drawn upon this question five years before, when he came across Avicenna’s chapter ‘on temperatures’ during his lectures on book I of the *Canon* at the University of Ferrara.³¹⁹ Later he examined diligently and submitted ‘to the examination of experience and reason’ the opinions of Avicenna and of those who felt differently from him.³²⁰ He observes that ‘the navigations of the Portuguese taught us clearly’ that Avicenna was right in arguing that ‘several peoples live beneath the equator’³²¹. Manardo’s conclusion is that ‘there can be no discussion whatsoever’ with those who, ‘granting more authority to Aristotle and Averroes of Cordoba than to factual truth’, refuse to believe ‘the testimony of many trustworthy men who sailed to these places’: the only thing to do with such people is to put them on a boat with the proper nautical instruments and make them go see by themselves, just

314 ‘Ptolemaeus secundo *Almagesti* et secundo *Quadripartiti* posse habitari censuit, nondum tamen habitari eam noverat’ (ibid.). The remark comes from the *Almagest*; see above, n. 286.

315 ‘Aristoteles secundo *Meteorum* non posse sub aequinoctiali circulo habitationem esse censere videtur ...’ (*Annotationes*, p. 105).

316 ‘Recentiores vero coli quidem testantur, sed incommode, quum intemperata sit’ (ibid.).

317 ‘Author noster ... temperatissimam esse regionem aequinoctialem et coli posse disseruit’ (ibid.).

318 Manardo, *Epistolae medicinales*, VII, 1 (*Ad Jacobum Ciglerium, quod sub aequinoctiali est habitatio*), pp. 10–35. The letter was sent from Buda on September 7th, 1514: ‘Ex hospitio nostro Budae, VII Idus Septembris, 1514’ (ibid., p. 35).

319 ‘Cum anno ab hinc quinto primum Avicennae medicinalem librum pro mea professione in Ferraria patriae meae literario gymnasio publice enarrarem, ad idque caput pervenissem in quo de temperaturis agitur ...’ (ibid., p. 10).

320 ‘Consideraremque diligentius, atque sub examen experimenti et rationis ducerem, tam ejus sententiam quam eorum qui secus ac ipse senserant’ (ibid.).

321 ‘Siquidem Lusitanorum ... navigatio clare nos docuit, sub aequatore ... varias gentes habitare’ (ibid., p. 11).

like Aristotle did with ‘those who deny that fire is hot’³²². Manardo seems to refer here to the treatise *On Breath* (now considered spurious), where it is said that ‘we must seek the effects of fire in nature, just as we should in a craft’ like that ‘of the goldsmith, the coppersmith, the carpenter and the cook’, in answer to ‘those who maintain [inaccurately] that heat is not the operative principle in bodies, or that fire has only one motion and potentiality, viz., for disintegration’³²³. Anyway, he makes an ironic use of Aristotle’s authority against the dogmatic supporters of Aristotle, and especially ‘those hard-headed Averroists’ who ‘take everything he said as an axiom’³²⁴, even when it is contrary to ‘experience and reason’.

Another debate grounded upon Avicenna’s *Meteorology*, which lasted well into the early modern period, is the one which focused on the possibility of human spontaneous generation. The starting point was the final chapter of book II of the fifth part of the *Natural Philosophy of The Healing, On the Remarkable Events Happening in the World*, translated into Latin as *On Floods (De diluviis)*.³²⁵ This debate, which has been examined in depth quite recently,³²⁶ shows that Averroes’ ‘deforming report of Avicenna’s position’ about ‘mankind’s rebirth after a catastrophic event like a universal flood’³²⁷ heavily shaped the terms and the theoretical frame of the discussion.

4 Conclusion

In all the polemics mentioned above—on the colours of the rainbow, on transmutations, on life in the ‘torrid’ zone, on human spontaneous generation—, Latin scholars had no other resource, until the last decades of the thirteenth century, than to refer to the two excerpts of Avicenna’s *Meteorology* that had been translated (*On Minerals* and *On Floods*), to other works by Avicenna such as the *Canon of Medicine*, or to indirect reports like those of Averroes. A strik-

322 ‘Quod si quis credere non vult, plus Aristotelis auctoritati tribuens et Averois Cordubensis quam aptae veritati, plurimorum fide dignissimorum virorum testimonio, qui ad ea loca navigarunt, approbatae, cum eo certe non esset aliquo alio modo disputandum, quam eo quo cum negantibus ignem esse calidum disputat Aristoteles, ut scilicet cogeretur cum astrolabio, stilo et abaco illuc navigare, rem ipsam exploraturus’ (ibid.).

323 Ps.-Aristotle, *On Breath*, 485a.

324 ‘Nos tamen ut obiter hosce tam obstinatos Averoicos retundamus, qui quicquid ille dixit axiomatis loco habent’ (Manardo, *Epistolae medicinales*, VII, 1, p. 11).

325 See above, pp. 499–500.

326 See Bertolacci, Averroes against Avicenna, pp. 37–54; see also Perrone Compagni, *Métamorphoses animales*, p. 69, and Hasse, *Spontaneous Generation*, pp. 155–8 (Avicenna), and 158–62 (Averroes).

327 Bertolacci, Averroes against Avicenna, pp. 54 and 42.

ing fact, however, is that the situation did not change, even after a full translation of Avicenna's *Meteorology* was made available.

The fourth and fifth parts of the Natural Philosophy of *The Healing, On Actions and Passions of Elementary Qualities* and *On Minerals and Lofty Impressions*, were put into Latin around the years 1274–80 by Johannes Gualvani with the assistance of a Jew named Solomon, at the request of the bishop of Burgos, together with the other parts of Avicenna's Natural Philosophy which had not been translated until then.³²⁸ This translation does not make clear that what corresponds to Aristotle's *Meteorologica* was spread by Avicenna across the fourth and fifth parts, for it renders the title *On Minerals and Lofty Impressions* as *Libri metheororum*, while the former part is entitled, quite literally, *De actionibus et passionibus qualitatum primarum*.³²⁹ Only one manuscript copy of this translation is extant today, made in Central Italy (Urbino) between 1474 and 1482,³³⁰ the work was never put to print. There was a copy in the Sorbonne library in 1338, but it does not seem to have been put to much use. The translation certainly arrived too late to be influential: at the end of the thirteenth century the Aristotelian corpus was firmly established, and the prestige of Avicenna had already paled due to the rise of Averroes. This translation, it seems, was completely forgotten in the Renaissance, which was not the case with other translations of Avicenna's philosophical works, especially the *Metaphysics* and *On the Soul*, while the translations of the chapters *On Minerals* and, to a lesser extent, *On Floods* remained influential and discussed.

The conviction that Avicenna, as a philosopher, was the greatest 'interpreter' of Aristotle contributed greatly to the initial success of his works in the Latin world. Alfred of Shareshill's insertion of the *De mineralibus* at the end of Aristotle's *Meteorologica* was a high point in this process, going so far as to use Avicenna to fill a gap in Aristotle's corpus. By minimising Avicenna's originality in respect to Aristotle, the same conviction also determined the failed introduction of Avicenna's *Meteorology* as a whole, which remained known only partially, or in an indirect and distorted way.

328 For an outline of the chronology, see Mandosio and Di Martino, La 'Météorologie' d'Avicenne, pp. 408–9.

329 Avicenna, *De actionibus et passionibus* (ed. Van Riet) is available in the series *Avicenna Latinus*; Silvia Di Donato and I are currently preparing the edition of the *Libri metheororum*.

330 MS Rome, Vatican Library, Urb. Lat. 186, fols 140v–173v.

Appendix 1

From Alfred of Sharesill's Commentary on Aristotle's *Meteorologica*³³¹

III, 10 (Capitulum de iride)³³²

[a] Involuta veritas in alto latet, et de malignitate naturae queri non possumus. Omnium autem causa polliceri paria domino sentire est³³³, et divinae intelligentiae aequalem se profiteri³³⁴.

[b] Haec immo dixerim, quia in capitulo de cazuza³³⁵, rerum magnitudine oppressus autem quadam³³⁶ succumbo, nec erubesco cum concessum sit, ipso Aristotele attestante, non intelligenti dicere non intelligo.

[c] Tristor autem maxime cum imitator Aristotelis praecipuus, immo ipso Aristotele excepto, philosophorum maximus Avicenna capitulum istud se nescire fateatur et doleat.

[d] Ostendit tamen Aristoteles quot in ipso arcu fieri possunt colores, causasque eorum nec plane determinat nec reliquit intactas; in quibus etiam regionibus, et quot et quando apparet, et quare semicirculum non excedat, perspicue declarat; quaedam quoque alia quae suo loco dicentur.

[e] Circa colorum autem causas, minus efficax est, quas tamen ipse non ignorasse praesumo, cum ea quae ignoret auctoritate propria non pigritetur dicere quoniam non intelligit.

[f] Nec ego in Arabico super iis quicquam plane evidens inveni, excepto quod Avicenna et Alexander et Tebustus, Alfarabius ceterique nonnulli, Aristotelis verba vigilantia studio longa attritione digerentes, quaedam non ad perspicuae lucis intelligentiam laboriose expresserunt; quorum ego dicam tam in hoc capitulo quam in praecedentibus subsequentibusque.

[g] Et super quosdam alios Aristotelis libros de philosophia, quorum etiam aliquos de Arabico in Latinum transtuli, quanta potui brevitate collegi. Omnium ergo communis compositio est. [...]

331 *Alfredi commentarius in IV libros Meteororum Aristotelis*, ed. Otte, pp. 50 (§§a–g) and 51 (§§h–j), reproduced with emendations and revised punctuation. To facilitate reference (see above, pp. 501–2), I divided the text in small sections. I had some hesitation whether to mention or not the appalling partial translations given by the editor in the annotation (pp. 83–5), but since they accompany the text of Alfred's commentary, the readers should be warned about them. Otte's limited understanding of Latin explains many shortcomings of his edition. In some cases, the quotations made by Ralph of Longchamp in his commentary on Alan of Lille's *Anticlaudianus* (see below, Appendix 2) helped restore the original text, garbled beyond recognition either by medieval copyists or by the editor's misreadings.

332 According to Alfred's own indications (§§i–j), this chapter heading should be *Capitulum de cazuza*.

333 Omnium autem causa non polliceri propria domino sentire est *Otte* (*corr. after Ralph of Longchamp*).

334 protectum *Otte* (*corr. after Ralph of Longchamp*).

335 casquara *Otte*; casquaza *Ralph of Longchamp*; cazuza *Alfred of Sharesill* (§§i–j).

336 quodam *Otte*.

[h] Nomen autem iris naturae incidit obscuritas. Iris enim apud Graecos idem est quod arcus daemonis. Arabes quoque ipsum³³⁷ cascuza, quod et idem sonat appellant. Daemon autem idem sonat quod angelus. Dicitur ergo iris sive cascuza, id est arcus angelicae considerationis, tanquam ad ejus notitiam humanus non ascendit intellectus.

[i] Negat tamen magister meus Salomon Avenraza, et Israelita celeberrimus et modernorum philosophorum praecipuus, debere dici cascuza, set cazcuza, ut scilicet ultima primae³³⁸ syllabae sit z; quod interpretatur arcus multicolor sive arcus varius.

[j] Et quod hoc nomen irim sonare autumat, et quoniam dictis illius plurimam³³⁹ fidem habeo, capitulo titulum secundum ipsam interpretationem praeposui. [...]

Chapter on the Rainbow

[a] The convoluted truth is hidden up on high, and we cannot complain about the malignity of Nature³⁴⁰. To promise the cause of everything is to know things as the Lord does, and to consider oneself equal to the Divine Intelligence³⁴¹.

[b] Nay, I may have said that because, in the chapter on *cazcuza*³⁴², overwhelmed, as it were, by the grandeur of the subject, I am defeated³⁴³; and I am not ashamed of it, since,

337 ipsam *Otte*.

338 prima *Otte*.

339 plurimum *Otte*.

340 *Otte*'s translation is inaccurate: 'Secret truth lies concealed on high, and we are not able to learn about the evilness of nature'. The meaning of the sentence is that human understanding is naturally limited, as a consequence of the original sin; therefore humans 'cannot complain about the malignity of Nature', for it is not by Nature's decree that they have been deprived of the capacity of knowing everything, but by their own fault.

341 Alfred may have in mind Aristotle, *Metaphysics*, A, 2, 983a: '... for God is thought to be among the causes of all things and to be a first principle, and such a science either God alone can have, or God above all others.' *Otte*'s edition of this sentence makes no sense, and his translation is shockingly incoherent ('The cause of everything cannot be promised, it is proper to God to perceive with the senses [!!], and the same of divine intelligence itself having been protected').

342 *Qaws quzah* ('iridescent bow') is the Arabic name of the rainbow, whose etymology is discussed later by Alfred (§§h–i). The 'chapter on *cazcuza*' refers to the part of Gerard of Cremona's translation of Yahyā al-Biṭrīq's abridgment of Aristotle's *Meteorologica* (*Liber Aristotelis ... in factura impressionum*, III, §§7–9, pp. 124–38) called *Discourse on the Variegated Rainbow* (*Sermo de vario iri*). It corresponds to several chapters of Aristotle's Greek text, in which the halo and the rainbow are mostly treated together (*Meteorologica*, III, 2, 4, 5), while al-Biṭrīq separates them (the halo is dealt with in III, 6 [*Sermo de alilati*], pp. 122–4).

343 Alfred means that, being unable to understand Aristotle's theory of the rainbow because the subject was too great for him, he minimised his own deficiency by starting his chapter with a general statement on man's inability to understand elevated things. The nature of the rainbow is so enigmatic that it eluded Avicenna (§c) and the whole Peripatetic school (§f),

as Aristotle himself testifies, he who doesn't understand is allowed to say 'I don't understand'³⁴⁴.

[c] I am saddened, above all, when the foremost imitator of Aristotle, truly the greatest of all philosophers (Aristotle excepted), Avicenna, admits and regrets that he doesn't comprehend this chapter³⁴⁵.

[d] Aristotle shows how many colours may be produced in a rainbow, but he doesn't plainly determine their causes, although he doesn't leave them untouched,³⁴⁶ however, he explains clearly in what places and when does a rainbow appear³⁴⁷, how many [rainbows may appear at the same time]³⁴⁸, and why the rainbow doesn't exceed a semicircle³⁴⁹; and also other things which shall be told in due time.

[e] It is on the causes of colours that he is the least convincing, although I presume that he wasn't ignorant of them, since about the things he doesn't know he is not afraid to say, on his own authority, that he doesn't understand them³⁵⁰.

[f] As for me, I haven't found anything plain and clear about them in Arabic, except that Avicenna, Alexander, Tebustus³⁵¹, Alfarabi and some others who assimilated the words

while Aristotle is given the benefit of the doubt. Its usual names supposedly refer to some demonic or angelic conception or contemplation (§h), thus confirming the disarray of the human mind in front of this disconcerting phenomenon. There is a pun on 'the convoluted truth hidden up on high', alluding not only to God's mysterious ways, but also to the incomprehensible explanation of the rainbow, 'shrouded in the obscurity' (§h) of cloudy and rainy skies. Otte missed the point completely: he believes that *Haec immo dixerim* ('Nay, I may have said that ...') means that Alfred 'has said this in contradiction', as if to justify the nonsensical English rendering of §a.

344 This may be a reminiscence of Aristotle, *Metaphysics*, A, 2, 982b: 'For it is owing to their wonder that men both now begin and at first began to philosophize ... And a man who is puzzled and wonders thinks himself ignorant ...; therefore since they philosophized in order to escape from ignorance, evidently they were pursuing science in order to know, and not for any utilitarian end.' There probably is a closer textual source which I couldn't identify.

345 Avicenna, *Ma'adin*, II, 3 (*On the Halo and the Rainbow*); see above, pp. 468–9. Unaware of the fact that Alfred refers to actual Avicennan statements, Otte is puzzled by this 'long, rather strange account of Avicenna'.

346 Aristotle, *Meteorologica*, III, 2, 372a, and 4, 374b–375a. Cf. Gerard's translation, p. 126 and 130–34.

347 Ibid., 4, 373a–374b ('in what places'); 2, 371b and 372a ('when'). Cf. Gerard's translation, pp. 128–30, 132–4 and 138 ('in what places'); pp. 126, 128, 130 and 138 ('when').

348 Ibid., 2, 371b; 4, 375a–b. Cf. Gerard's translation, p. 126.

349 Ibid., 2, 371b, and 5, passim. Cf. Gerard's translation, p. 132 (the geometrical demonstrations from Aristotle's chapter 5 are absent from al-Biṭrīq's abridgment).

350 This is in accordance with the maxim quoted above, §b. Otte mistranslates: 'I presume Aristotle not ignorant in these, because one who ignores proper authority is not slow to speak'.

351 This name, obviously corrupted, was tentatively identified with Themistius by Otte, but it is more likely to be Theophrastus, as Resianne Fontaine suggested during the 2013 Avicennan conference in Villa Vigoni.

of Aristotle through attentive study and a long familiarity³⁵², expressed laboriously some things [on the subject] without coming close to the bright light of intellection³⁵³. Of these I speak in this chapter and in the preceding and following ones as well³⁵⁴.

[g] And on certain other books by Aristotle on philosophy, some of which I even translated from Arabic into Latin³⁵⁵, I brought together as briefly as I could [what the interpreters said]³⁵⁶. Therefore the composition is common to them all³⁵⁷. [...]

[h] The name [of the] rainbow is shrouded in the obscurity of its nature. For *iris*³⁵⁸, among the Greeks, means ‘demon’s bow’³⁵⁹. The Arabs call it *cascuza*, because it has the same meaning³⁶⁰; for ‘demon’ means the same as ‘angel’³⁶¹. Therefore it is called *iris* or *cascuza*, that is, ‘bow of angelic contemplation’, as if to say that the human intellect doesn’t ascend to its comprehension.

[i] However, my master Salomon Avenraza, both a very famous Jew and the foremost among modern philosophers, argues that it shouldn’t be spelled *cascuza* but *cazcuza*, so that the last letter of the first syllable be *z*; it translates as ‘multicoloured bow’ or ‘variegated bow’³⁶².

352 Otte believes that here ‘Alfred also tells us how he has carefully studied the words of Aristotle “in long chastisement”’.

353 Literally ‘without coming close to the intelligence of bright light’. There is a little pun here, for the rainbow is caused by the reflection (i.e. refraction) of sunlight on drops of water. To misunderstand the rainbow theory, thus, would be to miss ‘the intelligence of bright light’. Throughout this chapter of his commentary, Alfred plays on the contrast between light and obscurity (see §h; other instances appear in passages not reproduced here).

354 What Alfred seems to mean here is that he refers to the opinions of the interpreters throughout his commentary, and not only in this chapter. Otte’s translation, once more, doesn’t make sense: Avicenna and the others ‘don’t express laboriously with intelligence of great light, of what I spoke in this chapter, the previous, and following ones’.

355 Alfred translated the pseudo-Aristotelian treatise *On Plants (Liber de vegetabilibus)*, and the chapters *On Minerals (De mineralibus)* excerpted from Avicenna’s *Book of the Healing*.

356 Alfred means that he enriched his commentary on *Meteorologica* by taking the interpretative tradition of other Aristotelian works into account.

357 This cryptic sentence probably means that Alfred’s commentary includes all the passages of Aristotle’s works in which the topics addressed in *Meteorologica* are touched upon; therefore, it is not only a commentary on this single work but on the other related works as well. Not surprisingly, Otte misses the point and translates: ‘How much I was able to collect briefly, is the general composition of all’.

358 *Iris* is the Greek and Latin name for the rainbow.

359 In Greek mythology, Iris was a messenger of the gods, and therefore a demon in Christian terms, as all pagan characters – even though technically she was an ‘angel’ (ἄγγελος, messenger).

360 *Quzah* was a pre-Islamic god of storms and thunder, and therefore a demon in Islamic terms. *Qaws Quzah* would then be ‘Quzah’s bow’.

361 In the Platonic tradition, demons are intermediate beings between gods and humans; in the Jewish, Christian and Islamic traditions, angels play more or less the same part, as ‘messengers’ who bring divine revelations to mankind.

362 *Qaws quzah* appears as ‘variegated bow’ (*arcus varius*) in some manuscripts of Gerard of Cremona’s translation, and as ‘demon’s bow’ (*arcus daemonis*) in others; see Schoonheim’s

[j] Thus, because this name asserts the rainbow³⁶³ and since I have much faith in what he [Avenraza] says³⁶⁴, I placed at the head of this chapter a title in agreement with this interpretation³⁶⁵. [...]

edition, pp. 126, 132, 134, 136 and 138. These two different versions show that Gerard first translated *qaws quzah* as *arcus daemonis*, later replaced by *arcus varius* – the reading retained by Schoonheim (see his list of Arabic roots, p. 198) – when the translation was revised, either by himself or more probably by Alfred of Shareshill, taking advice from Avenraza, as he tells us here. On this revision, see above, pp. 494–5.

363 Alfred means that the word *qaws quzah*, when it is spelled *cazcuza* according to Avenraza's indications, is more akin to what the rainbow really is (an iridescent bow) than *cascuza* (a demonic or angelic bow). The implication is that figurative appellations are inappropriate in the study of natural philosophy; hence the revision of Gerard's translation.

364 The link supposedly established by Avenraza between the two spellings and the two meanings of *qaws quzah* doesn't make sense, for the significant word here is not *qaws* ('bow') but *quzah*, interpreted either as 'demon' or 'iridescent'. Alfred's remembrance of Avenraza's teaching seems to be a bit blurred.

365 Otte's translation is garbled: 'And since I have much faith in what was said, I have offered the title according to the same interpretation in this chapter.'

Appendix 2

Ralph of Longchamp's Citations from the *Libri meteororum*
Attributed to Avicenna by Mistake³⁶⁶

Ralph of Longchamp

[a] Quandoque etiam fit [motus terrae], *ut dicit Avicenna*, ex vento per actionem solis in ventre terrae generato, qui ventus agitur et tendit ad exitum, sicut et ventus in ventre hominis inclusus.

[b] Quod autem nubes quandoque videntur nigrae, quandoque rubeae, quandoque virides, quandoque albae, provenit ex spissitudine et tenuitate earundem. Cum enim spissae sunt, *ut dicit Avicenna*, non recipiunt radios solis, quare videntur nigrae. Si autem tenues sint et non coarctantur in suis partibus, radios solis recipiunt et sunt albae. Nubes autem rubeae et illae quae sunt ad viriditatem sunt inter albas et nigras.

Libri meteororum

[a] Quandoque etiam huiusmodi vapor in interioribus terrae compressus, multa repercussione vehementer agitur³⁶⁷. [...] quod accidit de diversitate agitationis venti occultati in terra, et sicut homo non potest retinere ventum agitatum in ventre suo³⁶⁸.

[b] Dico autem quod videmus nubes nigras quandoque, quod est quando agit in eas caliditas operationem vehementem, quoniam constringit eas et inspissant partes earum. Quare non recipiunt radios solis, ergo videntur nigrae. Nubes autem rubeae et illae quae sunt ad viriditatem sunt inter nigras et albas. Nebula autem alba est existens quando non potest in ea operatio ignis, quare remanet non adusta neque coarctatur in partibus suis. Ergo recipit radios solis et videtur propter illud alba. Et operatio caliditatis in nube rubea est plus operatione sua in alba. Et operatio sua in illa quae est ad viriditatem est supra operationem suam in nigra³⁶⁹.

366 Radulphus de Longo Campo, *In Anticlaudianum Alani commentum*, ed. Sulowski, pp. 33 (§a), 90 (§b), 92 (§c), and 93 (§d). See above, pp. 503–4.

367 *Alfredi commentarius*, III, 8, p. 49. Otte placed Alfred of Shareshill's chapter on earthquakes in book III, but it actually belongs to book II, as in Aristotle's original text (see above, p. 464) and in Gerard's translation, to which it is associated (see the following note).

368 *Liber Aristotelis ... in factura impressionum*, II, 8 (*Sermo in terrae motu*), p. 104.

369 *Ibid.*, III, 5 (*Sermo de colore nubium*), p. 122.

[c] *Unde Avicenna*: Pluvia et ros differunt paucitate et multitudine, quoniam ros pluvia est pauca, pluvia est ros multus. Propterea quod pluvia non fit nisi ex vapore multo, qui jam in frigidatus est. Vaporis autem remanentia dies³⁷⁰ est unus, locus strictus et parvi frigoris.

[d] Mollities autem nivis fieri, *ut dicit Avicenna*, ex parte caliditatis admixtae vaporibus qui facti sunt nubes, prohibentes partes illius inspissari et vehementer aggregari.

[c] At vero corpora descendunt ex aere sunt duo corpora similia, quoniam causa generationis utrorumque est una, et non diversificantur nisi paucitate et multitudine tantum, et sunt nix et pruina. Et similiter etiam pluvia et ros, quoniam ros pluvia est pauca, et pluvia est ros multus, propterea quod pluvia non fit nisi ex vapore multo, qui jam in frigidatus est. [...] Roris autem remanentia dies est unus, et locus ejus est strictus, parvi frigoris³⁷¹.

[d] Et significatio illius est mollities nivis et durities pruinae, quoniam mollities nivis fit ex parte caliditatis admixtae vaporibus qui facti sunt nubes, prohibentes³⁷² partes illius vaporis inspissari³⁷³ et vehementer aggregari³⁷⁴.

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³⁷⁰ dictus Sulowski.

³⁷¹ Ibid., I, 7 (*Rememoratio loci secundi aeris elevati super terram in nebula et pluvia et rore et pruina et grandinis*), pp. 38–40.

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³⁷³ inspissati Schoonheim.

³⁷⁴ Ibid., I, 7, p. 40.

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