Avicenna

The Physics of *The Healing*

Books I & II

A parallel English-Arabic text
translated, introduced, and annotated by

Jon McGinnis



ISLAMIC TRANSLATION SERIES

THE PHYSICS OF *THE HEALING*

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BOOKS I & II

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Avicenna

The Physics of *The Healing*

الشفاء: السّماع الطبيعي

Books I & II

A parallel English-Arabic text
translated, introduced, and annotated by

Jon McGinnis

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First Edition

To

EVERETT ROWSON

and

JAMES ROSS

for teaching me how to read Avicenna's Physics

and how to appreciate what I read

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Foreword to the Series

Brigham Young University and its Middle Eastern Texts Initiative are pleased to sponsor and publish the Islamic Translation Series (ITS). We wish to express our appreciation to James L. and Beverley Sorenson of Salt Lake City for their generous support, which made ITS possible, and to the Ashton Family Foundation of Orem, Utah, which kindly provided additional funding so that we might continue.

Islamic civilization represents nearly fourteen centuries of intense intellectual activity, and believers in Islam number in the hundreds of millions. The texts that appear in ITS are among the treasures of this great culture. But they are more than that. They are properly the inheritance of all the peoples of the world. As an institution of The Church of Jesus Christ of Latter-day Saints, Brigham Young University is honored to assist in making these texts available to many for the first time. In doing so, we hope to serve our fellow human beings, of all creeds and cultures. We also follow the admonition of our own tradition, to "seek . . . out of the best books words of wisdom," believing, indeed, that "the glory of God is intelligence."

—Daniel C. Peterson
—D. Morgan Davis

Foreword to the Volume

The Kuwait Foundation for the Advancement of Sciences (KFAS) is a leading institution in the Arab world that provides support for scientific projects and activities. KFAS publishes scientific books that are either originally written in Arabic or are translated into Arabic. These publications provide valuable information to scientists and researchers. In this regard, KFAS concentrates on publishing Arabic and Islamic scientific works, shedding light on the contribution of Islamic scientists and scholars to the development of science and technology throughout the whole world.

In its aim of furthering science and technology, KFAS has always been active in cooperating with other institutions of higher learning, both locally and internationally. The cooperation between KFAS and Brigham Young University to introduce the remarkable scientific achievement of the *Physics* by the famous scholar Ibn Sīnā (Avicenna) is a successful example of such collaboration. By sponsoring the publication of this text, which is a part of Ibn Sīnā's book *The Healing,* KFAS aims to highlight the singular achievements and contributions of Islamic intellectuals to important fields of knowledge such as physics. In doing so, KFAS is actually introducing to scientists and researchers all over the world the views and findings of men of learning who sought knowledge about the natural world during the golden age of Islamic civilization.

This translation of the *Physics* is the first full English translation that has ever been done from the text that was originally written in Arabic by Ibn Sīnā. It primarily concerns the study of natural motion, as opposed to metaphysics or cosmology. Some of his thinking in these areas has been heavily criticized by many Islamic scholars, but at the same time it has also gained support from others. The sponsorship by KFAS of this volume should in no way be viewed as an endorsement of

Ibn Sīnā's metaphysical or philosophical system. It is, rather, a proof of the Foundation's commitment to raise awareness throughout the world of important Islamic contributions to the history of science, as Muslims throughout the ages have sought knowledge and learning.

—Director General
Kuwait Foundation for the Advancement of Sciences

مقدمة

تعد مؤسسة الكويت للتقدم العلمي إحدى المؤسسات الرائدة في العالم العربي في دعم المشاريع العلمية. وهي تعمد في هذا الإطار إلى نشر الكتاب العلمي العربي بهدف دعم المكتبة العربية بالمؤلفات والترجمات، حيث تقدم المؤسسة خدمة جليلة للقارئ والباحث العربي بما يعينه على البحث والعلم والمعرفة. وتولي المؤسسة اهتماما بالغا بنشر كتب التراث العلمي العربي والإسلامي، والتي تلقي الضوء على مساهمات العلماء العرب والمسلمين والتي كان لها أثر بالغ في تطوير العلوم.

والمؤسسة تسعى لتعزيز التعاون بينها وبين العديد من المؤسسات العلمية الأخرى على المستويين المحلي والدولي لتحقيق أهدافها من أجل نشر المعرفة العلمية. وكان من ثمرة هذا التعاون المميز المشروع المشترك بين المؤسسة وجامعة برغهام يونغ، حيث يقدم المشروع عملا مميزا لأحد أعلام الفكر الإسلامي في عهد يعج بالعلماء المسلمين الأفذاذ من أمثال ابن سينا وكتابه «الطبيعيات» الذي هو جزء من كتابه الكبير «الشفاء» ليكون مثالا لجهود علماء المسلمين في ذلك العصر وتأثيرهم في الفكر الإنساني.

والمؤسسة إذ تساهم في هذا الإصدار المميز لابن سينا في مجال الفيزياء «الطبيعيات» فإنها تقدم للباحثين والمهتمين في مختلف أنحاء العالم نتاج أحد أبرز العلماء

خلال عصر النهضة الإسلامية، ليكون هذا الإصدار الأول من نوعه في العالم لترجمة كتاب «الطبيعيات» لابن سينا إلى اللغة الانجليزية. وقد اقتصرت الترجمة على علم الفيزياء عند ابن سينا من الكتاب و خصوصاً في حركة الأجسام الطبيعية و ذلك لإبراز الجانب العلمي عنده، دون تبني أو الخوض في تفاصيل آرائه في ما فوق الطبيعة أو فكره الفلسفي والذي كان له العديد من المعارضين والأنصار سواء في العالم الإسلامي أو الأجنبي، حيث استمر هذا التأثير من تأييد ومعارضة إلى يومنا هذا.

وتأتي مساهمة المؤسسة في هذا الإصدار لإبراز دور العلماء المسلمين في نشر الثقافة والمعرفة العلمية التي كتب العديد منها باللغة العربية في حينها، وإيمانا من المؤسسة بالدور الذي تلعبه الترجمة في التواصل بين الحضارات وبناء الجسور بينها.

المدير العام
مؤسسة الكويت للتقدم العلمي

Acknowledgments

My love affair with Avicenna's *Physics* began while I was still a graduate student. Thus, my debt to individuals and institutions alike goes back many years. I would first like to thank all those on my dissertation committee who read through the nearly five-hundred-page behemoth that was my dissertation and included a translation of 2.10–13 of Avicenna's *Physics.* These include Susan Sauvé Meyer, Gary Hatfield, Everett Rowson, and James Ross. I am particularly thankful to Everett Rowson for the countless hours he spent reading Avicenna's Arabic with me and to James Ross, who, although he does not know Arabic, immensely improved my translation by his constant admonition, "This translation cannot be right; Avicenna's smarter than that!" (Jim, as far as I can tell, was always right.) From my Penn days, I would also like to thank Susan Peppers, Todd Bates, and Shane Duarte for their never-ending willingness to talk about natural philosophy, and philosophy more generally, whether ancient, medieval, or early modern.

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On the institutional front, I would like, first, to acknowledge the University of Missouri–St. Louis for two summer grants that supported my initial translation of book 2. Additionally, I would like to thank the Center of International Study at UM–St. Louis for the significant travel support they have provided me over the years that has allowed me to present my work on Avicenna's *Physics* at conferences both here and abroad. I am also very grateful for the support offered by two University of Missouri system-wide Research Board awards that allowed me time off to work on the present translation. Beyond the local level, I was blessed with a National Endowment for the Humanities summer stipend and two NEH fellowships, all of which allowed me to focus on Avicenna's *Physics*. One of the NEH Fellowships additionally provided for my expenses while I was a member at the Institute for Advanced Study in Princeton, whose staff and permanent members I also want to thank for the intellectually stimulating environment that they have created, and where I was able to work on parts of books 1 and 4 uninterrupted.

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Translator's Introduction

Unlike Avicenna's metaphysics, philosophical psychology, and even logic, his natural philosophy—that is his general physics—has received relatively little attention.[1] One indication of the discrepancy in scholarly interest is that while the *Metaphysics* (*Kitāb al-ilāhīyāt*) of Avicenna's voluminous *The Healing* (*Kitāb al-shifāʾ*) has six translations in European languages—a medieval Latin translation (ed. S. Van Riet), as well as modern translations into German (Horten), French (Anawati), two Italian (Lizini and Porro, and Bertolacci), and English (Marmura)—the *Physics* (*Kitāb al-samāʿ al-ṭabīʿī*), in contrast, was never completely translated into Latin and has received modern translations only into Persian and Turkish.[2] While Avicenna's *Physics,* for whatever reasons,

1. I am happy to say that since the 1980s, there has been a gradually increasing interest in Avicenna's *Physics.* This new trend was spearheaded by Aydın Sayılı ("Îbn Sınâ and Buridan on the Dynamics of Projectile Motion," in *Îbn Sınâ, Doğumunum Bininci Yılı Armağanı,* ed. A. Sayılı, [Ankara: Türk Tarih Kurumu Basımevi, 1984]) and even more so by Ahmad Hasnawi ("La dynamique d'Ibn Sīnā (la notion d'"inclination": *mayl*)," in *Études sur Avicenne*, ed. J. Jolivet and R. Rashed, Collection Sciences et philosophies arabes (Paris: Les Belles Lettres, 1984), 103–23; "Le mouvement et les catégories selon Avicenne et Averroès l'arrière-fond grec et les prolongements latins médiévaux," *Oriens-Occidens* 2 (1998): 119–22; "La définition du mouvement dans la 'Physique' du Shifāʾ d'Avicenne," *Arabic Sciences and Philosophy* 11 (2001): 219–55; "La *Physique* du *Shifāʾ*: Aperçus sur sa structure et son contenu," in *Avicenna and His Heritage; Acts of the International Colloquim … 1999,* Ancient and Medieval Philosohpy, ser. 1, 28, ed. Jules Janssens and Daniel de Smet (Leuven, Belg.: Leuven University Press, 2002), 678–80; "Le statut catégorial du mouvement chez Avicenne: Contexte grec et postérité médiévale latine," in *De Zénon d'Élée à Poincaré: Recueil d'études en hommage à Roshdi Rashed,* ed. R. Morelon and A. Hasnawi, Les cahiers du MIDEO 1 (Leuven, Belg.: Peeters, 2004), 607–22).

2. The Persian translation is from 1937 by Muhammad Farūghī; and, more recently, there is the Turkish translation by Muhittin Macit and Ferruh Özpilavci (Istanbul: Litera Yayincilik, 2004–2005).

has not fascinated most students of the great Muslim sage, the paucity of work dedicated to it has, in my opinion, impoverished Avicennan studies generally. That is because the *Physics* frequently provides the basis for a full appreciation and proper understanding of many of Avicenna's advancements in other fields. It presents the language, concepts, and presuppositions for the special sciences within natural philosophy, such as the study of the soul. Similarly, it raises the puzzles that were to become the issues and themes central to Avicenna's metaphysics—and in many cases, even offers the first pass at their solutions.

A few examples from his psychology and metaphysics might make this abstract point a bit more concrete. One of the distinguishing characteristics of Avicenna's psychology—at least among medieval theories of the soul—is its substance dualism. For Avicenna, the human intellect is not the form of the body, but an immaterial substance that is the perfection of the body and that uses the body as a tool. In his *Psychology* (*Kitāb al-nafs*) (5.2), Avicenna attempts to demonstrate this claim; and as part of his proof, he shows that what receives intelligible objects—the intellect—cannot be material and indivisible. In the *Psychology* itself, he sketches the argument against this position only loosely and refers his reader back to his *Physics* for the full account. While the argument in the *Psychology* can appear quite baffling, it is in fact merely a truncated version of his fully articulated refutation of atomism from books 3.3–5 of his *Physics.* Thus, while it might be quite difficult on the basis of the *Psychology* passage alone to see that he is arguing against an atomist's account of the soul, a position associated with certain *mutakallimūn,* it is obvious if one has read his *Physics.* In this case, a knowledge of the *Physics* helps one understand Avicenna's argument as well as its place in the history of psychology.

Another example from psychology concerns the role and function of Avicenna's celebrated doctrine of the estimative faculty (*wahm*). Concerning this internal faculty, there has been some scholarly dispute: does it function primarily as animal instinct,[3] or does it have a more robust role in Avicenna's thought?[4] Certainly, in his *Physics,* Avicenna gives it a much greater cognitive role than mere instinct. In fact, *wahm*

3. Dag N. Hasse, *Avicenna's "De anima" in the Latin West: The Formation of a Peripatetic Philosophy of the Soul, 1160–1300,* Warburg Institute Studies and Texts 1 (London: The Warburg Institute; Turin: Nino Aragno Editore, 2000), 127–41.

4. Deborah L. Black, "Estimation in Avicenna: The Logical and Psychological Dimensions," *Dialogue* 32 (1998): 219–58.

and its cognates are Avicenna's preferred vocabulary for setting up so-called thought experiments throughout the *Physics.* Indeed, he makes it the faculty that tracks what initially appears to the human intellect to be possible, even if not always indicating real possibility. Here, then, seeing how Avicenna actually employs the estimative faculty in physical investigation, beyond relying merely on his formulaic examples from his *Psychology,* provides one a deeper insight as to how he envisions the role of this faculty.

As for his metaphysical thought, Avicenna raises literally scores of problems in his *Physics* whose answer he defers to first philosophy. Thus, a proper appreciation of many of the problems treated in his *Metaphysics* requires an understanding of the physical theory or issues that gave rise to them. Certainly, one of the more apparent cases is Avicenna's distinction between "metaphysical causation" as opposed to mere "physical causation." In both the *Physics* and the *Metaphysics,* Avicenna dedicates an entire book to the causes. If I may resort to a bit of "bean counting" to suggest the significance of the *Physics* for understanding Avicenna's theory of causation, I would note that while the relevant book from the *Metaphysics* consists of six chapters, totaling altogether around thirty-five pages, the corresponding book from the *Physics* on the causes and principles of natural things consists of fifteen chapters, coming in at around one hundred pages. Moreover, despite his constant refrain that "these issues are better treated in First Philosophy," the pages of the *Physics* are nonetheless filled with material vital for reading and interpreting Avicenna's conception of metaphysical causation, since he regularly contrasts the physical causation that he is discussing with metaphysical causation. (See especially his account of the efficient and final causes in 1.2 of his *Physics,* but elsewhere as well.) Indeed, even the Necessary Existent in itself makes an appearance when Avicenna provides his own unique interpretation of Parmenides (see 1.4).

Perhaps an even more telling example of metaphysical doctrines that are foreshadowed in the *Physics* is Avicenna's arguments concerning the age of the world and those arguments' reliance on his analysis of possibility (3.11). While today we may think that issues associated with temporal topology (as, for example, "What was there before the Big Bang?") belong to metaphysics or theoretical cosmology, for those working in the ancient and medieval Aristotelian tradition—as Avicenna in a real sense was—this topic fell squarely within the science of physics, or natural philosophy. Thus, while Avicenna does have a strictly

"metaphysical" argument for the eternity of the world based upon divine immutability, which he gives only in his *Metaphysics,* he also has two modal proofs for the eternity of the world developed in his *Physics:* one showing that change presupposes the possibility for change and that the possibility for change requires pre-existent matter as a subject; and another that draws upon his unique and provocative analysis of time in terms of possibility. Indeed, his discussion of possibility throughout his *Physics* sheds much light on his corresponding treatments of possibility, power, and potency throughout the *Metaphysics.*

The above is merely intended to give one a taste for the important role that Avicenna's physical theory plays in an overall appreciation of his philosophical synthesis and system. By no means have I exhausted all the instances where an understanding of Avicenna's natural philosophy provides a deeper insight into other areas of his thought. Similarly, I do not make any claim to having uncovered the most important cases. Hopefully, though, I have piqued some interest.

It is also worth noting that Avicenna's treatment of issues physical was arguably the most creative, well conceived, and overarching in all of the medieval Arabic-speaking world. Thus, in addition to aiding our understanding of other facets of Avicenna's thought, a careful study of Avicenna's *Physics* will provide historians of science with a more complete understanding of the history of physics and natural philosophy in general, and particularly its development in the medieval Islamic milieu.[5]

There can be no question that Avicenna's physical theory is deeply indebted to Aristotle's *Physics* and other physical writings by Aristotle such as *On the Heavens, On Generation and Corruption,* and the *Meteorology.* In fact, Avicenna tells us in his preface that he is intentionally going to follow the order of presentation followed by the Peripatetics. There also seems little doubt that he drew on the commentary traditions that grew up around Aristotle's *physica.* Thus, one sees in Avicenna's *Physics* hints of Alexander of Aphrodisias, Themistius, and other Greek Aristotelian commentators alongside Abū Bishr Mattá and Yaḥyá ibn ʿAdī, among Peripatetics working in Arabic. Most significantly, however, one sees the influence of the Neoplatonist John Philoponus (ca. 490–570s)—both his *Physics* commentary and his *Contra Aristotelem* (that is, at least based upon what we know from the fragments of that now-lost work). Sometimes

5. For a discussion of Avicenna's significance as a historian of science, see Jules Janssens, "Ibn Sînâ: An Extraordinary Historian of the Sciences," paper presented at the Ibn Sīnā Symposium, Istanbul, Turkey, May 2008, forthcoming.

Philoponus is an object of criticism, as, for example, in Avicenna's refutation of the interval (Grk. *chōra,* Arb. *buʿd*) (2.8), but sometimes he is a source of inspiration, as, for instance, in Avicenna's defense of inclination (Grk. *rhopē,* Arb. *mayl*) or acquired power (4.8 and 12). Additionally, one sees Avicenna addressing issues raised by more thoroughgoing Neoplatonic works, such as the *Enneads* of Plotinus (204–270), a redacted version of which Avicenna knew under the pseudoeponymous title the *Theology of Aristotle.*[6] Avicenna similarly incorporates the medical works of Galen, the astronomical works of Ptolemy, and the works of other Greek intellectual luminaries into his overall physical theory.

The sources upon which Avicenna drew for his *Physics,* however, were by no means limited merely to Greek ones. He likewise knew and responded to works of Arabic composition. Thus, along with al-Kindī, al-Fārābī, and the Baghdad Peripatetics, Avicenna seems to have been intimately familiar with the thought of Abū Bakr Muḥammad al-Rāzī (ca. 864–925 or 932) and particularly with his theory of time as an eternal substance (see 2.10).

Equally of interest to the historian of science is Avicenna's impressive knowledge of *kalām* Atomism, discussions of which permeate the first half of book 3. Indeed, not only does Avicenna rehearse many of the *kalām* arguments found in the notable studies of this topic by Shlomo Pines (1936; 1997), Alnoor Dhanani (1994), and more recently, A. I. Sabra (2006), but he also presents arguments not catalogued by these scholars. In the same vein, Avicenna is conversant with the thought of the anti-Atomist *mutakallim,* Ibrāhīm al-Naẓẓām, and quite likely had read the latter's *Book of the Atom* (*Kitāb al-juzʾ*), now no longer extant. All in all, then, Avicenna's *Physics,* and especially book 3, makes an excellent additional source for the study of Islamic Atomism.

Moreover, Avicenna knew and responded to a growing trend in medieval Islamic courts to mathematize problems in natural philosophy—that is, to consider natural things not only qualitatively, but also quantitatively.[7] One example of Avicenna's knowledge of this newly

6. For a discussion of Plotinus's influence in the Arabic-speaking world, see Peter Adamson, *The Arabic Plotinus: A Philosophical Study of the 'Theology of Aristotle'* (London: Duckworth, 2002).

7. For a general discussion of the application of mathematics to so-called physical problems, see Roshdi Rashed, "The Philosophy of Mathematics," in *The Unity of Science in the Arabic Tradition; Science, Logic, and Their Interactions,* ed. S. Rahman, T. Street, and H. Tahiri Logic, Epistemology, and the Unity of Science 11(Dordrecht, Germany: Springer, 2008), 155–84.

emerging approach to physical theory is his awareness and use of the method of projection (2.8) as part of his criticism of an infinite void.[8] Another example is his careful and tentative comments on the issue of the *quies media*, the topic of whether a stone, for example, when it is thrown upward must come to rest at the apex of its motion before turning downward (4.8).[9] Finally, while his criticism of certain commonly accepted mathematical formulas for the relations between power exerted and the time and/or distance of the motion produced (4.15) may give the impression that Avicenna is opposed to the application of mathematics to physics—and indeed, in a certain sense he was—his real objection was that these overly simplistic formulas failed to do justice to the actual complexity of the physical phenomena they intended to explain. Consequently, they did not provide the desired necessity that is the hallmark of demonstrative science, at least in Avicenna's mind.

All of these examples, then, hopefully give witness to Avicenna's knowledge of and role in the emergence of this nascent quantified physics: Despite all the sundry influences coming together in Avicenna's *Physics*—or perhaps more precisely because of them—Avicenna's natural philosophy defies being classified as simply either "Aristotelian" or "Neoplatonized Aristotelianism." It is perhaps simply best to say that Avicenna's natural philosophy is "Avicennan." Michael Marmura's elegant comments about Avicenna's *Metaphysics* apply equally to his *Physics:* "The conceptual building blocks, so to speak, of this system are largely Aristotelian and Neoplatonic. The final structure, however, is other than the sum of its parts, and the cosmic vision it portrays has a character all its own."[10]

I have mentioned the role that Avicenna's *Physics* can play in clarifying the Avicennan philosophical system overall as well as its place in

8. Avicenna's argument has certain similarities to an argument of al-Qūhī, though it is much simplified and put to quite a different use. For al-Qūhī's argument, see Roshdi Rashed, "Al-Qūhī vs. Aristotle: On Motion," *Arabic Sciences and Philosophy* 9 (1999): 3–24.

9. See Shlomo Pines, "Études sur Awḥad al-Zamān Abu'l-Barakāt al-Baghdādī," in *The Collected Works of Shlomo Pines,* vol. 1, *Studies in Abu'l-Barakāt al-Baghdādī, Physics and Metaphysics* (Jerusalem: The Magnes Press, 1979), 1–95, esp. 66–71. See also **Y**. Tzvi Langermann, "*Quies media:* A Lively Problem on the Agenda of Post-Avicennian Physics," paper presented at the International Ibn Sīnā Symposium, Istanbul, Turkey, May 2008, forthcoming.

10. Avicenna, *The Metaphysics of* The Healing: *A Parellel English-Arabic Text,* trans. and ed. Michael E. Marmura, Islamic Translation Series (Provo, Utah: Brigham Young University Press, 2005), xxii.

the history of early natural philosophy and physics. Let me now address Avicenna's *Physics* as a work of philosophical and historical interest in its own right. Natural philosophy is one of the three theoretical sciences (Grk. *epistēmē,* Arb. *ʿilm*) identified among ancient and medieval philosophers. These three theoretical sciences include physics, mathematics, and metaphysics. Each of them is distinguished by its own proper subject matter. In the case of physics, Avicenna identifies that science's proper subject matter with the sensible body insofar as it is subject to change—in effect, those things that have a nature—and specifically the necessary accidents and concomitants of these natural things. He then proceeds to investigate this subject in four books.

The first book concerns the causes and principles of natural things, corresponding roughly with book 1 through 2 of Aristotle's *Physics.* Chapter one provides a nice overview of how a demonstrative science should investigate its proper subject; and as such, this chapter gives a succinct presentation of many of the salient points of Avicenna's *Book of Demonstration* (*Kitāb al-burhān,* the work most closely following in the tradition of Aristotle's *Posterior Analytics*). Chapters two through twelve (with a brief hiatus at chapter four, in which Avicenna discusses Melissus and Parmenides) take up the principles of natural things as well as the causes of change, perfection, and generation and corruption. Again, to repeat what I noted earlier, these chapters represent perhaps Avicenna's most extended discussion of the nature of causation. Chapters thirteen through fifteen, which conclude book 1, deal with luck and chance and provide evidence for Avicenna's strong causal determinism.[11]

The second book, which treats motion and its necessary concomitants—namely, place and time—is, in many ways, medieval theoretical physics at its best. It loosely follows the first part of book 3 of Aristotle's *Physics* (up to but not including the discussion of the infinite) and book 3 of that work. In book 2.1 of his *Physics,* Avicenna offers up his double sense of motion with its accompanying theory of motion at an instant.[12] He likewise provides in 2.1 and 3 an in-depth analysis of circular motion and introduces a new genus of motion—that of motion with respect to the category of position—which goes beyond the traditional three mentioned

11. For a fuller discussion of Avicenna's position on this point, see Catarina Belo, *Chance and Determinism in Avicenna and Averroes,* Islamic Philosophy, Theology, and Science 69 (Leiden: E. J. Brill, 2007).

12. See Ahmad Hasnawi, "La définition du mouvement," and my "A Medieval Arabic Analysis of Motion at an Instant: The Avicennan Sources to the *forma fluens/fluxus formae* Debate," *British Journal for the History of Science* 39 (2006): 189–205.

by Aristotle: motion in the categories of quantity, quality, and place. This new element of Avicenna's physics, in its turn, offers him a simple yet elegant answer to one of the great physical questions of the ancient period: "How can the cosmos undergo motion if it has no place?" The problem, which plagued Aristotle and many of his subsequent commentators and was in fact used by Aristotle's detractors to undermine his physics, was this: According to Aristotle, place is the limit of the outermost containing body. Consequently, the cosmos, which has nothing outside of it to contain it, cannot have a place. Yet, according to Aristotle and accepted by virtually every ancient and medieval thinker, the cosmos's outermost celestial sphere was constantly moving, making a complete rotation once approximately every twenty-four hours. It was just this motion that accounted for the rising and setting of the sun, moon, and stars. Clearly, this daily motion is not change in quantity or quality. Given the three canonical types of change identified by Aristotle, the motion of the cosmos must be with respect to place. But Aristotle's analysis of place precluded the cosmos from having a place such that it could undergo change with respect to it. For Avicenna, the solution was simple: The cosmos has no place—thus Aristotle's account of place is preserved—but moves with respect to its position, which, in fact, is just rotation without change of place.[13]

Another point of interest in book 2 is Avicenna's conceptual proof against the existence of a void (2.8), which seems to be a developed version of an argument hinted at by al-Kindī.[14] The difficulty is trying to prove that there *is* something that does *not* exist. Avicenna's argument takes advantage of logical developments he himself made in the *Introduction* (*Kitāb al-madkhal*, 1.13) and *Book of Demonstration* (1.10) of *The Healing*. Using these logical developments, he argues that if some notion is not merely an empty concept in the mind and in fact exists in reality, then one should be able to give a proper Aristotelian definition of it in terms of genus and difference, where both the genus and difference must identify some positive feature and not merely be a negation. Avicenna then shows that every attempt to define a void requires some appeal to its *not being* something else and so fails to yield a proper definition.

13. For the history of this problem and a more developed account of Avicenna's solution see my "Positioning Heaven: The Infidelity of a Faithful Aristotelian," *Phronesis* 51, no. 2 (2006): 140–61.

14. See al-Kindī, *On First Philosophy*, chapter 2.

Consequently, Avicenna concludes that the idea of a void is simply a vain intelligible.[15]

Also of importance in book 2 is Avicenna's proof for the existence of time and his analysis of it in at chapter eleven. Aristotle's temporal theory, upon which Avicenna's draws heavily, begins with a series of puzzles intended to cast doubt on the reality of time. Unfortunately, Aristotle does not follow up his puzzles with solutions. Avicenna, however, not only resolves all the puzzles raised by Aristotle, as well as several others, but he also included an explicit proof for the existence of time. His analysis of time, in turn, shows that it corresponds with the *possibility* for motions of the same speed to vary either in the length of the distance traversed (in the case of motions with respect to place) or the number of rotations made (in the case of motions with respect to position). This conception of time, which is quite intuitive and clever, provides the linchpin for one of Avicenna's proofs for the eternity of the world, presented at 3.11.

The third book of Avicenna's *Physics,* which treats issues of the infinitely large and infinitesimally small, took on a special urgency for Avicenna. This is because John Philoponus, in a series of arguments, had rebutted Aristotle's account of the infinite, especially with respect to the issue of the age of the world and its purported infinite extent into the past, a position that Avicenna himself held. Similarly, Islamic speculative theologians (that is, the practitioners of *kalām*) also denied that anything—whether matter, space, or even time—could be infinitely large. So, like Philoponus, they too denied the eternity of the world. Moreover, they additionally denied that the infinitely small was possible. Consequently, they argued for the existence of atoms that are physically and conceptually indivisible. The first half of book 3 of Avicenna's *Physics* is therefore dominated by Avicenna's rejection of Atomism, whether of the Democritean, Epicurean, or *kalām* variety. Interestingly, however, in chapter twelve of this book, Avicenna does suggest that there are *minima naturalia,* or magnitudes below which an element cannot retain its species-form. In effect, Avicenna is allowing that there are bodies that cannot physically be divided further and so are physical *a-tom*s (literally, "something that cannot be cut"), even if they are conceptually divisible *ad infinitum.*

15. See my "Logic and Science: The Role of Genus and Difference in Avicenna's Logic, Science and Natural Philosophy," *Documenti e studi sulla tradizione filosofica medievale* 43 (2007): 165–86.

Most of the second half of Book 3 discusses ways that the infinite can and cannot enter reality. In the *Physics* of *The Healing,* Avicenna takes the Aristotelian position that while it is impossible for an actual infinite to enter reality, a potentially infinite not only can but must enter reality in the form of infinite changes and time's stretching into the infinite past. In a second encyclopedic work, the *Salvation* (*Kitāb al-najāt*), Avicenna would, however, argue that an actually infinite number of immaterial souls must exist in reality.[16] Interestingly, a key element in the *Salvation* argument as to why there can be an infinite number of immaterial souls in existence is that such a totality does not involve an essentially ordered series, a point that Avicenna does make even in *The Healing.* The last two chapters of book 3 treats issues from Aristotle's *On the Heavens* concerning natural directions, such as up/down, right/left, and front/back, and how the natural philosophers can establish these directions.

The final book of Avicenna's *Physics,* book 4, is a miscellany. It covers issues such as what makes a motion one, whether with respect to number, species, or genus, as well as accidental motions. It additionally speaks about natural place and what makes a motion natural as opposed to forced. Perhaps two of the more theoretically interesting questions treated in this book are the issues of the *quies media* (4.8), already briefly mentioned, and Avicenna's account of inclination or acquired power (4.12). The issue of *quies media,* or medial rest, again concerns a motion that involves a change from one contrary to another, as, for example, a stone that is thrown upward and then falls downward. In a case of such motion, must the moving thing come to rest at the precise moment of the change from the one contrary to the other, or are the two motions, in fact, continuous without any rest? The issue was hotly debated by Avicenna's time, and Avicenna finds none of the arguments on either side to be wholly demonstrative. In the end, he opts that there must be a rest, but he does so because his own theory of inclination seems to force him in that direction.

The issue of inclination, in its turn, involves projectile motion. More precisely, the question is what keeps a mobile in motion in the cases

16. See Michael E. Marmura, "Avicenna and the Problem of the Infinite Number of Souls," *Mediaeval Studies* 22 (1960): 232–39; reprinted in *Probing in Islamic Philosophy: Studies in the Philosophies of Ibn Sina, al-Ghazali and Other Major Muslim Thinkers* (Binghamton, NY: Global Academic Publishing, 2005), 171–79.

where it is separated from its initial mover—as, for example, an arrow shot from a bow. The problem becomes more acute once it is assumed that the cause of an effect must exist together with the effect. Thus, at every instant that something is moving (the effect), it would need to be conjoined with its mover (the cause). So what is the mover in the case of projectile motion? At least within the Aristotelian tradition, there were two answers: the historical solution proposed by Aristotle, who maintains that the initial mover sets not only the projectile but also the surrounding air into motion, and it is the moving air that then acts as the immediate mover of the projectile's subsequent motion; and that of John Philoponus, who argues that the mover impresses a power, impetus, or inclination (*rhopē*) into the projectile that keeps it in motion. In the end, Avicenna, taking a position closer to that of Philoponus, thinks that there is an acquired power or inclination that keeps the projectile in motion.

This annotated outline of Avicenna's *Physics* by no stretch of the imagination exhausts the subjects treated in it. Hopefully though, it nonetheless provides at least a sense of the importance of this work, whether it be its place in the history of philosophy and science, its value for understanding Avicenna's overall philosophical thought, or its own intellectual merit.

A Note on the Source Texts

There are two editions of *Kitāb al-samāʿ al-ṭabīʿī:* that of Saʿīd Zāyid (1983)[17] and that of Jaʿfar al-Yāsīn (1996).[18] At least in one respect, al-Yāsīn's edition is preferable to Zāyid's in that al-Yāsīn seems to have a better grasp of the philosophical content of Avicenna's *Physics* and so, as it were, breaks up the text at its natural philosophical junctures. In contrast, in one case, Zāyid divides a single sentence admittedly a long one—into three separate paragraphs; similar instances can be multiplied. Consequently, al-Yāsīn's edition is, at least from a philosophical point of view, an advancement over Zāyid's. Also, Zāyid's edition is replete with typographical errors, some of which can be sorted out easily enough, but

17. *Al-Ṭabīʿīyāt, al-samāʿ al-ṭabīʿī,* ed. Saʿīd Zāyid (Cairo: The General Egyptian Book Organization, 1983); henceforth **Z**.

18. *Al-Ṭabīʿīyāt, al-samāʿ aṭ-ṭabīʿī,* ed. Jaʿfar al-Yāsīn (Beirut: Dār al-Manāhil, 1996); henceforth **Y**.

many others of which introduce significant misreading. While al-Yāsīn's also has typos, there seems to be fewer of them. Unfortunately, al-Yāsīn's edition suffers from a serious flaw not found in Zāyid's that prevents the former from being used as a basis of translation, at least as it stands: al-Yāsīn's edition is simply rife with instances of dittography and homeoteleuton—inadvertent repetitions and omissions of, at times, lengthy bits of Avicenna's text. Despite this failing of the edition established by al-Yāsīn, I decided to start with it and then emend the text as needs be in light of Zāyid's edition, as well as the Arabic edition of the text found in the Tehran lithograph of *The Healing*[19] and the available medieval Latin translation of Avicenna's *Physics*.[20] It is this collation of these four texts that makes up the edition included here.

As a warning to the reader, however, while I hope that the present edition is an improvement on the available editions of Avicenna's *Physics,* I did not approach the various texts at my disposal in as critical a way as some might hope. In general, I assumed that al-Yāsīn's edition was for the most part acceptable, and in general I only spot checked it, albeit frequently, against Zāyid's edition, the Tehran lithograph, and the Latin. Only when al-Yāsīn's text seemed to me to have obvious philosophical or grammatical problems did I then closely consult all the texts. Thus I have made no attempt to note all of the variations between al-Yāsīn's edition and that of Zāyid, the Tehran lithograph, and the Latin. Still I hope that the end result is at least a serviceable edition of Avicenna's Arabic text, even if more work may still need to be done.

Let me offer one further warning as well. As anyone who has seriously worked on the *Physics* can attest, both Avicenna's Arabic and his argumentation can be extremely difficult at times. Thus, in those cases where

19. *Al-Shifāʾ,* 2 vols. (Tehran: n.p., 1886), vol. 1, 2–159; henceforth **T**.

20. The Latin translation includes all of books 1 and 2 and then chapters 1–10 of book 3, after which the Latin translators stopped. For a history of the Latin edition, see Jules Janssens, "The Reception of Avicenna's *Physics* in the Latin Middle Ages," in *O Ye Gentlemen: Arabic Studies on Science and Literary Culture in Honour of Remke Kruk,* ed. Arnoud Vrolijk and Jan P. Hogendijk, Islamic Philosophy, Theology, and Science 74 (Leiden: E. J. Brill, 2007), 55–64. It should be noted that the manuscripts used to establish the Latin edition are approximately as early as some of the earliest Arabic manuscripts used by either Zāyid or al-Yāsīn. Thus, its variants should be considered when trying to establish the text.

21. *Liber Primus Naturalium, tractatus primus: De causis et principiis naturalium,* ed. Simon Van Riet, Avicenna latinus (1.8): (Leuven, Belg.: Peeters; Leiden E. J. Brill, 1992).

translations of certain parts of Avicenna's text were available, I consulted them. These translations include the Latin versions of book 1,[21] 2,[22] and 3[23] (which only goes through Chapter 10); Ahmad Hasnawi's partial translation of 2.1[24] and complete translation of 2.2;[25] Yegane Shayegan's translation of 2.10–13;[26] and Paul Lettinck's translation of 3.3–5.[27] While I always greatly benefited from these earlier translations, there are bound to be differences of interpretations among scholars when dealing with a text as difficult as Avicenna's. Any errors or other faults in the translation are wholly my own.

While I believe that, for the most part, I have accurately presented Avicenna's philosophical intention, I must confess that I have not fully grasped every argument and position Avicenna presents. I found this to be particularly the case when he is treating arguments outside of the tradition associated with Aristotle's *Physics* proper. In those cases where I felt uncertain of Avicenna's philosophical intention, I have taken refuge in presenting what I believe to be a very literal translation of the text, hoping that the clear-sighted reader will see more in it than I have.

In contrast, however, where I felt confident in my understanding of the text, I rendered it in what I hope is idiomatic English rather than an overly literal translation of the Arabic. The reason for this liberty is that while Avicenna's prose often has a certain elegance to it, when I translated the text completely literally, it frequently came across as too crabbed or too prolix. Indeed, at times a literal English translation seemed wholly unintelligible, whereas the Arabic made perfect sense. In the end, intelligibility and readability seemed more desirable than being able to reconstruct the Arabic on the basis of the translation. Additionally, Avicenna has a decidedly wry wit about him. After presenting a philosophically rigorous argument against a position, he often draws

22. *Liber Primus Naturalium, tractatus secundus: De motu et de consimilibus,* ed. S. Van Riet, J. Janssens, and A. Allard, Avicenna Latinus (1.10): (Leuven, Belg.: Peeters, 2006).

23. I am exceptionally grateful to Jules Janssens, who has graciously provided me with his provisional edition of what was available in Latin of book 3.

24. Ahmad Hasnawi, "La définition du mouvement dans la 'Physique' du Shifāʾ d'Avicenne."

25. Ahmad Hasnawi, "Le statut catégorial du mouvement chez Avicenne: Contexte grec et postérité médiévale latine."

26. Yegane Shayegan, "Avicenna on Time" (Ph.D. diss., Harvard University, 1986).

27. Paul Lettinck, "Ibn Sīnā on Atomism," *al-Shajarah* 4 (1999): 1–51.

a humorously absurd image of it. Moreover, he seems to have enjoyed a not-too-infrequent pun. To preserve some of the flavor of Avicenna's prose, I was at times slightly loose in rendering a term or image in order to capture a pun or make an example culturally relevant to a modern reader. In the end, I can only hope that the present translation gives one a sense of the thought and the man that was Avicenna.

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Sigla and Conventions

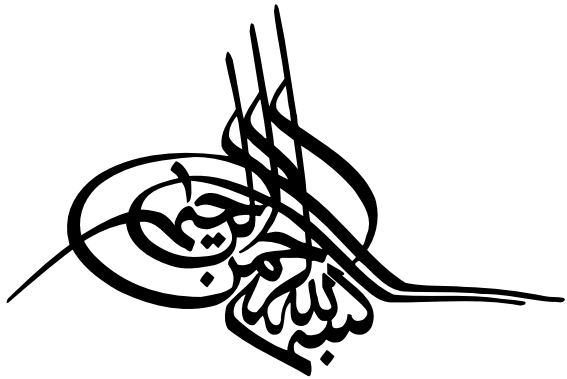
Z *al-Ṭabīʿiyāt, al-samāʿ al-ṭabīʿī,* ed. Saʿīd Zāyid (Cairo: The General Egyptian Book Organization, 1983)

Y *al-Ṭabīʿiyāt, al-samāʿ aṭ-ṭabīʿī,* ed. Jaʿfar al-Yāsīn (Beirut: Dār al-Manāhil, 1996)

T *al-Shifāʾ,* 2 vols. (Tehran: n.p., 1886), vol. 1, 2–159

In this work, terms of Arabic derivation found in *Webster's Third New International Dictionary* generally follow the first spelling given and are treated as regular English words. Otherwise, Arabic or Persian words and proper names have been transliterated following the romanization tables established by the American Library Association and the Library of Congress (*ALA-LC Romanization Tables: Transliteration Schemes for Non-Roman Scripts.* Compiled and edited by Randall K. Barry. Washington, D.C.: Library of Congress, 1997; available online at www.loc.gov/catdir/cpso/roman.html).

Passages from *The Physics* are referenced by book, chapter, and paragraph number, e.g. (3.9.7).


بسم الله الرحمن الرحيم

In the Name of God, the Merciful and Compassionate.

Praise God, the Lord of the Two Worlds,
and Blessing on Muḥammad and All His Family.

◆

THE FIRST PART OF THE NATURAL SCIENCES

Physics

[in Four Books]

◆

[Preface]

(1) Since, through God's assistance and help, we have completed in this book of ours what was needed by way of preface—namely, in the section on the art of logic—we should begin discussing the science of physics in the manner upon which our opinion has settled and to which our speculation has led. We shall adopt in this regard the order associated with the one that Peripatetic philosophy normally follows, and provide additional support[1] for what is farthest removed from what is immediate and seen on first inspection—namely, that which one is more likely to reject than [simply] to disagree with.

1. Reading *nushaddidu* with **Z** and **T** for **Y**'s *natashaddadu* (we are strengthened).

<تصدير>

بسم اللّه الرحمن الرحيم

الحمد الله ربّ العالمين والصلاة عاى محمدٍ وآله أجمعين

الفن الأول من الطبيعيات

في السّماع الطبيعي

(١) وإذ قد فرغنا ، بتيسير الله وعونه، مما وجب تقديمه في كتابنا هذا ؛ وهو تعليم اللُباب من صناعة المنطق، فحريّ بنا أن نفتتح الكلام في تعليم العلم الطبيعي على النحو الــذي تقرّر عليه رأينا وانتهى إليه نظرنا . وأنْ نجعل الترتيب في ذلك مقارناً للترتيب الذي تجري عليه فلسفة المشائين، وأنْ نشدّد فيما هو أبعد عن البداية والفِطَر الأُول، والمخالف فيه أبعد من الجاحد .

(2) We shall indulge whatever the truth itself reveals of its form, giving evidence against the one who disagrees by means of what [the truth] shows and holds back of itself. That our time be not wasted and bound up by repudiating and sufficiently opposing every school of thought—for often we see that when those discussing the sciences treat in their refutation some insignificant treatise or dwell in their exposition upon a question about which the truth is clearly perceived, then they expend every effort, exhibit every subdivision, and list every argument, whereas when they are persistently troubled by some problem or reach some doubtful matter, they tend to ignore it—[in order to avoid all that,] we hope to tread a different path and follow a course opposite theirs.

(3) We shall endeavor, as far as possible, to exhibit the truth arrived at by our predecessors and to excuse what we think they have overlooked unintentionally. This is what has barred us from commenting on their books and interpreting their texts, for we could not guard against coming upon matters that we believe they overlooked and so being compelled to try to find an excuse for them, invent an argument or profess it on their behalf, or simply confront them with a rebuttal. God has spared us all this [trouble] and has, in fact, assigned it to people who have exerted their utmost effort in achieving it and interpreting their books. He who wishes to acquaint himself with their words will find that their commentaries will guide him aright and that their interpretations will suffice him, whereas he who exerts himself in pursuing knowledge and meanings will find them scattered throughout these books. Part of what the measure of our search has yielded, despite the short space of time we spent therein, is given in the books that we have written and called collectively *The Healing*. God is the source of our support and strength, and in Him we place our trust. From here we start our exposition.

(٢) وتتساهل فيما نفس الحق تكشف عن صورته، ونشهد على المخالف بمرائه وجحده. وأنْ لا يذهب عمرنا في مناقضته كلّ مذهب، والعدول عن الاقتصار في مقاومته على البلاغ، فكثيراً ما نرى المتكلمين في العلوم؛ إذا تناولوا بنقضهم مقالة واهية، أو أكبوا ببيانهم على مسألةٍ يُلحظ الحق فيها عن كثب، نقضوا كلّ قوة وحقّقوا كلّ قسمة، وسوّدوا كل حجة، وإذا تلججوا في المُشكل، وخلصوا إلى جانب المشتبه؛ مرّوا عليه صفحاً. ونحن نرجو أنْ نكون وراء سبيلٍ مقابلةً لسبيلهم، ونهجْ معارض لنهجهم.

(٣) ونجتهد ما أمكن في أنْ ننشر عمّن قبلنا الصواب، ونعرض صفحاً عمّا نظنّهم سهوا فيه. وهذا هو الذي صدّنا عن شرح كتبهم وتفسير فصوصهم، إذْ لم نأمن الانتهاء إلى مواضع نظنّ أنّهم سهوا فيها؛ فنضطر إمّا إلى تكلف اعتذارٍ عنهم، أو اختلاق حجّة وتمحلها لهم، أو إلى مجاهرتهم بالنقْض؛ وقد أغنانا الله عن ذلك ونَصَبَ له قوماً بذلوا طوقهم فيه، وفسّروا كتبهم. فمَنْ اشتهى الوقوف على ألفاظهم؛ فشروحهم تهديه، وتفاسيرهم تكفيه. ومَنْ نشط للعلم وللمعاني فسيجدها في تلك الكتب منثورة. وبعض ما أفادناه مقدار بحثنا مع قصر عمرنا في هذه، الكتبَ التي عملناها وسميناها كتاب الشفاء مجموعاً، والله وليّ تأييدنا وعصمتنا .ومن ها هنا نشرع في عرضنا متوكلين عليه.

FIRST BOOK:
ON THE CAUSES AND PRINCIPLES OF NATURAL THINGS

Chapter One

Explaining the means by which to arrive at the science of natural things from their first principles

(1) From the part [of *The Healing*] where we concisely presented the science of demonstration, you have already learned that some sciences are universal and some particular, and that some are related to others.[1] So now what you need to learn is that the science we are engaged in explaining is physics, which is a particular science in relation to what comes later. Since you have learned that each science has a subject matter, the subject matter of [physics] is the sensible body insofar as it is subject to change. What is investigated about it is the necessary accidents belonging to [the body subject to change] as such—that is, the accidents that are termed *essential*[2]—and also the concomitants that

1. See *Kitāb al-burhān* 2.2.

2. Reading *min jihah mā huwa hākadhā wa hiya al-aʿrāḍ allatī tusammī dhātīyah wa hiya* with **Z**, **T**, and the equivalent phrase in the Latin translation (*Avicenna latinus: Liber primus naturalium, tractatus primus de causis et principiis naturalium*, ed. Simon Van Riet [Louvain-la-Neuve: E. Peeters; Leiden: E. J. Brill, 1992]), which is omitted in **Y**.

المقالة الأولى

في الأسباب والمبادىء للطبيعيات

<الفصل الأول>

في تعريف الطريق الذي نتوصل منه إلى العلم بالطبيعيات من مبادئها

(١) قد علمتم من الفن الذي فيه علم البرهان الذي لخّصناه؛ أنَّ العلوم منها كلّية ومنها جزئية؛ وعلمتم مقايسات بعضها إلى بعض. فيجب أن تعلموا الآن أنَّ العلم الذي نحن في تعليمه هو العلم الطبيعي؛ وهو علمٌ جزئي، بالقياس إلى ما نذكره فيما بعد وموضوعه - إذ قد علمتم أنَّ لكل علمٍ موضوعاً - هو الجسم المحسوس من جهة ما هو واقعٌ في التغيّر. والمبحوث عنه فيه هو الأعراض اللازمة له من جهة ما هو هكذا، وهى الأعراض التى تسمى ذاتية وهى واللواحق التي تلحقه بما هو هو؛ كانت صوراً أو

attach to [the body] inasmuch as it is, whether forms, accidents, or derivatives of the two, as you have come to understand. Now, natural things are these bodies considered from this respect and whatever is accidental to them insofar as they are such. All of them are called *natural* in relation to that power called *nature,* which we will define later.[3] Some of them are subjects for [the nature] and some are effects, motions, and dispositions proceeding from it. If, as was explained in the science of demonstration,[4] natural things have principles, reasons, and causes without which the science of physics could not be attained, then the only way to acquire genuine knowledge of those things possessing principles is, first, to know their principles and, from their principles, to know them, for this is the way to teach and learn that gives us access to the genuine knowledge of things that possess principles.

(2) Also, if natural things do possess certain principles, then either each and every one of them has those principles or they do not all share the principles in common. In [the latter] case, it would not be unlikely that the science of physics establishes the existence of those principles and at the same time identifies their essence. If these natural things do share certain first principles in common that are general to all of them—namely, those that are undoubtedly principles of their shared subjects and shared states—then the proof of these principles (if they are in need of proof) will not belong to the discipline of the natural philosophers, as was shown in the part [of *The Healing*] dealing with the science of demonstrations,[5] but to another science, and the natural philosopher must simply accept their existence as a postulate and conceptualize their essence as fully real.[6]

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3. See 1.5.
4. See *Kitāb al-burhān* 1, passim.
5. The reference appears to be to *Kitāb al-burhān* 1.12.
6. Avicenna's point here is explained more fully at 1.2.8–11, where he observes that principles can be common in two ways. For now, it is enough to note that certain common principles, such as the existence of forms, prime matter, a universal agent such as God, and the like have to be posited by the natural sciences and are not proven within them, whereas other common principles, such the existence of the natural places toward which bodies move naturally or primary qualities such as hot-cold and wet-dry, can be proven within the natural sciences.

أعراضاً أو مشـــتقةً منهما ؛ على ما فهمتم . والأمور الطبيعية ؛ هي هذه الأجسام من هذه الجهة ، وما يعرض لها ، من حيث هي بهذه الجهة ، وتســـمّى كلّها طبيعية بالنســـبة إلى القوة التي تســـمّى طبيعة ؛ التي سنعرّفها بعد . فبعضها موضوعات لها ، وبعضها آثار وحركات وهيئات تصدر عنها . فإنْ كان للأمور الطبيعية مبادىء وأســـباب وعلل ؛ لم يتحقّق العلم الطبيعي إلاّ منها ، فقد شـــرح في تعليم البرهان أنّه لا ســـبيل إلى تحقّق معرفة الأمور ذوات المبادىء إلاّ بعد الوقوف على مبادئها ، والوقوف من مبادئها عليها ، فإنَّ هذا هو النحو من التعليم أو التعلّم الذي نتوصل منه إلى تحقّق المعرفة بالأُمور ذوات المبادىء .

(٢) وأيضـــاً إنْ كانت الأمور الطبيعيـــة ذوات مبادىء ؛ فلا يخلو إمّا أنْ تكون تلك المبادىء لجزئي منها ، و‹إمّا› لا تشترك كافّتها في المبادىء ، فحينئذ لا يبعد أنْ يفيد العلم الطبيعي إثبات إنّية هذه المبادىء وتحقيق ماهيّتها معاً . وإنْ كانت الأمور الطبيعية تشـــترك في مبـــادىء أُول تعمّ جميعها ، وهي التي تكون مبادىء لموضوعها المشـــترك ولأحوالها المشـــتركة لا محالة ، فلا يكون إثبات هذه المبادىء – إنْ كانت محتاجة إلى الإثبات – إلى صناعة الطبيعيين كما عُلِم في الفن المكتوب في علم البرهان ، بل إلى صناعةٍ أُخرى ، وأمّا قبول وجودها وضعاً ، وتصوّر ماهيتها تحقيقاً ، فيكون على الطبيعي .

(3) Moreover, if natural things possess certain principles common to all of them as well as possessing principles that are more specific than those (for instance, belonging to one of their genera, such as the principles of growth), and some [principles] are [even] more specific than [those] more specific [ones] (for instance, belonging to one of their species, such as the principles of humanity), and if, in addition, they possess essential accidents common to them all and others that are common to the genus, and still others that are common to the species, then the right course of intellectual teaching and learning consists in starting with what is more common and then proceeding to what is more specific. That is because you know that the genus is part of the definition of the species, and so the knowledge of the genus must be prior to the knowledge of the species, because the knowledge of the part of the definition precedes the knowledge of the definition, and conceptualizing it precedes the knowledge of what is defined, since we mean by *definition* that which identifies the essence of what is defined. Consequently, the principles of common things must first be known in order that common things be known, and the common things must first be known in order to know the specific things.

(4) We must, then, begin with the explanation of the principles belonging to common things, since common things are better known to our intellects even if they are not better known by nature.[7] In other words, [common things] were not in themselves the things intended in the natures for the completion of existence, for what is intended in the nature is not the existence of an animal absolutely or a body absolutely, but rather that the natures of the specific things exist, and when the specific nature exists in the concrete particulars, there is some individual. So, then, what is intended is that the natures of the specific things exist as certain individuals in the concrete particulars. Now, the

7. For discussions of *better known* and *prior to us* and *by nature* or *in themselves*, see Aristotle, *Posterior Analytics* 1.2.71b33–72a5 and *Kitāb al-burhān* 1.11.

(٣) وأيضاً إنْ كانت الأمور الطبيعية ذوات مبادىء عامة لجميعها ، وذوات مبادىء أخص منها ؛ تكون مثلاً لجنس من أجناسها ؛ مثل مباديء النامية منها . وذوات مباديء أخص من الأخص تكون مثلاً لنوعٍ من أنواعها ؛ مثل مباديء النوع الإنساني منها . وكانت أيضاً ذوات عوارض ذاتية عامّة لجميعها ، وأُخرى عامة لجنس ، وأخرى عامة لنوع ؛ فإنَّ وجه التعلّم والتعليم العقلي فيها أنْ تبتدىء ممّا هو أعم وتسلك إلى ما هو أخصّ . لأنك تعلم أنَّ الجنس جزء حدّ النوع ؛ فتعرّف الجنس يجب أنْ يكون أقدم من تعرّف النوع ؛ لأنَّ المعرفة بجزء الحدّ قبل المعرفة بالحدّ وتصوّره قبل الوقوف على المحدود ، إذ كنّا نعني بالحدّ ما يحقق ماهيّة المحدود . فإذا كان كذلك ، فالمباديء التي للأمور العامّة يجب أنْ تعرف هي أولاً حتى تعرف الأمور العامة ، والأمور العامّة يجب أنْ تعرف أولاً حتى تعرف الأمور الخاصّة .

(٤) فيجب أنْ نبتدىء في التعليم من المباديء التي للأمور العامّة ، إذ الأمور العامّة أعرف عند عقولنا ، وإنْ لم تكن أعرف عند الطبيعة . أي لم تكن الأمور المقصودة في الطباع لتتمّة الوجود بذاتها . فإنَّ المقصود في الطبيعة ليس أنْ يُوجد حيوانٌ مطلقاً ولا جسمٌ مطلقاً ، بل أنْ توجد طبائع النّوعيات ، والطبيعة النوعية إذا وجدت في الأعيان كان شخصاً ما . فالمقصود إذن أنْ توجد طبائع النوعيات أشخاصاً ما في الأعيان ؛ وليس المقصود هو الشّخص المعيّن إلا في الطبيعة الجزئية الخاصّة بذلك الشخص ، ولو

concrete individual is not what is intended except with respect to the particular nature proper to that individual; if the concrete individual [itself] were what was intended [by nature], then through its corruption and nonexistence the order of existence would be diminished. Likewise, if the common and generic nature were what was intended, then existence and order would be completed through its [singular] existence, whether it is, for example, the existence of some body or some animal, however it might be. So it is nearly self-evident that what is intended is the nature of the species, in order that it cause the existence of some individual (even if not some particular individual). In other words, [what is intended] is the perfection and the universal end. It is this that is better known by nature, while not being prior by nature (if, by *prior,* we mean what is stated in the *Categories*[8] and we do not mean the end).

(5) Now, all men are as good as alike in knowing the common and generic natures, whereas they are distinguished only insofar as some men know and reach the specific things and apply themselves to making differentiations, while others stop at the generic things. So, for example, some might know [only] animality, whereas others might additionally know humanity and equinity. When knowledge reaches the specific natures and what is accidental to them, inquiry stops and is not followed by the fleeting knowledge of individuals to which our souls[9] are not at all inclined.

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8. For the different meanings of *prior,* cf. Aristotle's *Categories* 12.

9. Reading with **Z** and added to **T**'s *nufūsnā,* which does not appear in **Y** or the Latin.

كان المقصود هو الشّخص المعيّن، لكان الوجود ينتقص نظامه بفساده وعدمه، كما لو كان المقصود هو الطبيعة العامّة والجنسية؛ لكان الوجود والنظام يتمّ بوجوده؛ مثل وجود جسم كيف كان، أو حيوانٍ كيف كان. فما أقرب من البيان أنَّ المقصود هو طبيعة النوع لتوجد شخصاً – وإنْ لم يعيّن – وهو الكامل، وهو الغاية الكلّية، فالأعرف عند الطبيعة هو هذا، وليس هو أقدم بالطبع؛ إنْ عنينا بالأقدم ما قيل في قاطيغورياس، ولم نعنِ بالأقدم الغاية.

(٥) والناس كلّهم كالمشتركين في معرفة الطبائع العامة والجنسية، وإنّما يتميّزون بأنَّ بعضهم يعرف النوعيات وينتهي إليها ويمعن في التفصيل، وبعضهم يقف عند الجنسيات؛ فبعضهم مثلاً يعرف الحيوانية، وبعضهم يعرف الإنسانية أيضاً والفرسية. وإذا انتهت المعرفة إلى الطبائع النوعية وما يعرض لها، وقف البحث ولم يُتْلَ بما يفوتها من معرفة الشخصيات، ولا مالتْ إليها نفوسنا البتّة.

(6) It is clear, then, that when we compare common and specific things and then compare them together with [what is better known to] the intellect, we find that common things are better known to the intellect. When, on the other hand, we compare them together with the order of existence and what is intended in the universal nature, we find that specific things are better known by nature. When we compare the concrete individuals with the specific things and relate both to the intellect, we find that the concrete individuals have some place of priority or posteriority in the intellect only if we include the internal sensitive faculty.[10] In that case, then, the individuals are better known to us than universals, for individuals are impressed on the internal sense faculty from which the intellect subsequently learns what things are shared in common and what things are not, and so extracts the natures of things common in species.[11] When we relate them both to the nature, we find [that] the thing common in species[12] is better known, even if its actuality begins with determinate individuals. So nature's intention concerning the existence of body is precisely that it arrives at the existence of man and what is generically similar. [Similarly,] its intention concerning the existence of the generable and corruptible particular individual is that the nature of the species exists; and when it is possible to achieve that end through a single individual whose matter is not subject to change and corruption, as, for example, the Sun, the Moon, and the like, then there is no need for another individual to belong to the species.

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10. Avicenna probably has the imagery faculty (*qūwah khayālīyah*) specifically in mind, for it is this faculty that provides the material intellect with the potential intelligible, which, when "illuminated" by the active intellect, becomes a universal corresponding with some specific thing, such as humanity.

11. For discussions of the roles of sensation and abstraction in Avicenna's noetic, see *Kitāb al-burhān* 3.5, and *Kitāb al-nafs* 2.2.

12. For example, the humanity or equinity common to all the individuals within the species.

(٦) فبيِّنٌ أنّا إذا قايسنا ما بين الأُمور العامّة والخاصّة، ثمّ قايسنا بينهما معاً وبين العقل، وجدنا الأُمور العامّة أعرف عند العقل. وإذا قايسنا بينهما معاً وبين نظام الوجود والأمر المقصود في الطبيعة الكلّية، وجدنا الأُمور النوعية أعرف عند الطبيعة. وإذا قايسنا بين الشخصيات المعيّنة، وبين الأُمور النوعية، ونسبناهما إلى العقل؛ لم نجد للشخصيات المعيّنة عند العقل مكان تقدم وتأخّر إلاّ أنْ نستشرك القوة الحاسّة في الباطن، فحينئذ تكون الشخصيات أعرف عندنا من الكلّيات، فإنَّ الشخصيات ترتسم في القوة الحاسّة التي في الباطن، ثم يقتبس منه العقل المشاركات والمباينات، فينتزع طبائع العامّيات النوعية. وإذا نسبناهما إلى الطبيعة وجدنا العامّة النوعية أعرف وإنْ كان إبتداء فعلها من الشخصيات المعيّنة. فإنَّ الطبيعة إنّما تقصد من وجود الجسم أنْ تتوصل به إلى وجود الإنسان وما يجانسه، وتقصد من وجود الشخص المعينّ الكائن الفاسد أنْ تكون طبيعة النوع موجودة. وإذا أمكنها حصول هذا الغرض في شخصٍ واحد، وهو الذي تكون مادّته غير مُذْعنة للتغيّر والفساد، لم يحتج إلى أنْ يوجد للنوع شخص آخر كالشمس والقمر وغيرهما.

(7) Although in perceiving particulars, sensation and imagination initiate the most important part of conceptualizing an individual, it is more like the common notion until they reach the conceptualization of the individual that is absolute in every respect. An illustration of how this is would be that *body* is a common notion to which it belongs, *qua* body, to be individualized and thus become this or that body. Similarly, *animal* is a common notion, but more particular than *body,* and it belongs to it, *qua* animal, to be individualized and thus become this or that animal. *Man* is also a common notion that is more particular than *animal,* and it belongs to it, *qua* man, to be individualized and thus become this or that man. Now, if we relate these orderings to the power of perception and observe therein two kinds of order, we find that what is closer to and more like the common thing is better known. Indeed, it is impossible that one should sensibly or imaginatively perceive that this is *this* man unless one perceives that he is *this* animal and *this* body. [Similarly,] one would not perceive that this is *this* animal, unless one perceives that it is *this* body, whereas if one perceives him from afar, one might perceive that he is *this* body without perceiving that he is *this* man. It is clearly obvious, therefore, that the case of sensation in this respect is similar to the case of the intellect and that what corresponds with the general is better known in itself even for sensation as well.

(8) With respect to time, however, sensation provides imagination with only an individual member of the species that is not uniquely delimited. So, from among those sensible forms impressed on the imagery faculty, the first one impressed on the child's imagery faculty is the form of an individual man or woman, without his being able to distinguish a man who is his father from a man who is not and a woman who is his mother from a woman who is not. Eventually, he is able to distinguish a man who is his father from one who is not, and a woman who is his mother from one who is not, and then by degrees the individuals remain differentiated for him.

(٧) على أنَّ الحسّ والتخيّل، في إدراكهما للجزئيات، يبتدئان أول شيءٍ من تصور شخصٍ هو أكثر مناسبة للمعنى العامّي، حتى يبلغا تصوّر الشّخص الذي هو شخص صرف من كل وجه. وأمَّا بيان كيفية هذا؛ فهو أنَّ الجسم معنى عام وله - بما هو جسم - أنْ يتشخص فيكون هذا الجسم، والحيوان أيضاً معنى عام وأخصّ من الجسم، وله بما هو حيوان أنْ يتشخص فيكون هذا الحيوان، والإنسان أيضاً معنى عام وأخصّ من الحيوان، وله بما هو إنسان أنْ يتشخّص فيكون هذا الإنسان. فإذا نسبنا هذه المراتب إلى القوة المدركة، وراعينا في ذلك نوعين من الترتيب؛ وجدنا ما هو أشبه بالعام وأقرب مناسبة له هو أعرف. فإنّه ليس يمكن أنْ يدرك بالحسّ والتخيّل أنَّ هذا هو هذا الإنسان، إلاّ وأدرك أنّه هذا الحيوان وهذا الجسم، وقد يدرك أنّه هذا الجسم إذا لمحه من بعيد ولا يدرك أنّه هذا الإنسان فقد بانَ وَوَضح أنَّ حال الحسّ أيضاً من هذه الجهة كحال العقل، وأنَّ ما يناسب العام أعرف في ذاته أيضاً عند الحسّ.

(٨) وأما في الزمان؛ فإنَّ التخيّل إنّما يستفيد من الحسّ شخصاً من النوع غير محدودٍ بخاصّيته. فأول ما يرتسم في خيال الطفل من الصورة التي يحسّها على سبيل تأثّرٍ من تلك الصور في الخيال؛ هو صورة شخص رجلٍ، أو صورة شخص إمرأة، من غير أن يتميّز له رجلٌ هو أبوه عن رجلٍ ليس هو أباه، وامرأة هي أُمّه عن امرأة ليست هي أُمّه. ثم يتميّز عنده رجل هو أبوه، ورجلٌ ليس هو أباه، وامرأة هي أُمّه وامرأة ليست هي أُمّه، ثم لا يزال تنفصل الأشخاص عنده يسيراً يسيراً.

(9) Now, this image, in which a wholly indistinct likeness of the individual human is imprinted, is the image of something that is termed *vague*. When *vague individual* is said of [(1)] this [indistinct likeness] and of [(2)] an individual imprinted upon sensation from a distance (assuming the impression is that it is a body without perceiving whether it is animal or human), then the expression *vague individual* is applied equivocally to them. The reason is that what is understood by the expression *vague individual* in [the first] case is one of the individuals of the species to which it belongs, without determining how or which individual; and the same holds for a certain man and woman. It is as though the sense of *individual,* while not being divided into the multitude of those who share in its definition, has been combined with the account of nature applied relative to the species or the kind. From them both, there is derived a single account termed *a vague indeterminate individual*—just as is indicated by our saying, "Rational, mortal animal is one," which does not apply to many when it is defined in this way, since the definition of individuality is attributed to the definition of the specific nature. In short, this is an indeterminate individual. In [the second] case, however, it is this determinate corporeal individual. It cannot be other than it is, save that, owing to the mind's uncertainty, either the account of being animate or inanimate can be attributed to it in thought, not because the thing in itself can be such—that is, such that any one of the accounts could be attributed indiscriminately to that corporeality.[13]

(10) So the vague individual in [the first] case can be thought to be any existing individual of that genus or the one species. In [the second] case, however, it cannot be thought to be just any individual of that species, but can only be this single, determinate one. Be that as it may, the mind can still be susceptible to uncertainty, making it possible that, relative to [the mind, the individual] is designated, for example, either by determinately being animate to the exclusion of being inanimate or determinately being inanimate to the exclusion of being animate, even after it is judged that in itself it cannot be both things but is determinately one or the other of them.

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13. The first case of a vague image of *human* is that which appears before the mind's eye when one is asked to imagine *human,* but not any particular human, whereas the second case of a vague image is of some particular human seen from afar, even though one might not be able to make out which particular human it is.

(٩) وهذا الخيال الذي يرتسم فيه مثلاً من الشخص الإنساني مطلقاً غير مخصّص، هو خيال المعنى الذي يسمى منتشراً، وإذا قيل شخص منتشر لهذا؛ وقيل شخص منتشر لما ينطبع في الحسّ من شخصٍ لائحٍ من بعيد إذا ارتسم أنّه جسم، من غير إدراك حيوانيةٍ أو إنسانيةٍ؛ فإنّما يقع عليها اسم الشخص المنتشر باشتراك الاسم. وذلك أنَّ المفهوم من لفظة الشّخص المنتشر بالمعنى الأول هو أنّه شخصٌ مّا من أشخاص النوع الذي يُنسب إليه، غير معيّنٍ كيف كان وأي شخص كان، وكذلك رجلٌ مّا وامرأةٌ مّا. فيكون كأن معنى الشخص - وهو كونه غير منقسم إلى عدة مَنْ يشاركه في الحدّ - قد انضم إلى معنى الطبيعة الموضوعة للنوعية أو للصِنْفية، وحصل منهما معنى واحد يسمى شخصاً منتشراً غير معيّن، كأنّه ما يدل عليه قولنا حيوانٌ ناطقٌ مائتٌ هو واحدٌ؛ لا يقال على كثرةٍ، ويحد بهذا الحدّ، فيكون حدّ الشخصية مضافاً إلى حدّ الطبيعة النوعية. وبالجملة هذا هو شخص غير معيّن. وأمّا الآخر؛ فهو هذا الشخص الجسماني المعيّن، ولا يصلح أنْ يكون غيره، إلاّ أنّه يصلح عند الذّهن أنْ يضاف إليه معنى الحيوانية أو معنى الجمادية لشّك الذهن، لالأنَّ الأمر في نفسه صالح أنْ يكون كذلك؛ أي يكون بحيث يصلح أن يضاف إلى تلك الجسمية أي المعنيين منهما كان.

(١٠) فالشّخص المنتشر بالمعنى الأول، يصلح عند الذّهن أنْ يكون في الوجود أي شخص كان من ذلك الجنس أو النوع الواحد. وبالمعنى الثاني، ليس يصلح في الذّهن أنْ يكون أي شخصٍ كان من ذلك النوع، بل لا يكون غير هذا الواحد المعيّن. لكنه يصلح عند الذّهن صلوح الشك والتجويز - أنْ يتعيّن بحيوانيةٍ معيّنةٍ مثلاً دون جمادية، أو جمادية معيّنة دون حيوانية، تُعيّنا بالقياس إليه، بعد حكمه أنّه في نفسه لا يجوز أنْ يكون صالحاً للأمرين، بل هو أحدهما متعيّناً.

(11) There is also a correlation here between causes and effects and a correlation between simple parts and composites. So when the causes enter into the constitution of the effects as parts of them—as, for example, the case of wood and shape relative to the bed—then their relation to the effects is that of simple parts to composites. As for when the causes are separate from the effects—as, for example, the carpenter who makes the bed—then it is a different issue.

(12) Now, both correlations have a relation to sensation, intellect, and nature. As for the correlation between sensation and causes and effects where the causes are separate, then, if the causes and effects are sensible, neither one has more priority or posteriority over the other as a sensation. If they are insensible, then neither one of them has a relation to sensation. The same holds for the status of the image.

(13) Vis-à-vis the intellect, however, the cause might reach it before the effect, whereupon [the intellect] moves from the cause to the effect. Examples are when someone sees the Moon in conjunction with a planet whose degree is near the lunar nodes, while the Sun is at the opposite extreme of the [celestial] arc, and so the intellect judges that there is an eclipse. Again, [another example would be that] when [a person] knows that matter [within his body] has undergone putrefaction, he knows that fever has set in. Often the effect reaches [the intellect] before the cause—sometimes through deduction, sometimes through sensation—in which case [the intellect] moves from the effect to the cause. Also, [the intellect] often recognizes an effect first, and then moves from it to the cause, and then thereafter moves from the cause to another effect. We have already explained these notions clearly in our study of demonstration.[14]

14. See *Kitāb al-burhān* 1.7, where Avicenna distinguished between the *burhān lima* (demonstration *propter quid*), which goes from cause to effect, and the *burhān inna* (demonstration *quia*), which goes from effect to cause and is itself divided into the "absolute *burhān inna*" and the "indication," which correspond with the accounts given here.

(١١) هذا، وها هنا مقايسة أيضاً بين العلل والمعلولات، ومقايسة بين الأجزاء البسيطة والمركّبات. فإذا كانت العلل داخلة في قوام المعلولات، وكالأجزاء لها؛ مثل حال الخشب والشكل بالقياس إلى السرير، فإن نسبتها إلى المعلولات نسبة البسائط إلى المركّبات، وأما إذا كانت العِلل مباينة للمعلولات؛ مثل النّجار للسرير، فهناك نظرٌ آخر.

(١٢) ولكلتا المقايستين نسبة إلى الحسّ والعقل وإلى الطبيعة؛ فأمّا مقايسة ما بين الحسّ وبين العِلل والمعلولات – على أنَّ العِلل مباينة – فإنْ كانت العِلل والمعلولات محسوسة؛ فلا كثير تقدّم وتأخّر لأحدهما على الآخر حسّاً، وإنْ كانت غير محسوسة فلا نسبة لأحدهما إلى الحسّ، وكذلك حكم الخيال.

(١٣) وأما عند العقل فإنَّ العقل ربما وصلتْ إليه العِلّة قبل المعلول؛ فسلك من العِلّة إلى المعلول؛ كما إذا رأى الإنسانُ القمرَ مقارناً لكوكب درجته عند الجوزهر، وكانت الشمس في الطرف الآخر من القطر، فيحكم العقل بالكسوف، وكما إذا علم أنَّ المادة متحركة إلى عَفَنٍ فيعلم أنَّ الحمى كائنة. وربّما وصل إليه المعلول قبل العلّة، فسلك من المعلول إلى العِلّة، وقد يعرف المعلول قبل العِلّة؛ تارة من طريق الاستدلال، وتارة من طريق الحسّ. وربّما عرف أولاً معلولاً فسلك منه إلى العِلّة، ثم سلك من العلّة إلى معلولٍ آخر. وكأنا قد أوضحنا هذه المعاني في تعليمنا لصناعة البرهان.

(14) As for the correlation of those separate causes analogous to nature with the effects, those that are causes in the sense of an end are better known by nature. Also better known by nature than the effect are those causes that are an agent—that is, the one that acts for the sake of what it makes, not [merely] given that it exists. [As for] that [cause] whose existence in nature does not [act] for the sake of [what is made] itself, but, rather, whatever comes from it is made such that not only does it have [that agent] as an end with respect to its [own] activity but also with respect to its very existence (assuming that there is such a thing in nature), it would not be better known than the effect; and in fact, the effect would be better known by nature than it.

(15) As for the relation of the parts of the composites to what is composed from them, the composite is better known according to sensation, since sensation first grasps and perceives the whole and then differentiates. When it grasps the whole, it grasps it in the most general sense (namely, that it is a body or an animal), and thereafter it differentiates it. In the intellect, however, the simple is prior to the composite, since it knows the nature of the composite only after it knows its simple components. If [the intellect] does not know [the composite's] simple components, then it really knows it through one of the accidents or genera [of the composite] without having reached the thing itself—as, for instance, if it knew it as a round or a heavy body and the like but did not know the essence of its substance. As for by nature,[15] the composite is what is intended in most things and parts in such a way that from them, the composite comes to subsist.

15. Reading *fa* with **Z** and **T**, which is omitted in **Y**.

(١٤) واما مناسبة هذه العلل المفارقة للمعلولات، بحسب القياس إلى الطبيعة، فإنَّ ما كان منها عِلّة على أنَّه غاية فهو أعرف عند الطبيعة. وما كان منها علّة؛ على أنّه فاعل وكان فاعلاً لا على أنَّ وجوده ليكون فاعلاً لما يفعله، فإنَّه أعرف عند الطبيعة من المعلول. وما كان وجوده في الطبيعة ليس لذاته، بل ليفعل ما يكون عنه، حتى يكون المفعول غاية لا له في فعله فقط، بل له في وجود ذاته – إنْ كان في الطبيعة شيء هذا صفته – فليس هو أعرف من المعلول، بل المعلول أعرف عند الطبيعة منه.

(١٥) وأمّا نسبة أجزاء المركبات إلى المركبات منها، فإنَّ المركّب أعرف بحسب الحسّ؛ إذ الحسّ يتناول أولاً الجملة ويدركها ثم يفصّل، وإذا تناول الجملة تناولها بالمعنى الأعم؛ أي أنّه جسمٌ أو حيوانٌ، ثم يفصّلها. وأمّا عند العقل، فإنَّ البسيط أقدم من المركّب؛ فإنّه لا يعرف طبيعة المركّب إلاّ بعد أنْ يعرف بسائطه، فإنْ لم يعرف بسائطه فقد عرفه بعرضٍ من أعراضه أو جنسٍ من أجناسه ولم يصل إلى ذاته؛ كأنه عرفه مثلاً جسماً مستديراً أو ثقيلاً، أو ما أشبه ذلك، ولم يعرف ماهيّة جوهره. وأمّا عند الطبيعة، فإنَّ المركّب هو المقصود فيها في أكثر الأشياء والأجزاء؛ تُقصد ليحصل منها قوام المركّب. فالأعرف عند العقل

(16) So, from among the general and specific things and the simple and compound things, the general and simple are better known to the intellect, whereas the specific property and composite are better known by nature. Now, just as nature begins in the way of discovery with the general and simple and from them discovers the things that are themselves differentiated according to species and themselves composite, so likewise instruction begins with the general and simple and from them comes to know specific things and composites. The primary aim of both, then, is reached upon acquiring specific and compound things.

(١٦) مــن الأمور العامّــة والخاصّة ومن الأمور البســيطة والمركّبــة – هو العامّة والبســيطة، وعند الطبيعة هو الخاصّة والنوعيّة والمركّبة. لكنه، كما أنَّ الطبيعة تبتدىء في الإيجاد بالعوام والبســائط، ومنها توجــد ذوات المفصّلات النوعية وذوات المركّبات، فكذلــك التعلّم يبتدىء من العوام والبســائط، ومنها يوجد العلــم بالنوعيات والمركبات، وكلاهما يقف قصده الأول عند حصول النوعيات والمركبات.

Chapter Two

Enumerating the principles of natural things by assertion and supposition

(1) Natural things have certain principles that we shall enumerate, setting forth what is necessary about them and providing their essences.

(2) We say, then, that 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. The body is not a body by virtue of having a given [set of] three posited dimensions, since a body can exist and remain as a body even if the dimensions belonging to it are actually changed. So, [for example], a piece of wax or a drop of water may be such that there exist in it the actual dimensions of length, breadth, and depth determined by its extremities; but then, if it changes in shape, each of these definite dimensions ceases, and other dimensions or extensions exist. Yet the body continues as body, without corruption or change, and the form that we predicated of it as necessary—namely, that those dimensions can be posited in it—continues unchanged. This has been referred to in another place,[1] where you learned that those definite extensions are the quantity of its sides, which are concomitant with it and change, while its form and substance do not change—although this quantity may follow[2] a change in certain accidents or forms in it, just as water, when heated, increases in volume.

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1. See *Kitāb al-burhān* 1.10.
2. Reading *tabiᶜat* with **Z** for **Y**'s *tabᶜathu* (emit).

<الفصل الثاني>

في تعديد المبادىء للطبيعيات على سبيل المصادرة والوضع

(١) ثم أنَّ للأمور الطباعية مبادىء وسنعدّها ونضعها وضْعاً على ما هو الواجب فيها ، ونعطي ماهيّاتها

(٢) فنقول : إنَّ الجسم الطبيعي هو الجوهر الذي يمكن أنْ يُفرض فيه إمتدادٌ ، وامتدادٌ آخر مقاطعٌ له على قوائم ، وامتدادٌ ثالثٌ مقاطعٌ لهما جميعاً على قوائم . وكونه بهذه الصفة هو الصورة التي بها صار الجسم جسماً . وليس الجسم جسماً بأنّه ذو امتدادات <ثلاثة> مفروضة ، فإنَّ الجسم يكون موجوداً جسماً وثابتاً وإنْ غُيّرت الامتدادات الموجودة فيه بالفعل . فإنَّ الشمعة ، أو قطعة من الماء ، قد تحصل فيها أبعاد بالفعل ؛ طولاً وعرضاً وعمقاً محدودة بأطرافها . ثم إذا استبدل شكلاً ، بَطل كلّ واحدٍ من أعيان تلك الأبعاد المحدودة ، وحصلت أبعادٌ وامتدادات أخرى ، والجسم باقٍ بجسميته لم يفسد ولم يتبدل . والصورة التي أوجبناها له – وهي أنّه بحيث يمكن أنْ تُفرض فيه تلك الأبعاد – ثابتة لا تبطل ، وقد أشير لك إلى هذا في غير هذا الموضع . وعلمت أنَّ هذه الامتدادات المعيّنة هي كميّة أقطاره ، وهي تلحقه وتتبدل ، وصورته وجوهره لا تتبدل . وهذه الكميّة ربّما تبعت تبدل أعراض فيه أو صور ، كالماء يسخن فيزداد حجماً .

(3) This natural body has certain principles *qua* natural body, as well as additional principles *qua* generable and corruptible or in general alterable. The principles by which it acquires its corporeality include whatever are parts of its existence as actually present in [the natural body] itself, and these are more appropriately called *principles,* according to [the natural philosopher]. They are two: one of them is like the wood of the bed, while the other is like the form or shape of the bed. What is like the wood of the bed is called *material*, *subject*, *matter*, *component*, and *element,* according to various considerations, whereas what is like the form of the bed is called *form*.

(4) Since the form of corporality is either prior to all the other forms that belong to natural things and their genera and species or is something inseparably joined with them, what belongs to the body as the wood belongs to the bed also belongs to all those other things that possess the forms in this way, since all of them exist in fact together with corporality; and so that [namely, the material] is a substance. When [the material] is considered in itself, without reference to anything, it exists devoid in itself of these forms. Still, it is susceptible to receiving these forms or being joined with them in either of two ways. On the one hand, it may be from the susceptibility of [the material's] universal absolute nature, as if it were a genus for two species, one prior and one joined, each one of which is specified by a receptivity to some forms to the exclusion of others, after the [form] of corporality. On the other hand, from the susceptibility of the nature, [the material] itself may be something common to all [the forms]; and so, by means of its universality, it is susceptible to receiving all of these forms, some of them collectively and successively and others just successively. In this case, there would be a certain correspondence with the forms in its nature—namely, that [the material] is receptive to them, where this receptivity is like an impression in it and a shadow and specter of the form, while it is the form that actually perfects this substance.

(٣) لكن هذا الجسم الطبيعي – من حيث هو جسمٌ طبيعي – له مبادىء ، ومن حيث هو كائن وفاسد ، بل متغيّرٌ بالجملة ، له زيادة في المبادىء . فالمبادىء التي بها تحصل جسميته ؛ منها ما هي أجزاء من وجوده وحاصلة في ذاته ، وهذه أولى عندهم بأنْ تسمى مبادىء وهي إثنان : أحدهما قائمٌ منه مقام الخشب من السرير ، والآخر قائمٌ منه مقام صورة السريرية وشكلها من السرير . فالقائم منه مقام الخشب من السرير يسمى هيولى ، وموضوعاً ، ومادّة ، وعنصراً ، وأُسْطُقسّاً ؛ بحسب اعتباراتٍ مختلفة ، والقائم منه مقام صورة السريرية يسمّى صورة .

(٤) وإذ صورة الجسمية إمّا متقدمة لسائر الصور التي للطبيعيات وأجناسها وأنواعها ، وإمّا مقارنة لا تنفك هي عنه ؛ فيكون هذا الذي هو للجسم كالخشب للسرير ، هو أيضاً لسائر ذوات تلك الصور بهذه المنزلة ، إذ كلّها متقرّره الوجود مع الجسمية فيه . فيكون ذلك جوهراً إذا نُظر إلى ذاته غير مضافٍ إلى شيءٍ وُجد خالياً في نفسه عن هذه الصور بالفعل ، ويكون من شأنه أنْ يقبل هذه الصور أو يقترن بها . أمّا من شأن طبيعته المطلقة الكلّية كأنها جنسٌ لنوعين : للمتقدمة وللمقارنة ، وكلّ واحدٍ منهما يختص بقبول بعض الصور دون بعض بعد الجسمية . أمّا من شأن طبيعةٍ هي بعينها مشتركة للجميع ، فتكون بكلّيتها من شأنها أنْ تقبل كلّ هذه الصور ، بعضها جمعة ومتعاقبة ، وبعضها بتعاقبٍ فقط . فتكون في طبيعتها مناسبة مّا مع الصور ؛ على أنّه قابلٌ لها ، وتكون هذه المناسبة كأنّها رسمٌ فيها وظلٌ وخيالٌ من الصورة ، وتكون الصورة هي التي تكمل هذا الجوهر بالفعل .

(5) Let it be posited for the science of physics, then, that body *qua* body has a principle that is material and a principle that is form, whether you intend an absolute corporeal form, or a species form from among the forms of bodies, or an accidental form ([as] whenever you regard body, insofar as it is white, strong, or healthy). Let it also be posited for [this science] that what is material is never separated from form so as to subsist in itself. In other words, [the material] does not actually exist unless form is present and so actually exists through [the form]. If it were not the case that the form departs from it only with the arrival of another form that takes over and replaces it, then the material would actually cease to be.

(6) Now, from the perspective that this material is potentially receptive to a form or forms, it is called their *material.* From the perspective that it is actually bearing some form, it is called in this context its *subject.* (The sense of *subject* here is not the same as the meaning of *subject* that we gave in logic as part of the description of substance, since matter is never subject in that sense.)[3] From the perspective that it is common to all forms, it is called *matter* and *stuff.* It is called *element* because, through a process of analysis, it is resolved into [constitutive elements], in which case [the material] is the simple part of the whole composite receptive to form; and the same is true of everything of that sort. Finally, because composition in this precise sense starts with [the material], it is called *component,* and the same is true of everything of that sort. It is as though, when the composition in this precise sense starts from it, it is called a *component;* whereas when it starts with the composite and ends with [the material], it is called *element,* since the element is the simplest part of the composite. These, then, are the internal principles that constitute the body.

3. The reference is to *Kitāb al-burhān* 1.10.

(٥) فليوضع للطبيعي أنَّ للجسم - بما هو جسم - مبدأ هو هيولى، ومبدأ هو صورة إن شئت صورة جسمية مطلقة، وإنْ شئت صورة نوعية من صور الأجسام، وإن شئت صورة عرضية، إذا أخذت الجسم من حيث هو؛ كالأبيض أو القوي آو الصحيح. وليُوضَع له أنَّ هذا الذي هو هيولى لا يتجرد عن الصورة قائمة بنفسها البتّة، ولا تكون موجودة بالفعل إلاّ بأنْ تحصل الصورة؛ فيوجد بها بالفعل وتكون الصورة التي تزول عنها، لولا أنَّ زوالها إنَّما هو مع حصول صورة أُخرى تنوب عنها وتقوم مقامها، لفسدت معها الهيولى بالفعل. وهذه الهيولي.

(٦) من جهةِ أنّها بالقوة قابلة لصورةٍ أو لصور فتسمّى هيولى لها، ومن جهة أنّها بالفعل حاملة لصورةٍ فتسمّى - في هذا الموضع - موضوعاً لها، وليس معني الموضوع هاهنا، معني الموضوع الذي أخذناه في المنطق جزء رسم للجوهر، فإنَّ الهيولى لا تكون موضوعاً بذلك المعنى البتة. هذا؛ ومن جهة أنّها مشتركة للصور كلّها تسمّى مادّة وطينة، ولأنّها تنحّل إليها بالتحليل؛ فتكون هي الجزء البسيط القابل للصورة من جملة المركّب؛ تسمّى أُسْطُقُسّاً، كذلك كلّ ما يجري في ذلك مجراها. ولأنّها يبتدىء منها التركيب في هذا المعنى بعينه؛ تسمّى عنصراً، وكذلك كل ما يجري في ذلك مجراها. وكأنّها إذا <ابتدأ> منها التركيب في هذا المعنى بعينه تسمّى عنصراً، وإذا ابتديء من المركّب وانتهى إليها تسمّى أُسْطُقُسّاً؛ إذ الأُسْطُقُس هو أبسط أجزاء المركب. فهذه هي المباديء الداخلة في قوام الجسم.

(7) The body also has additional principles: an agent and an end. The agent is that which impresses the form belonging to bodies into their matter, thereby making the matter subsist through the form, and from [the matter and form] making the composite subsist, where [the composite] acts by virtue of its form and is acted upon by virtue of its matter. The end is that for the sake of which these forms are impressed into the matters.

(8) Now, since our present discussion concerns the common principles, the agent and end considered here are common to them. Now, what is common may be understood in two ways. One is the way in which the agent is common as producing the first actuality from which all other actualities follow, such as that actuality that provides Prime Matter with the initial corporeal form. If there is such a thing (as you will learn in its proper place),[4] it would provide the initial foundation subsequent to which what comes next reaches completion. The end would be common [in this sense], if there is such an end (as you will learn in its proper place),[5] in that it is the end toward which all natural things tend. This is one way. The other way that something is common is by way of generality, as the universal [predicate] *agent* is said of each of the particular agents of particular things, and the universal [predicate] *end* is said of each one of the particular ends of particular things.

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4. See the *Ilāhīyāt* of the *Najāt* 2.12, for what is perhaps Avicenna's most succinct version of his celebrated proof for a common, efficient cause in this first sense, which can safely be identified with the Necessary Existent in Itself, or God. The version of the proof found in the *Ilāhīyāt* of the *Shifāʾ* its spread throughout that work, although in general see book 8. See also Michael E. Marmura, "Avicenna's Proof from Contingency for God's Existence in the *Metaphysics* of the *Shifāʾ*," in his *Probing in Islamic Philosophy: Studies in the Philosophies of Ibn Sina, al-Ghazali and Other Major Muslim Thinkers* (Binghamton, NY: Global Academic Publishing, 2005), 131–48.

5. Cf. *Ilāhīyāt* 8.6.

(٧) وللجسم مباديء أيضاً ، فاعلة وغائية. والفاعلة هي التي طبعت الصورة التي للأجسام في مادّتها فقوّمت المادة بالصورة، وقوّمت منهما المركّب يفعل بصورته، وينفعل بمادّته، والغائية هي التي لأجلها ما طُبعت هذه الصور في المواد.

(٨) ولما كان كلامنا ها هنا في المباديء المشتركة، فيكون الفاعل المأخوذ ها هنا هو المشترك، والغاية المعتبرة ها هنا هي المشترك فيها ، والمشترك فيه ها هنا يُعقل على نحوين: أحدهما أنْ يكون الفاعل مشتركاً فيه على أنّه يفعل الفعل الأول الذي تترتب عليه سائر الأفاعيل؛ كالذي يفيد المادّة الأولى الصورة الجسمية الأولى – إنْ كان شيء كذلك؛ على ما تعلمه في موضعه – فيكون يفيد الأصل الأول، ثم من بعد ذلك يتمّ كون ما بعده. وتكون الغاية مشتركاً فيها بأنّها الغاية التي تؤمها جميع الأمور الطبيعية، إنْ كانت غاية كذلك، على ما تعلمه في موضعه؛ فهذا نحوٌ. والنحو الآخر؛ أنْ يكون المشترك فيه مشتركاً فيه بنحو العموم؛ كالفاعل الكلّي المقول على كلّ واحد من الفاعلات الجزئية للأمور الجزئية، والغاية الكليّة المقولة على كل وحدةٍ من الغايات الجزئية للأمور الجزئية.

(9) The difference between the two is that in the first sense, *common* denotes a determinately existing entity that is numerically one [and] which the intellect indicates that it cannot be said of many, whereas in the second sense, *common* does not denote a single determinately existing entity in reality, but an object of the intellect that applies to many that are common in the intellect in that they are agents or ends, and so this common thing is predicated of many.

(10) The efficient principle common to all in the first sense (if natural things have an efficient principle in this sense) would not be part of the natural order, since everything that is part of the natural order is subsequent to this principle, and it is related to all of them as their principle [precisely] because they are part of the natural order. So, if that principle were part of the natural order, then either it would be a principle of itself, which is absurd, or something else would be the first efficient principle, which is a contradiction. Consequently, the natural philosopher has no business discussing [such an efficient principle], since it has nothing to do with the science of physics.[6] Also, if there is such a thing, it may be a principle of things that are part of the natural order as well as things that are not part of the natural order, in which case its causality will be of a more general existence than [both] the causality of what specifically causes natural things and the things that are specifically related to natural things.

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6. Here Avicenna is anticipating his position put forth in book 1 of his *Ilāhīyāt* (1.1–2), that discussions of the First Efficient and/or Final Cause—God—properly belong to the subject matter of metaphysics, and that Aristotle and the tradition following him erred when they discussed the deity in the science of physics.

(٩) والفرق بين الأمرين؛ أنَّ المشـــترك بحســـب المعني الأول – يكون في الوجود ذاتاً واحدةً بالعدد؛ يشـــير العقل إليها بأنَّهـــا هي من غير أنْ يجوز فيها قولاً على كثيرين. والمشترك، بحسب المعنى الثاني، لا يكون في الوجود ذاتاً واحدةً، بل أمراً معقولاً يتناول ذواتاً كثيرة تشترك عند العقل في أنَّها فاعلة أو غاية؛ فيكون هذا المشترك مقولاً على كثيرين.

(١٠) فالمبـــدأ الفاعلي المشـــترك للجميع بالنحـــو الأوّل – إنْ كان للطبيعيات مبدأ فاعلـــي من هذا النحو – فلا يكون طبيعياً، إذْ كان كل طبيعي فهو بعد هذا المبدأ؛ وهو منسوبٌ إلى جميعها بأنه مبدؤه؛ لأنّه طبيعي. فلو كان ذلك المبدأ طبيعياً لكان حينئذ مبدأ لنفسه، وهذا محال، أو يكون المبدأ الأول الفاعلي غيره، وهذا خُلْفٌ. فإذا كان كذلك، لم يكن للطبيعي بحثٌ عنه بوجهٍ؛ إذ كان لا يخالط الطبيعيات بوجه. وعساه يكون مبدأ للطبيعيات ولموجودات غير الطبيعيات، فتكون عليته أعمّ وجوداً من علّية ما هو علّة للأمور الطبيعية خاصّة، ومن الأُمور التي لها نسبة خاصّة إلى الطبيعيات، إنْ كان شيء كذلك.

(11) Certainly, it might be possible that, with respect to the totality of natural things, what is an efficient principle of everything within the natural order other than itself is not such absolutely but is the common efficient principle in the latter sense, in which case it would not be at all out of place if the natural philosopher were to investigate [this efficient principle or agent]. The method of that investigation would be [(1)] to discover the state of whatever is an efficient cause of some given natural thing, the manner of its power, its relation to its effect in point of proximity, remoteness, when it is in direct contact and not in direct contact, and the like; and [(2)] to demonstrate it. When he does this, he will have learned the nature of the general [term] *agent* that is common to natural things in the latter sense, since he will know the state that is particular to whatever is an agent among natural things. So also, in an analogous fashion, let him discover the state of the final principle. That the principles are these four[7] (and we shall discuss them in detail later)[8] is a matter postulated in physics but demonstrated in first philosophy.[9]

(12) The body has an additional principle insofar as it is changeable or perfectible or comes to be or is generable, where its being changeable is different from its being perfectible, and both are again different from what is understood by its being something that comes to be and is generable. Now, what is understood by *changeable* is that it had a specific attribute that ceased to exist, and it came to have another attribute. In this case, then, there are [three factors]: [(1)] something that remains—namely, what undergoes the change; [(2)] a state that existed and then ceased to exist; and [(3)] a non-existent state that came to exist. Clearly, then, insofar as [a body] undergoes change, there must be [(1)] something susceptible to [both] that from which and that into which it changed; [(2)] a presently existing form; and [(3)] its privation, which occurred together with the form that departed. An example [of these three factors] would be the robe that became black, the whiteness, and the blackness, where there was a privation of blackness when the whiteness existed.

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7. That is, the four causes of Aristotelian physics: the material, formal, efficient, and final; cf. Aristotle, *Physics* 2.3.

8. See 1.10.

9. See *Ilāhīyāt* 6.1.

(١١) نعــم، قد يجوز أنْ تكون في جملة الأُمور الطبيعية ما هو مبدأ فاعلي لجميع الطبيعيات غير تفســه، لا مبدأ فاعلي لجميع الطبيعات مطلقاً. والمبدأ الفاعلي المشــترك بالنحــو الآخر فــلا عجب أنْ لو بحث الطبيعي عن حاله، ووجه ذلك البحث أنْ يتعرف حال كلّ ما هو مبدأ فاعلي لأمرٍ من الأمور الطبيعية؛ أنَّه كيف قوته وكيف تكون نســبته إلى معلوله، في القرب والبعد، والموازاة والملاقاة، وغير ذلك، وأنْ يبرهن عليه. فإذا فعل ذلك فقد عرف طبيعة الفاعل العام المشــترك للطبيعيات بهذا النحو، إذْ عرف الحال التي تخصّ ما هو فاعل في الطبيعيات من الطبيعيات، وعلى هذا القياس. فاعرف حال مبدأ الغائي. وأمّا أنَّ المبادىء هي هذه الأربعة - وســنفصل الكلام فيها بعد - فهو موضوع للطبيعي مبرهنٌ عليه في الفلسفة الأُولى.

(١٢) هذا؛ وأمّا الجســم من جهة ما هو متغيّرٌ أو مســتكملٌ أو حادثٌ كائنٌ؛ فإنَّ له زيادة مبدأ. وكونه متغيّراً غير كونه مســتكملاً، والمفهوم من كونه حادثاً وكائناً هو غير المفهوم من كليهما جميعاً. فإنَّ المفهوم من كونه متغيّراً أنّه كان بصفةٍ حاصلةٍ بطلت وحدثت له صفةٌ أخرى. فيكون هناك شــيءٌ ثابتٌ هو المتغيّــر، وحالة كانت موجودة فعُدمت، وحالــة كانــت معدومة وجدت. فبيّنٌ أنَّه لا بدّ له - من حيث هو متغيّر - من أنْ يكون له أمرٌ قابل لما تغيّر عنه ولما تغيّر إليه، وصورة حاصلة، وعدم لها كان مع الصورة الزائلة؛ كالثوب الذي اسودّ، والبياض والسواد، وقد كان السواد معدوماً إذْ كان البياض موجوداً.

(13) What is understood by [a body's] being *perfectible* is that it comes to have something that did not exist before, without itself losing anything. An example would be the object at rest that is moved, for so long as it rested, there was only a privation of the motion that belonged to it possibly or potentially, whereas when it is moved, nothing is lost of it except the privation only. [Another] example is the empty slate once one has written on it. That which undergoes perfection must also include [three factors]: [(1)] a determinate being that was imperfect and then was perfected, [(2)] something presently existing in it, and [(3)] a privation that preceded [what is presently existing in it].

(14) Privation, in fact, is a precondition for something's being subject to change and perfection, since, were there no privation, it would be impossible for it to be perfected or changed, but rather, there would always be the presently existing perfection and form. Therefore, what is changed and what is perfected require that a certain privation precede them to the extent that they really are something changeable or perfectible, whereas the privation in that it is a privation does not require that a change or perfection occur. So, the elimination of privation requires the elimination of the changeable and perfectible, insofar as they are changeable and perfectible, whereas the elimination of the changeable and perfectible does not requires the elimination of privation. So privation in this respect is prior, and so is a principle, if *principle* is whatever must exist, however it might exist, in order that something else exist, but not conversely. If that is not sufficient for being a principle, and a principle is not whatever must exist, however it might exist, but rather is whatever must exist simultaneously with the thing whose principle it is without being prior or posterior, then privation is not a principle. We achieve nothing by quibbling over terminology, so in lieu of *principle,* let us use *whatever must . . . but not conversely*. So we find that, in order for the body to be subject to change and perfection, there needs to be [(1)] that which is susceptible to change or perfection, [(2)] privation, and [(3)] form.[10] This is clear to us on the slightest reflection.

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10. Cf. Aristotle, who regarded privation, *sterēsis,* as principle in an accidental sense; see his *Physics* 1.7.190b27, and 1.7.191a13–l5.

(١٣) والمفهوم من كونه مستكملاً هو أنْ يحدث له أمرٌ لم يكن فيه، من غير زوال شيءٍ عنه، مثل الساكن يتحرك؛ فإنَّه حين ما كان ساكناً لم يكن إلاّ عادماً للحركة التي هي موجودة له بالإمكان والقوة، فلمّا تحرّك لم يزل منه شيءٌ إلاّ العدم فقط، ومثل اللوح الساذج كُتِبَ فيه. والمستكمل لا بُدَّ أنْ يكون له ذاتٌ وجدت ناقصة ثم كَمُلت، وأمرٌ حصل فيه وعدمٌ تقدمه،

(١٤) إذ العدم شرطٌ في أنْ يكون الشيء متغيّراً أو مستكملاً. فإنَّه لو لم يكن هناك عدمٌ لا ستحال أنْ يكون مستكملٌ أو متغيّرٌ، بل كان يكون الكمال والصورة حاصلة له دائماً. فإذن المتغيّر والمستكمل يحتاج إلى أنْ يكون قبله عدمٌ حتى يتحقّق كونه متغيّراً أو مستكملاً، والعدم ليس يحتاج في أنْ يكون عدماً إلى أنْ يحصل تغيّرٌ أو استكمالٌ، فرفْع العدم يوجب رَفْع المتغيّر والمستكمل، من حيث هو متغيّر ومستكمل، ورفْع المتغيّر والمستكمل لا يوجب رَفْع العدم. فالعدم من هذا الوجه أقدم؛ فهو مبدأ – إنْ كان كلّ ما لا بُدّ من وجوده، أي وجود كان، ليوجد شيءٌ آخر، من غير إنعكاس – مبدأ، وإنْ كان ذلك لا يفي في كون الشيء مبدأ. ولا يكون المبدأ كلّ ما لا بُدَّ من وجوده للأمر أيّ وجود كان، بل لا بُدّ من وجوده مع الأمر الذي هو له مبدأ، من غير تقدّم ولا تأخّر فليس العدم مبدأ، ولا فائدة لنا في أنْ نناقش في التسمية، فلنستعمل بدل المبدأ المحتاج إليه من غير انعكاس، فنجد القابل للتغيّر والاستكمال، ونجد العدم، ونجد الصورة؛ كلّها محتاجاً إليه في أنْ يكون الجسم متغيّراً أو مستكملاً، وهذا يتّضح لنا بأدنى تأمل.

(15) What is understood by the body's being something subject to generation and coming to be compels us to affirm something that has come to be as well as a preceding privation. As for whether the generation and coming to be of what is subject to such requires a preceding substance that [initially] was associated with the privation of the generable form and then ceased to be associated with it once the privation of [the form] ceased, that is not something that is obvious to us on immediate inspection. In fact, for physics we must simply posit it and content ourselves with inductive proof, but we will demonstrate it in first philosophy.[11] Dialectic may sometimes provide a useful bit of information to quiet the soul of the student, but [take care] not to confuse the demonstrative with the dialectical.

(16) Among the principles, the body has those that are inseparable from it and by which it subsists: it is these that we specifically term *principles*. Insofar as [the body] is a body absolutely, these are the aforementioned material and corporeal form, which necessarily entails the accidental quantities, or the specific form that perfects it. Insofar as [the body] is the subject of change, perfection, and generation, it is additionally related to the privation associated with its material, which is a principle in the sense previously mentioned. Now, if we consider what is common to the changeable, the perfectible, and the generable, the principles are a certain material, a disposition, and a privation. Now, if we confine ourselves to the changeable, then the principles are a certain material and some contrary, for the thing that changes out of and into the intermediate does so only inasmuch as it contains a certain contrariness. The difference between contrariety, disposition, and privation is apparent from what you have learned and can be acquired by you from what you have been taught.

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11. Avicenna has argued that, in the case of what is changeable and what is perfected, there must be three factors: (1) an underlying thing, (2) a form, and (3) a privation. In the case of what is generated and comes to be in time it is likewise obvious that there is something that comes to be—the form—and a privation. What is not obvious is whether there must always be a pre-existing underlying thing. That is because if there must be, then it is quite easy to show that the world is eternal, which, in fact, is the issue to which Avicenna is alluding here. See *Ilāhīyāt* 4.2, where he argues that matter must precede all generation and temporal coming to be and thus provides the key premise in his argument for the eternity of the world; see also 3.11 of the present work where, despite his claim that this issue should not be treated in the science of physics, he provides arguments much like those found in the *Ilāhīyāt*.

(١٥) والمفهوم من كون الجسم كائناً وحادثاً يضطرنا إلى إثبات أمر حَدَثَ وإلى عدم سبق. وأمّا أنَّ هذا الحادث وهذا الكائن هل يحتاج إلى أنْ يتقدم كونَه وحدوثَه وجودُ جوهرٍ كان مقارناً لعدم الصورة الكائنة ثم فارقه وبَطل عنها العدم، فهو أمرٌ ليس يبين لنا عن قريب بيان ذلك، بل يجب أنْ نضعه للطبيعي وضْعاً ونقنعه بالاستقراء، ونبرهن عليه في الفلسفة الأولى. وربّما قامت صناعة الجدل في إفادة نفس المتعلم طرفاً صالحاً من السكون إليه، إلاّ أنَّ الصنائع البرهانية لا تُخلط بالجدل.

(١٦) فالجسم له من المباديء التي ليست مفارقة له ولما فيه بالقوام؛ وإياها نخصّ باسم المبادىء. أمّا من حيث هو جسم مطلقاً؛ فالهيولى والصورة الجسمية المذكورة التي تلزمها الكميّات العرضية، أو الصورة النوعية التي تكمله. وأمّا من من حيث هو متغيّرٌ أو مستكملٌ أو كائنٌ، فقد تزيد له نسبة العدم المقارن لهيولاه قبل كونه، ويكون مبدأ على ما قيل. فإنْ أخذنا ما يعمّ المتغيّر والمستكمل والكائن؛ كانت المباديء هيولى وهيئة وعدما، وإنْ خصّصنا المتغيّر كانت المباديء هيولى ومضادّة، فإنَّ المتوسط إنّما يتغيّر عنه وإليه من حيث فيه ضدّية مّا. ويشبه أنْ يكون الفرق بين المضادّة والهيئة والعدم ممّا قد عرفته، ويحصل لك فيما قد عُلّمتَه.

(17) Now, the disposition of the substance, insofar as it is substance, is a form, whereas the disposition of that which is undergoing nonsubstantial change and perfection is an accident, and we have already explained to you the difference between form and accident. In this context, however, it is standard to call every disposition *form;* and so let us do so, where by *form* we mean anything that comes to be in a recipient such that [the recipient] comes to have a certain specific description. The material is distinct from both [that is, form and privation] in that it has its own existence together with each of them. Form is distinct from privation in that the form is, in itself, a certain essence that adds to the existence belonging to matter, whereas privation does not add to the existence that belongs to matter, but rather is a certain accompanying state that corresponds with this form when [that form] does not exist but the potential to receive it does exist. This privation, however, is not absolute privation, but one having a certain mode of being, since it is a privation of some thing, bringing along with itself a certain predisposition and preparedness in some determinate matter. So, [for example,] human does not come to be from whatever is nonhuman, but only from nonhuman in what is receptive to [the form of] humanity. So generation [comes about] by the form, not the privation, whereas it is through the privation, not form, that there is corruption.

(١٧) والجوهـــر – من حيث هو جوهـــر – فهيئته صورة؛ وقد عرّفناك الفرق بين الصورة والعرض، وأمّا المتغيّرات والمستكملات لا في الجوهرية فهيئتها عرض. وقد جرت العادة أنْ تسمّى كل هيئة في هذا الموضع صورة، فلنسم كلّ هيئة صورة؛ ونعني به كلّ أمرٍ يحدث في قابل يصير له موصوفاً بصفةٍ مخصوصة، والهيولى تفارق كلّ واحدٍ منهما بأنّها توجد مع كلّ واحدٍ منهما بحالها، والصورة تفارق العدم؛ بأنَّ الصورة ماهيّة مّا بنفســـها، زائـــدة الوجـــود على الوجود الذي للهيولـــى، والعدم لا يزيد وجـــوداً على الوجود الذي للهيولى، بل يصحبه حال مقايسته إلى هذه الصورة إذا لم تكن موجودة، وكانت القوة على قبولها موجودة. وهذا العدم ليس هو العدم المطلق؛ بل عدم له نحوٌ من الوجود؛ فإنّه عدم شيءٍ مع تهيؤٍ واستعدادٍ له في مادة معيّنة. فإنَّه ليس الإنسان يكون عن كلّ لا إنسانية، بل عن لا إنسانية في قابلٍ للإنسانية، فالكوْن بالصورة لا بالعدم، والفساد بالعدم لا بالصورة.

(18) It is often said that something was from the material and from the privation, whereas it is not said that it was from the form. So it is both said that the bed was from the material—that is, from the wood—and from the non-bed. Now, in many cases it is all right to say that [the thing] came to be from the material, but in many others it is not, whereas it is always said that it was from the privation. A case in point is that we do not say that a writer was *from* the man, but that the man *was* a writer, whereas we say that a man was from the semen, and a bed was from the wood. The reason for this, in the case of the semen, is that the seminal form is cast off. In this instance, *from* is equivalent to *after,* just as the claim *it was from the privation* signifies the same thing as *a man was from the not-man*—that is, *after* the not-man. As for the case of wood, and so again where a bed is said to be from the wood, it was because the wood is devoid of a certain form, even if it is not devoid of the form of wood, since unless the wood changes with respect to some description and shape, through carving and woodworking, neither will there be the bed from it nor will it take on the shape of [the bed]. So, in some sense, [the wood] resembles the semen, since both of them changed from their current state, and so we use *from* also in the case of [the wood].

(١٨) وقد يقال إنَ الشـــيء كان عن الهيولى وعن العدم، ولا يقال كان عن الصورة، فيقال إنَّ السرير كان عن الهيولى أي عن الخشب، ويقال كان عن اللاسرير، وفي كثيرٍ من المواضـــع يصح أنْ يقال إنَّه كان عـــن الهيولى، وفي كثير منها لا يصح، ودائماً يقال إنَّه كان عن العدم. فإنَّه لا يقال كان عن الإنسان كاتب، بل يقال إنَّ الإنسان كان كاتباً، ويقال عن النُطْفة كان إنســـان، ويقال عن الخشب كان سرير. والسبب في ذلك؛ أمّا في النُطْفة فلأَّ نهـــا خلعتْ صورة النُطْفية، فتكون ها هنـــا لفظة «عن» تدل على «بعد»؛ كما يدلّ في قولهم: كان عن العدم، كما يقال إنَّه كان عن اللاإنســـان إنسانٌ، أي بعد اللاّإنسانية. وأمّا في الخشـــب فحيث يقال أيضاً عن الخشب كان سريرٌ، فكان؛ لأنَّ الخشبَ، وإنْ لم يخلُ عن صورة الخشب، فقد خلا عن صورةٍ مّا، إذ الخشب ما لم يتغيّر في صفةٍ من الصفات وشـــكلٍ من الأشكال بالنحت والنّجر، لا يكون عنه السرير، ولا يتشكل بشكله، فيشبه النُطْفة من وجه، إذ كل منهما قد تغيّر عن حاله، فنستعمل فيه أيضا لفظة عن.

(19) About these two kinds of subjects and material things, we may say *from* in the sense of *after,* but there is another kind of subjects about which we use *from* and *out of* in another sense. To illustrate that, when one of the forms has certain subjects that are produced for it only by means of mixture or composition, then what is generated is said to be *from* them, and so *from* and *out of* signify that what is generated is constituted by [those subjects], just as we say that the ink was *from* vitriol and gall. It also would seem that *from,* [both] in the sense of something composed of after-ness and in this latter sense, is said about the first kind [of subjects and material things]. [That] is because what is meant by something's having been from the semen or wood is that it was after they were in a certain state as well as that something was drawn from them, where the generated thing, which was said to be from them, was made to subsist. Now, it is not said about what is like the semen or vitriol that it was the generated thing, such that the semen would be said to be a man or vitriol to be ink, as it is said[12] that man was a writer, save in some figurative sense meaning that [the semen or vitriol] *became* (that is, changed), whereas both ways are said about what is like the wood. So [in the case of wood], it is said that a bed was *from* the wood and the wood *was* a bed, because the wood, as wood, does not undergo corruption in the way the semen does, and so [the wood] is like the man insofar as he is susceptible to being something that writes. Still, if it is not devoid of a certain shape, it cannot receive the shape of a bed, and so it is like the semen insofar as [the semen] is altered into being something that is a man.

12. Following **Z**, **T**, and the Latin, which do not have the negation *lā*.

(١٩) فهذان الصنفان من الموضوعات والهيولّيات يقال فيهما «عن» بمعنى «بعد»، وصنفٌ من الموضوعات يستعمل فيه لفظة «عن» ولفظة «من» على معنى آخر. وبيان ذلك أنَّه إذا كانت موضوعات مّا لصورةٍ من الصور؛ إنّما توضع لها بالمزاج والتركيب، فقد يقال إنَّ الكائن يكون عنها، فيدل بلفظة «عن» وبلفظة «من» على أنَّ الكائن متقوّم منها كقولنا عن الزّاج والعفص كان المداد. ويشبه أيضاً أن يكون الصنف الأوّل يقال فيه لفظة «عن» بمعنى مركّب من البَعْدية وهذا المعنى. إنَّ النُطْفة أو الخشب كان عنهما ما كان؛ بمعنى أنَّه كان بعد أنْ كانت على حالٍ، ثم أُستل منهما شيءٌ وقوّم به الكائن الذي قيل إنَّه كان عنهما. فما كان مثل النُطْفة أو الزاج فلا يقال فيه أنَّه كان الشيء الكائن؛ فلا يقال إنَّ النُطْفة كانت إنساناً، أو الزّاج كان حبراً. كما يقال إنَّ الإنسان كان كاتباً إلاّ بنوعٍ من المجاز وبمعنى صار أي تغيّر. وما كان مثل الخشب فقد يقال فيه كلا الوجهين: فيقال عن الخشب كان سريرٌ، وأنَّ الخشب كان سريراً؛ وذلك لأنَّ الخشب - من حيث هو خشب - لا يفسد فساد النُطْفة، فيشبه الإنسان من حيث يقبل الكتابة. ولكنه ما لَمْ يُخلِ شكلاً لم يقبل شكل السرير، فيشبه النُطْفة من حيث تَستحيل إلى الإنسانية.

(20) Now, in those cases where it is not acceptable to say *from,* it becomes so once the privation is added to it—as, for example, saying, *a writer was from a* nonwriting *man.* It is never acceptable, however, to say it about the privation itself, except together with *from,* for we do not say that the nonwriter *was* a writer; otherwise, a nonwriter would be a writer. Certainly, if one does not mean by *nonwriter* the nonwriter himself, but simply the subject who is described as a nonwriter, then we can say that, and [of course] it is always acceptable to use *from* in this case. Still, I do not insist on this and similar cases, since languages may differ in the license and proscription of these uses. I only say that when we mean by *from* the two aforementioned senses, they are permissible where we allowed and not permissible where we did not allow.

(21) In the place corresponding with the present one,[13] there is sometimes mentioned the material's desire for the form and its imitating the female, while the form imitates the male, but this is something I just do not understand [for the following reasons]. As for the desire associated with having a soul, there is no dispute about denying it of the material. Equally improbable is the natural compulsive desire whose incitement is in the way of a drive, as, for example, belongs to the stone to move downward in order that it be perfected after being displaced from its natural place.

13. That is, in Aristotle's *Physics* 1.9.192a22–25.

(٢٠) وحيــث لا يصح من ذلك أنْ يقال فيه «عن» ، فإذا أُضيف إليه العدم صحّ ، كما يقال عن الإنســان ‹غير› الكاتب كان كاتب . والعدم نفسه لا يصح فيه البتّة أنْ يقال إلاّ مع لفظة «عن» ، فإنَّه لا يقال إنَّ غير الكاتب كان كاتباً ، وإلاّ فيكون كاتباً غير كاتب ، نعــم إنْ لم نعن بغير الكاتب نفس غير الكاتــب ، بل الموضوع الموصوف بأنّه غير كاتبٍ ، فربما قيل دلك . وأما لفطه «عن» فيصح استعمالها فيه دائما ، على أني لا اتشدد في هذا وما أشــبهه : فعســى اللغات تختلف في إباحة هذه الاستعمالات وحظرها . بل أقول إذا عُني بلفظة «عن» المعنيان اللّذان ذكرناهما جازا حيث أجزنا ، ولم يجوزا حيث لم نُجز .

(٢١) وقــد يذكر في مثل هذا الموضع حال شــوق الهيولى إلى الصورة وتشــبيهها بالأُنثى وتشبيه الصورة بالذكر ؛ وهذا شيء لستُ أفهمه . أمّا الشوق النفساني فلا يُختلف في ســلبه عن الهيولى ، وأمّا الشوق التســخيري الطبيعي الذي يكون إنبعاثه على سبيل الإنْسياق ، كما للحجر إلى التسفّل ليستكمل به بعد نقْصٍ له في أيْنه الطبيعي .

(22) Again, then, it would have been possible for the material to desire forms, were it free of all forms, or [if] it grew weary of a given form joined to it or lost the sense of contentment with the presently existing forms that perfect it as a species, or [if] it could move itself toward the acquisition of form, in the way the stone acquires [its natural] place (assuming that it possessed a motive power). Now, it is not the case that [the material] is devoid of all forms. Also, [the material] is not the sort of thing that grows weary of the presently existing form so as to work for its dismissal and destruction. [That] is because if the weariness is the necessary result of the very presence of this form, then [the form] is necessarily undesirable, whereas if [the weariness] results from the length of time, the desire would not be something in the substance of [the material] but something that accidentally happens to it after a period of time, in which case there is a cause necessitating it. Equally impossible is that [the material] grew discontent with the presence [of the form] and rather desired to gather contraries into itself, which is absurd. The [real] absurdity, however, seems to be having supposed that it desires [in] the way [that] the soul desires. The [natural] compulsive desire, on the other hand, is only for some end in the perfecting nature. Now, natural ends are inevitable, and so, notwithstanding this, how can the material be moved toward the form when its being disposed to the form arises only from some cause that nullifies the existing form, not its acquiring [that form] through its own motion? Had [the Peripatetics] not made this desire a desire for the forms that make [the material] subsist, which are first perfections, but rather, [made it] a desire for the secondary concomitant perfections, it would have been difficult enough understanding the sense of this desire; but how [is it possible at all] when they have made this desire a desire for the forms that cause [the material] to subsist?

(٢٢) فهذا أيضاً بعيدٌ عنه فلقد كان يجوز أنْ تكون الهيولى مشـــتاقة إلى الصور ؛ وكان هناك خلوٌ عن الصور كلّها ، أو ملال صورة مقارنة ، أو فقدان القناعة بما يحصل من الصور المكملة إيّاها نوعاً ، وكان لها أنْ تتحرك بنفســها إلى اكتســاب الصورة كما للحجر في اكتساب الأين – إنْ كان فيها قوة محرّكة – وليست خالية عن الصور كلّها . ولا يليق بهــا الملال للصورة الحاصلة ، فتعمل في نقضهــا ورفضها . فإنَّ حصول هذه الصورة – إنْ كان موجبــاً للمــلال لنفس حصولها – وَجَبَ أنْ لا يشــتاق إليها ، وإنْ كان لمدةٍ طالت ، فيكون الشوق عارضاً لها بعد حين لا أمراً في جوهرها ؛ ويكون هناك سببٌ يوجبه . ولا يجــوز أيضاً أن تكون غير قانعةٍ بما يحصل ، بل مشــتاقة إلى اجتماع الأضداد فيها ؛ فإنَّ هذا محال ، والمحال ربّما ظُنَّ أنَّه يُشتاق إليه الاشتياق النفساني . وأما الاشتياق التسخيري فإنّما يكون إلى غايةٍ في الطبيعة المكمّلة ، والغايات الطبيعية غير محالة . ومع هذا ؛ فكيف يجوز أنْ تكون الهيولى تتحرّك إلى الصورة؟ وإنّما تأتيها الصورة الطارئة من ســببٍ يُبطل صورتها الموجودة لا أنّها تكسبها بحركتها . ولو لم يجعلوا هذا الشوق إلى الصورة المقوّمة التي هي كمالات أُولى ، بل إلى الكمالات الثانية اللاحقة ، لكان تصوّر معنى هذا الشــوق من المتعذر ، فكيف وقد جعلوا ذلك شوقاً لها إلى الصورة المقوّمة؟

(23) For these reasons, it is difficult for me to understand this talk, which is closer to the talk of mystics[14] than that of philosophers. Perhaps someone else will understand it as it should be, so that one might refer to him in this matter. If the material [understood] absolutely were replaced with a certain material that is [already] perfected by the natural form so that, from the natural form that belongs in it, it comes to have an incitement toward the perfections of that form—like, for example, earth's moving downward and fire's moving upward—there would be some sense to this talk, even if it attributed that desire to the active form. In an absolute sense [of the material], however, I cannot understand it.

14. Literally, Sufis.

(٢٣) فمن هذه الأشـياء يعْسُـر عليَّ فهم هذا الكلام الذي هو أشبه بكلام الصوفية منه بكلام الفلاسـفة! وعسـى أنْ يكون غيري يفهم هذا الكلام حقَّ الفهم؛ فليُرجع إليه فيه. ولو كان بدل الهيولى بالإطلاق؛ هيولى ما تسـتكمل بالصورة الطبيعية حتى يحدث من الصورة الطبيعية التي فيها لها إنبعاثٌ نحو إسـتكمالات تلك الصورة، مثل الأرض في التسـفّل والنار في التصعّد، لكان لهذا الكلام وجهٌ - وإنْ كان مرجع ذلك الشـوق إلى الصورة الفاعلة - وأمّا على هذا الإطلاق فممّا لستُ أفهمه.

Chapter Three

How these principles are common

(1) Since our inquiry is about common principles only, we should inquire into which of the two aforementioned ways[1] these three common principles [that is, matter, form, and privation] are common.

(2) It will become apparent to us later[2] that some bodies are susceptible to generation and corruption (namely, those whose material acquires a new form and loses another), while others are not susceptible to generation and corruption and instead exist as a result of an atemporal creation.[3] If that is the case, then there is no common material in the first of the two senses, since there is no single material that is sometimes susceptible to the form of what undergoes generation and corruption and at other times is susceptible to the form of what is naturally incorruptible and has no material generation. So that is impossible. (In fact, however, it might be possible that the class of bodies subject to generation and corruption has material that is common to those that are generated out of and corrupted into one another, as we shall show in the case of the four properly called *elements* [namely, earth, water, air, and fire].)[4] Or at best, [if a common material for both what is and what is not subject to generation and corruption is not impossible], we would have to concede that the nature of the subject that belongs to the form of what is incorruptible and the subject that belongs to the form of what is corruptible is a single nature that, in itself, is able to receive every form, except that what is incorruptible was accidentally joined with a form that has no contrary.

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1. See 1.2.8–11, where again Avicenna notes two distinct ways in which natural things can share something in common. So, on the one hand, *common* might be understood as a numerically singular thing common to all natural things, or, on the other hand, *common* might be understood as some specifically or generically similar notion applying to all natural things equally. So, for example, *agent* understood as something common to natural things in the first instance would signify God, whereas in the second instance it would signify the universal predicate *agent*.

2. This point is discussed in detail throughout *Kitāb fī al-kawn wa-l-fasād*.

3. For a detailed discussion of Avicenna's use of *ibdā*^{c} (atemporal creation), see Jules Janssens, "Creation and Emanation in Ibn Sīnā," *Documenti e studi sulla tradizione filosofica medievale* 8 (1997): 455–77.

4. See for instance *Kitāb fī al-kawn wa-l-fasād,* chs. 9 and 14.

<الفصل الثالث>

في كيفية كوْن المبادىء مشتركة

(١) لمّا كان نظرنا هذا إنّما هو في المباديء المشـــتركة فيحق علينا أن ننظر في هذه المبادىء <الثلاثة> المشـــتركة؛ إنّها على أي نحوٍ من النحوين المذكورين تكون مشـــتركة.

(٢) لكنه ســـيظهر لنا أنَّ الأجســـام منها ما هي قابلة للكون والفساد، أي منها ما هيولاها تستجدّ صورة وتُخلي صورة، ومنها ما ليس قابلاً للكون والفساد، بل وجودها بالإبداع. فإذا كان كذلك؛ لم تكن هيولى مشـــتركة على النحو الأوّل من النحوين؛ فإنّه لا تكون هيولى واحدة تارة تقبل صورة الكائنات الفاســـدة وتارة تقبل صورة ما لا يفسد في طباعه ولا له كونٌ هيولاني، فإنَّ ذلك مســـتحيل. بل ربّما جاز أنْ تكون الهيولى المشتركة لمثل الأجسام الكائنة الفاسدة التي يتكون بعضها من بعض، ويفسد بعضها إلى بعض، كما ســـنبيّن من حال الأربعة التي تسمّى الأُسْطُقسْات. اللّهم إلاَّ أنّ نجعل طبيعة الموضوع التي لصورة ما لا يفســـد والموضوع لصورة ما يفسد، طبيعةً واحدةً في نفسها صالحة لقبول كل صورة إلاَّ أنَّ ما لا يفسد قد عرض أنْ قارنته الصورة التي لا ضدّ لها، فيكون السبب في

In this case, the reason that things not subject to generation and corruption are such would be owing to their form, which, as a result of what is in their natures, hinders the matter, not because the matter is passive. Assuming that—which is unlikely, in light of what will become clear later[5]—a common material, would exist in this way. The common material in this way—whether common to all natural things or just those subject to generation and corruption—would be something resulting from an atemporal creation, neither being generated out of nor corrupted into anything; otherwise, [this common material] would need another material, in which case that [other material] would be prior to it and common.

(3) As for whether natural things have a formal principle common in the first of the two ways, only the corporeal form among the forms that we imagine belongs to them as such. So if you turn to the bodies undergoing generation and corruption that are only in what immediately follows the corporeal form (so that the corporeal form that is in water, for example, when air undergoes alteration [into water], is something that itself remains in the water), then the bodies so described would have formal principles that are numerically common to them, whereas [the bodies] thereafter have individual formal principles specific to each of them. If this is not the case, and instead when the form of water is corrupted, there is in the corruption of the form of water the corruption of the corporeality that belonged to [the water's] material and some other corporeality different in number but similar in kind comes to be, then bodies would not have this kind of common, formal principle. The truth concerning the two cases will become apparent to you in its proper place.[6] Should bodies, or some subset of bodies, or even a single body, have a formal principle of this kind as an inseparable form, then that formal principle would eternally be joined with matter and would not undergo generation and corruption, but instead it would again result from an atemporal creation.

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5. It is not clear to what Avicenna is referring. Perhaps he means the necessary role of matter with respect to those things that at are *ḥādith*—that is, what comes to be in time and, as such, would be subject to generation and corruption. See 3.11 below and *Ilāhīyāt* 4.2.

6. The reference would appear to be to *Kitāb fī al-kawn wa-l-fasād* 14 and *Ilāhīyāt* 9.5.

أنّها لا تكون ولا تفسد من جهة صورتها المانعة لمادّتها عمّا في طباعها ، لا من جهة المادّة المطاوعة. فإنْ كان كذلك – وبعيدٌ أنْ يكون كذلك على ما سيتضح بعد – فسيكون حينئذ هيولى مشتركة بهذا الوجه، والهيولى المشتركة بهذا الوجه، سواء كانت مشتركة للطبيعيات كلّها أو للكائنات الفاسدة منها ، فإنّها متعلقة بالإبداع، وليست تكون من شيء وتفسد إلى شيء ، وإلاّ كانت تحتاج إلى هيولى أخرى، فتكون تلك متقدمة عليها ومشتركة.

(٣) وأمّا هل للطبيعيات مبدأ صوري مشترك بالنحو الأول من النحوين ، فليس يوجد لها من الصور ما تتوهمه أنّه ذاك إلاّ الصورة الجسمية. فإنْ كان تصرف الأجسام في الكون والفساد إنّما يكون فيما وراء الصورة الجسمية؛ حتى تكون مثلاً الصورة الجسمية التي في الماء – إذا استحال هواء – باقية بعينها في الماء. فيكون للأجسام مبادىء صورية على هذه الصفة مشترك لها بالعدد ، ووُجد لها بعده مباديء صورية يخص كلّ واحدٍ منها واحدة منها ، وإنْ كان الأمر ليس كذلك، بل إذا فسدتْ المائية فسدت الجسمية التي كانت لهيولاه في فساد المائية، وحدثت جسمية أُخرى مخالفة بالعدد موافقة في النوع، فلا يكون للأجسام مثل هذا المبدأ الصوري المشترك، وسيظهر لك الحقّ من الأمرين في موضعه. ولو كان للأجسام مبدأ صوري بهذه الصفة، أو لطائفةٍ من الأجسام، أو لجسم واحدٍ صورة لا تفارق، لكان ذلك المبدأ الصوري مداوم الاقتران بالهيولى، ولم يكن ممّا يكون ويفسد ، بل يتعلق أيضاً بالإبداع.

(4) As for privation, it is clearly altogether impossible that there be a common privation in the first sense. [That is] because this privation is the privation of something, *x,* that regularly comes to be through a process of generation; and if it is such, then it is likely that *x* will be generated, and so at that time this privation will no longer remain. In that case, however, it is not something common.

(5) As for that which is common in the second of the two senses, the three principles are common to what is subject to generation and change, since it is common to all [of those sorts of things] that they all have matter, form, and privation.

(6) *Being neither generable nor corruptible* is predicated of what is common in the same way that it is predicated of universals—namely, in two ways. One way by which we mean that the universal is neither generable nor corruptible is that with respect to the world, there is no moment that is the first moment at which some first individual or number of first individuals of whom the universal is predicated existed and before which there was a moment at which none of [those individuals] existed. The case would be the parallel opposite to this with respect to corruption. In this way, some people (namely, those who require that as long as the world exists there always be generation, corruption, and motion in it) say that these common principles are neither generable nor corruptible. The second way is to inquire into their essence—as, for example, the essence of man—and then consider whether [man] *qua* man is subject to generation and corruption. In this case, accounts of generation and corruption are found that are not the account of man *qua* man, and so both are denied of the essence of man *qua* man, because something that is necessarily joined to him is not intrinsic to him. The same is said about these principles that are common in the second of the two ways that [the predicate] *being common* was used; and in the present context, our inquiry and discussion are about the principles from this perspective and not the first one.

(٤) وأمّا العدم فواضحٌ من حاله أنَّه لا يجوز أنْ يكون من جملته عدمٌ مشتركٌ بهذا النحو الأول؛ لأنَّ هذا العدم هو عدم شيءٍ من شأنه أنْ يكون، وإذا كان من شأنه أنْ يكون، لم يبعد أنْ يكون، فحينئذ لا يبقى هذا العدم، فحينئذ لا يكون مشتركاً.

(٥) وأمّا المشترك على النحو الآخر من المعنيين فإنَّ المباديء الثلاثة توجد مشتركة للكائنات والمتغيّرات، إذ تشترك كلّها في أنَّ لكل منها هيولى وصورة وعدماً.

(٦) وهذا المشترك يقال إنَّه لا يكون ولا يفسد، على نحو ما يقال للكلّيات أنَّها لا تكون ولا تفسد ويقال للكلّيات أنَّها لا تكون ولا تفسد على وجهين؛ فنعني بأحد الوجهين أنَّ الكلّي لا يكون ولا يفسد، أي أنَّه لا يكون وقتٌ في العالم هو أول وقتٍ وجد فيه أول شخصٍ أو عدّة أوائل أشخاص يُحمل عليها ذلك الكلّي، وكان قبله وقت، وليس ولا واحد منها موجوداً فيه، وفي الفساد ما يقابل هذا. فبهذا الوجه، من الناس من يقول إنَّ هذه المباديء المشتركة لا تكون ولا تفسد، وهم القوم الذين يوجبون في العالم دائماً؛ كوناً وفساداً وحركة، ما دام العالم موجوداً. والوجه الثاني؛ أنْ يُنظر إلى ماهيّتها، كماهيّة الإنسان، فينظر هل هو من حيث هو إنسان يكون أو يفسد، فيوجد معنى إنّه يكون ومعنى إنَّه يفسد ليس معنى الإنسان من حيث هو إنسان، فيسلبان عن ماهيّة الإنسان من حيث هو إنسان لأنَّه أمرٌ يلزمه ليس داخلاً فيه. وكذلك يقال في هذه المبادىء المشتركة بالنحو الثاني من نحويْ الاشتراك المذكور. ونظرنا ها هنا في المباديء هو من هذه الجهة، وليس كلامنا هاهنا في الجهة الأُولى.

(7) In the case where we intend the existence of concrete particulars, then, there will be materials that are subject to generation and corruption, such as the wood of the bed and gall for ink; whereas Prime Matter, to which we have gestured,[7] is not subject to generation and corruption, but exists only as a result of an atemporal creation. As for forms, some are generated and corrupted (namely, the ones subject to generation and corruption), whereas others are not (namely, those that are atemporally created). In another sense, however, it might be said of [forms] that they are neither generable nor corruptible, for it might be said of the forms that involve generation and corruption that they are not generated and corrupted in the sense that they are not a composite of form and material so as to undergo generation and corruption, since in this case, one means by *generation* (and the parallel opposite for *corruption*) that a subject comes to have a form, where it is through the [form and matter] together that something is generable.

(8) As for privation, its generation (if it has one) is its being present after it was not. Also, its being present and existing cannot be as some presently existing determinate entity in itself; but rather, it exists accidentally, because it is a privation of some determinate thing, *F,* in some determinate thing, *x,* in which there is the potential of [*F*]. Therefore, [privation] likewise has some accidental mode of generation and corruption. Its generation, then, is that the form is removed from the matter through corruption, in which case a privation [conversely related] to this attribute becomes present, whereas its corruption is that the form becomes present, at which time the privation that [is conversely related] to this attribute no longer exists. Now, this privation has an accidental privation, just as it has an accidental existence, where its privation is the form. Be that as it may, the form's subsistence and existence are not relative to it; but rather, that belongs to it accidentally through a certain

7. See 1.2.8 and par. 2 of the present chapter.

(٧) وأمّـا إذا قصدنـا إلى الأعيـان الموجودة؛ فها هنا هيوليات تكون وتفسـد؛ كالخشـب للسـرير والعفص للحبر. والهيولى الأُولى - التي أشـرنا إليها - لا تكون ولا تفسـد، إنّما هي متعلقة الوجود بالإبداع. وأمّا الصور فبعضها يكون ويفسـد، وهي التي في الكائنة الفاسدة، وبعضها لا يكون ولا يفسد وهي التي في المبدعات. وقد يقال لها إنّها لا تكون ولا تفسد بمعنى آخر؛ فإنَّه ربّما قيل للصور التي في الكائنة الفاسدة إنّها لا تكون ولا تفسـد؛ بمعنى أنَّها غير مركبة من هيولى وصورة حتى تكون وتفسد؛ إذ يراد بالكون حينئذ حصول صورة لموضوع ويكون الكائن مجموعهما، وبالفساد ما يقابله.

(٨) وأمّـا العدم، فإذا كان كونه - إنْ كان له كَوْن - هو حصوله بعد ما لَمْ يكن، وكان حصولـه ووجوده ليس وجود ما له ذات حاصلة بنفسـه بل كان وجوده بالعرض، لأنَّه عدم شـيءٍ معيّن في شـيءٍ معيّن هو الذي فيه قوّته، فنكون له نحوٌ من الكون أيْضاً بالعرض ومن الفسـاد بالعرض. فكونه هو أنْ تفسـد الصورة عن المادّة فيحصل عدمٌ بهذه الصفـة، وفسـاده أنْ تحصل الصورة فلا يكون حينئذٍ العدم الـذي بهذه الصفة موجوداً. ولهـذا العدم عـدمٌ بالعرَض، كما أنَّ له وجوداً بالعـرض، وعدمه هو الصورة، لكن ليس قـوام الصورة ووجودها هـو بالقياس إليه، بل ذلك يعرض له باعتبار مّا، وقوام هذا العدم

consideration—that is, the subsistence and existence of this privation is a result of the relation itself to this form. So it is as if the privation of privation is a certain consideration accidentally belonging to the form from among the infinitely many relational considerations that might accidentally belong to something. The potentiality for privation is of the same type, since real potential is relative to actuality and perfection, and there is no perfection by privation, nor does it really have an actuality.

(9) Concerning these three common principles, we should also know in what way they are common in relation to whatever falls under any one of the things in which they are common. The claim of those[8] who say that each one of them is an equivocal term we find distressing, since, if that is the case, then the efforts of this group would be limited to finding three terms for the many principles, each one of which would include a subset of the principles, while the three terms [together] would encompass all. Had it been possible that this were enough, the important issue would have been that, among ourselves, certain terms are adopted as a matter of convention and there is agreement upon them. Whether we should have been the ones to do that or not and instead we accepted what others did, we would have nothing available to us but three terms and would not be one step closer [to understanding] what the principles signify. What an awful thing to inflict upon whoever would content himself with this! Equally, we cannot say that each one of them indicated what is included in it by way of sheer univocity. How could that be, when different kinds of various categories fall under each one of them, differing with respect to the meaning of *principles* by way of priority and posteriority? In fact, they must signify by way of analogy,[9] just as *being*, *principle*, and *unity* signify. We have already explained in the section on logic the difference between what is analogous as compared with what is agreed upon and what is univocal.[10]

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8. I have not been able to identify the referent here. The claim that *matter, form,* and *privation* are equivocal terms does not appear in Aristotle's explicit discussion of the principles of nature in book 1 of the *Physics,* nor have I found it in the earlier extant Arabic commentaries on the *Physics.*

9. *Tashkīk* literally has the sense of "being ambiguous" or even "equivocal." In the present context, it would seem that Avicenna is using it in the sense of the Aristotelian *pros hen* equivocation. For a discussion of *pros hen* equivocation see G. E. L. Owens, "Logic and Metaphysics in Some Earlier Works of Aristotle," in *Logic, Science and Dialectic: Collected Papers in Greek Philosophy* (Ithaca, NY,: Cornell University Press, 1986), 180–99.

10. The reference seems to be to *Kitāb al-jadal* 2.2.

ووجــوده هو بنفس القياس إلى هذه الصورة. فكأنَّ عــدم العدم اعتبار ما يعرض للصورة من الاعتبارات الإضافية التي ربّما عرضت للشــيء إلى غير نهاية. والقوة على العدم هي بهذه المنزلة؛ لأنَّ القوة الحقيقية هي بالقياس إلى الفعل والاســتكمال، ولا استكمال بالعدم ولا فعلٌ حقيقاً له.

(٩) ويجــب أن نعلم أيضاً؛ أنَّ هذه المباديء الثلاثة المشــتركة على أي نحو يكون مشــتركاً فيها بالقياس إلى ما تحت كلّ واحدٍ ممّا فيه تكون الشــركة. فإنَّه يعظم علينا ما يقولونه من أنَّ إســم كلّ واحدٍ منها مشــترك؛ فإنه إن كان كذلك، فيكون سعي الجماعة مقصــوراً علــى أنْ يوجدوا للمباديء الكثيرة ثلاثة أســماء يعمّ كلّ إســم منها طائفة من المبــاديء، وتحتوي الأســماء الثلاثة على الجميع. فإنَّ هذا قــد كان يمكن أنْ يكفي المهمّ فيه بأنْ نصطلح فيما بيننا على أســماء ويتواطأ عليها – ولو فعلنا ذلك أو لم نفعله – بل قبلنا ما فعلوه؛ لم يكن في أيدينا إلاّ أسماء ثلاثة، وما كان يحصل لنا من معاني المباديء شيءٌ البتّة، وبئْس ما فعل مَنْ رضي بهذا لنفسه. وليس يمكننا أيضاً أنْ نقول إنَّ كلّ واحدٍ منها يدلّ على ما يشمله بالتواطؤ الصرف، فكيف وقد وقع تحت كلّ واحدٍ منها أصنافٌ شــتى من مقولاتٍ شــتى، تختلف في معنى المبدئية بالتقديم والتأخير، وبالأحْرى – بل يجب – أنْ تكون دلالتها دلالة التشــكيك، كدلالة الوجود والمبدأ والوحدة، وقد عرفنا الفرق بين المشكّك وبين المتّفق والمتواطىء في المنطق.

(10) Everything of which *material* is predicated has a nature that is common in that [the material] [(1)] is a certain factor that is capable of acquiring some other factor in itself that it previously did not have, [(2)] is that from which something is generated, and [(3)] is in [that thing] nonaccidentally. Sometimes it is simple,[11] and at other times it is something composite, such as the wood that belongs to the bed, that follows after the simple. It is also something that might acquire a substantial form or an accidental disposition. Everything of which *form* is predicated is a disposition that has been acquired by an instance of this previous factor [namely, the material] and from which, together with it, a given thing actually exists as a result of this type of composition. Everything of which *privation* is predicated is the nonexistence of some instance of what we have called *form* in that which is capable of acquiring it [that is, in the material].

(11) Now, in the present context [namely, with respect to the science of physics], our entire inquiry into and approach to form and its being a principle is strictly limited to its being a principle in the sense that it is one of the two parts of something that undergoes generation, not that it is an agent, even if it is possible that a form be an agent. Also, we have already shown that the natural philosopher does not deal with the efficient and final principles that are common to all natural things in the first way [mentioned in the previous chapter], and so we should concentrate our efforts on the second [way] that the efficient principle is common to all natural things.

(12) Having finished [the discussion] of those principles that most properly are called *principles*—namely, those that are constitutive of what is subject to generation or of the natural body—we should next focus on those principles that most deserve the title *causes*. Of these, let us define the efficient principle common to natural things—namely, the nature.

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11. As, for example, the elements fire, air, water, and earth.

(١٠) فلجميع ما يقال إنَّه هيولّى طبيعة تشـــترك في أنّها أمرٌ من شـــأنه أنْ يحصل له أمرٌ آخر في ذاته بعد أنْ لا يكون له، وهو الذي يكون منه الشـــيء وهو فيه لا بالعرض. فربّما كان هو بســـيطاً، وربّما كان مركّباً بعد البسيط كالخشب للسرير، وربّما كان الحاصل له صورة جوهرية، أو هيئة عرضية. وجميع ما يقال له إنَّه صورة فهو الهيئة الحاصلة لمثل هذا الأمر المذكور؛ الذي يحصل منهما أمرٌ من الأُمور بهذا النحو من التركيب، وجميع ما يقال له عدمٌ فهو لا وجود مثل هذا الشيء الذي سميناه صورة فيما من شأنه أنْ تحصل له.

(١١) وجميع نظرنا في الصورة ها هنا، واعتبار مبدئيتها، مصروفٌ إلى كونه مبدأ؛ بأنَّـــه أحد جزئي الكائن، لا أنَّه فاعل – وإنْ جـــاز أنْ تكون صورة فاعلاً. وقد كنا بيّنا أنَّ الطبيعي لا يشتغل بالمبدأ الفاعلي والغائي المشتركين بالنحو الأول للأمور الطبيعية كلّها. فحريٌ بنا أنْ نشتغل بالمبدأ الفاعلي المشترك للطبيعيات التي بعده،

(١٢) إذ قد فُرِغ من المباديء التي هي أحرى أنّ تسمّى مبادىء، أي المقوّمة للكائن أو للجسم الطبيعي، فيجب أنْ بشتغل بالمباديء التي هي أولى بأنْ تسمى عللاً، ولنعرف منها المبدأ الفاعلي المشترك للطبيعيات؛ وهو الطبيعة.

Chapter Four

Examination of what Parmenides and Melissus said regarding the principles of being

(1) Once we reached this point, some of our colleagues asked us to talk about the more troublesome schools of the Ancients concerning the principles of natural things, given that the custom has been to mention them at the opening of the science of physics before discussing nature. Those schools of thought are, for example, the one associated with Melissus and Parmenides—namely, that what exists is one and unmovable, of which Melissus further says that it is infinite, while Parmenides says that it is finite.[1] Other examples are the school of those who said that [the principle] is one finite thing, whether water, air, or the like,[2] that is able to move. Again, there are also those who maintained an infinite number of principles, either atoms dispersed in the void[3] or small bodies, whether water, flesh, air, or the like, that are homogeneric with what results from them and all of which are mixed together in the whole.[4] There are also the rest of the schools of thought mentioned in the books of the Peripatetics. [Finally, we were asked] to talk about how [the Peripatetics] refuted these views.

(2) As for the view of Melissus and Parmenides, I do not get it. I can neither state what their aim is nor believe that they reached the level of foolish nonsense that their words, taken at face value, might indicate, since they also spoke about natural things and about [those natural things'] having more than one principle—as, for example, Parmenides, who held that there is earth and fire and that from them, there is the composition of things subject to generation. It is almost to the point that what they mean by *what exists* is the Necessary Existent, the Existence that truly is what exists, as you will learn in its proper place,[5] and

1. For the views of Melissus and Parmenides, cf. Aristotle, *Physics* 1.2–3.
2. For instance, Thales, who believed that everything came from water (Aristotle, *Metaphysics* 1.3.983b20–21), or Anaximenes, who said that everything is some manifestation of air (Aristotle, *Metaphysics* 1.3.984a5).
3. This is the view of the Atomists such as Democritus and Leucippus; cf. Aristotle, *Physics* 1.5.188a22ff. and Aristotle, *On Generation and Corruption* 1.8.325a5ff.
4. The view of Anaxagoras; cf. Aristotle, *Physics* 1.4.187a24ff.
5. See the *Ilāhiyat* 8.

<الفصل الرابع>

في تعقّب ما قاله برمِنيدس وملِيسوس في أمر مبادىء الوجود

(١) وإذْ قــد بلغنا هذا المبلغ، فقد ســألنا بعض أصحابنــا أن نتكلم على المذاهب المستفسدة التي للقدماء في مبادىء الطبيعيات، وقد جرت العادة بذكرها في فاتحة العلم الطبيعي، قبل الكلام في الطبيعية. وتلك المذاهب مثل المذهب المنســوب إلى مليســوس وبَرمِنيدس أنَّ الموجود واحد غير متناه قابل للحركة، إمّا ماء أو هواء، أو غير ذلك. ومذهب مَنْ جعل المباديء غير متناهية العدد، إمّا أجزاء لا تتجزأ مبثوثة في الخلاء، وإمّا أجساماً صغاراً مشابهة لما يكون عنها؛ مائية ولحميّة وهوائية وغير ذلك، مخالطٌ كلّها للكل. وسائر المذاهب المذكورة في كتب المشائين، وأنْ نتكلم على النحو الذي نقضوا به مذاهبهم؛ فنقول:

(٢) أمَّا مذهب مليسوس وبَرمِنيدس؛ فإنّا غير محصّلين له، ولا يمكننا أن ننصّ على غرضهما فيه، ولا نظنهما يبلغان من السَــفَه والغبــاوة المبلغ الذي يدل عليه ظاهر كلامهما فلهما كلامٌ أيضاً في الطبيعيات وعلى كثرة المباديء لها؛ مثل قول بَرمِنيدس بالأرض والنار وعلى تركيب الكائنات منهما. فيوشك أنْ تكون إشارتهما إلى الموجود هي إلى الموجود الواجــب الوجود الذي هو بالحقيقــة موجودٌ – كما تعلمه في موضعه – وأنَّه غير متناهٍ

that it is what is infinite, immobile, and infinitely powerful, or that it is "finite" in the sense that it is an end at which everything terminates, where that at which [something] terminates is imagined to be finite insofar as [something] terminates at it. Or their aim [could] be something different—namely, that the nature of existence *qua* the nature of existence is a single account in definition and description, and that the other essences are different from the nature of existence itself because they are things, such as humanity, to which [existence] just happens to belong while being inseparable from them (for humanity is an essence that is not itself what exists, but neither does existence belong to it as a part). Instead, existence is something outside of the definition of [humanity], while concomitant with its essence that it happens to have, as we have explained in other places.[6] So it seems that whoever says that [what exists] is finite means that what is defined in itself is not the natures that pass into the many, whereas whoever says that it is infinite means that it happens to belong to infinitely many things.

(3) Now you know very well from other places that the man *qua* man is not what exists *qua* what exists, which, in fact, is something extrinsic to [man *qua* man]. The same holds for any one of the states that fall within the categories; and in fact, anything involving them is a subject for existence, [albeit] the existence is inseparable from it. If, however, this is not their opinion and they obstinately hold the view [that is foolish nonsense], then I actually cannot refute them. That is because the syllogism by which I would refute their view is inevitably composed of premises. Now, those premises either [(1)] must be better known in themselves than the conclusion or [(2)] must be granted by the opponent. As for the first, I do not find anything that is more evident than this conclusion [namely, that existence *qua* existence is different, for example, from what humanity is *qua* humanity]. As for the second, it is not up to me to suggest which of the premises these two should concede, since if they can live with this absurdity, then who is to assure me that they would not unabashedly deny any premise used in the syllogism against them?

6. Cf., for instance, *Kitāb al-madkhal* 1.2, and then later at *Ilāhīyāt* 1.5.

ولا متحرك، وأنَّه غير متناهي القوة. أو أنَّه متناهٍ على معنى إنَّه غاية ينتهي إليها كلّ شيء؛ والذي ينتهَى إليه يتخيل أنّه متناهٍ من حيث أنّه ينتهَى إليه. أو يشبه أنْ يكون غرضهما شيئاً آخر، وهو أنَّ طبيعة الموجود، بما هي طبيعة الوجود، معنى واحد بالحدّ أو بالرسم، وإنَّ سائر الماهيات هي غير نفس طبيعة الوجود، لأنَّها أشياء يعرض لها الوجود ويلزمها كالإنسانية؛ فإنَّ الإنسانية ماهيّة وليست نفس الموجود، ولا الوجود جزء لها، بل الوجود خارجٌ عن حدّها لا حقٌ لماهيّتها، كما بيّنا في مواضع أُخرى، عارض لها. فيشبه أنْ يكون مَنْ قال إنَّه متناهٍ عنى أنَّه محدود في نفسه ليس طبائع ذاهبة في الكثرة، ومَنْ قال إنَّه غير متناهٍ عنى أنّه يعرض لأشياء غير متناهية.

(٣) وليس يحفى عليك ممّا ‹تعلّمته› في مواضع أُخرى إنَّ الإنسان – بما هو إنسان – ليس هو الموجود بما هو موجود، بل معناه خارجٌ عنه، وكذلك حال واحدٍ من الأُمور الداخلة في المقولات، بل كلّ شيء منها موضوع للوجود يلزمه الوجود. فإنْ لم يذهبا إلى هذا وكابرا فليس يمكنني أنْ أُناقضهما؛ وذلك لأنَّ القياس الذي نناقض به مذهبهما يكون لا محالة مؤلَّفاً من مقدمات، ويجب أنْ تكون تلك المقدمات إمّا في أنفسها أظهر من النتيجة – ولا أجد شيئاً يكون أظهر من هذه النتيجة – أو تكون مسلّمة عند الخصم، وليس يمكنني أنْ أعرض أي المقدمات يسلّمانها هذان. فإنَّهما إنْ جوّزا إرتكاب هذا المحال، فمَنْ يؤمنني إقدامهما على إنكار كلّ مقدمة من المقدمات المستعملة في القياس عليهما.

(4) In fact, I find many of the premises by which they are "refuted" less known than the intended conclusion. An example is the statement that if what exists is substance only, it would be neither finite nor infinite (since this is an accident of quantity, and quantity is an accident of substance), and so, in that case, there would be an existent quantity and an existent substance, and so *being existent* would stand above both.[7] Now, if you think about it, you find that the existence of the finite and infinite, is in fact, sufficient for there to be a continuous quantity—namely, the observable magnitude. What we really need to do is to show that the observable magnitude subsists in matter or a subject, not that it is something existing, save in a subject (for this is not known in itself); but then we would need to undertake the difficult task of proving [this premise], which is preparatory to [the conclusion]. So how can this be taken as a premise [used] in drawing a conclusion that is self-evident? The same is true of their claim that what is defined is divisible into the parts of its definition and the like.[8]

(5) As for the remaining groups, let us just gesture at where the problems with their views are, and then, in our subsequent discussions, we will treat the details of their errors more thoroughly. For now, then, the refutation of those who claimed that there is a single principle comes from two sides: one is their statement that the principle is one, and the other is their statement that that principle is water or air. The refutation with respect to that principle's being water or air more naturally comes in the place where we discuss the principles of things subject to generation and corruption[9] rather than [where we discuss] the general principles, since [this group] also assumed that that principle is a principle

7. Cf. Aristotle, *Physics* 1.2.185a20ff.

8. Cf. Aristotle, *Physics* 1.3.186b14ff. and John Philoponus, *In Aristotelis Physicorum,* ed. Hieronymus Vitelli (Berlin: George Reimer, 1887), *ad* 186b14ff. (henceforth, Philoponus, *In Phys.*).

9. Cf. *Kitāb fī al-kawn wa-l-fasād* 3.

(٤) على أني أجد كثيراً من المقدمات التي يناقضان بها أخفى من النتيجة التي تُراد منهـا ، مثل ما يقال إنَّه إنْ كان الموجود جوهراً فقط ؛ فلا يكون متناهياً ولا غير متناهٍ لأنَّ هذا عارض للكمّ ، والكـمّ عارضٌ للجوهر ، فيكون حينئذ كمٌّ موجودٌ وجوهرٌ موجود ، فيكـون الموجـود فوق اثنين . وأنت إذا تأملتَ وجدتَ التناهـي وغير التناهي يكفي في تحقّق وجوده أن يكون كمّاً متصلاً ، وهو المقدار المشاهد . وبنا حاجة شديدة إلى أن نبيّن أنَّ المقـدار المشـاهد قائمٌ في مادةٍ وموضوع ، وليس موجـوداً إلاّ في موضوع ؛ فإنَّ هذا ليس ممّا يبين بنفسه ، بل يحتاج في إبانته إلى تكلّفٍ يُعتد به ، فكيف يؤخذ هذا مقدمة في إنتاج ما هو بيّنٌ بنفسه؟ وكذلك ما قالوا من أنَّ المحدود يتجزأ بأجزاء حدّه ، وغير ذلك .

(٥) وأمّا سائر القوم ؛ فلنشر إشارة خفيفة في هذا الموضع إلى فساد مذاهبهم ثم في مسـتقبل ما نكتبه كلامٌ يُوقف منه على جليّة الحال في زيغهم وقوفاً شـافياً ، ونقول الآن : أمّا القائلون منهم بأنَّ المبدأ واحد ، فيتوجه إليهم النقْض من وجهين : أحدهما من جهة أنَّهم قالـوا إنَّ المبـدأ واحد ، والثاني من جهة أنَّهم قالوا إنَّ ذلـك المبدأ هو ماء أو هواء . فأمّا النقض عليهم من جهة أنَّ ذلك المبدأ هو ماء أو هواء ، فالأخلق به الموضع الذي نتكلم فيه على مبادىء الكائنات الفاسدات ، لا على المباديء العامة ، فإنّهم وضعوا ذلك المبدأ مبدأ

of things subject to generation and corruption. What suggests that they are in error concerning the principle's being one is that their view would make all things the same in substance, varying [only] in accidents. That is to say that [this group] would eliminate the species-making differences among various bodies, whereas it will become clear to us that bodies do vary through species-making differences. As for those who hold that there is an infinite number of principles from which these generable things are generated, they [themselves] conceded that they have no scientific understanding of the things subject to generation, since their principles are infinite, in which case there is no way to comprehend them scientifically and so grasp what is generated from them. Now, since [purportedly] there is no way to know the things subject to generation, then how could they also know that the principles of [these things] are infinite? As for refuting them with regard to their specific assertion that those infinite things are either atoms scattered in the void[10] or embedded in the mixture,[11] it is again more fitting that we deal with it when we inquire into the principles of things subject to generation and corruption.[12]

(6) Having reached this point, let us conclude this chapter, which was included [almost] by chance; and so whoever wants to retain it, do so, and whoever does not, then do not.

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10. The view of Democritus and the Atomists generally.

11. The view of Anaxagoras, who posited an infinite number of germs or seeds (*spermata*, *chrimata*) jumbled together in the mixture. Cf. Aristotle, *On Generation and Corruption* 1.1.314a20ff.

12. Cf. *Kitāb fī al-kawn wa-l-fasād* 4, but also see the more general argument against Atomism presented below at 3.3–5.

للكائنات الفاسدات أيضاً . وأمّا الدلالة على فساد قولهم إنَّ المبدأ واحدٌ ، فهو أنَّ مذهبهم يجعل الأمور كلّها متفقة في الجوهر مختلفة في الأعراض ، ويبطلون مخالفة الأجسام بالفصول المنوّعة ، وسيتّضح لنا أنَّ الأجسام تختلف بالفصول المنوّعة . وأمّا القائلون بأنَّ المبادىء التي تتكون عنها هذه الكائنات غير متناهية ؛ فقد اعترفوا أنَّهم لا علم لهم بالكائنات ، إذ مبادئها غير متناهية فلا يحاط بها علماً ، فلا يحاط بما يتكون عنها . وإذ لا سبيل إلى معرفة الكائنات ، فكيف علموا أيضاً أنَّ مبادئها غير متناهية؟ وأمّا مناقضتهم من جهة تخصيصهم تلك ‹غير› المتناهية بأنّها أجزاء لا تتجزأ مبثوثة في الخلاء أو مودعة بالخليط ؛ فالأحرى أنْ نشتغل به ، حيث ننظر في مباديء الكائنات الفاسدة أيضاً .

(٦) وإذ بلغنا هذا المبلغ ، فلنختم هذا الفصل ، وهذا الفصل داخلٌ في كتابنا بالعرض ، فمن شاء أنْ يثبته أثبته ، ومَنْ شاء أنْ لا يثبته ، فلا يثبته .

Chapter Five

On defining nature

(1) Certain actions or movements occur in the bodies that are immediately present to us. Now, on the one hand, we find that some of those actions and movements proceed from certain external causes that make their occurrence in [the bodies] necessary, as, for example, water's being heated and a stone's rising. On the other hand, we find that other actions and movements proceed from [the bodies] owing to [the bodies] themselves in such a way that they are not traced back to some foreign cause—as, for example, when we heat water and then leave it alone, it cools through its own nature; and when we raise the stone and then leave it alone, it falls through its nature. This belief is also fairly close to our belief that there are plants because of the alteration of seeds and animals because of the generation of semen. Similarly, we find that animals, through their own volition, have a freedom of action in their [various] kinds of movements, [since] we do not see some external agent forcibly directing them to those actions. So, there is impressed upon our souls an image that those [movements], and, on the whole, the actions and passivities that proceed from bodies, are sometime caused by a foreign, external agent and sometimes are a result of the things themselves without an external agent.

<الفصل الخامس>

في تعريف الطبيعة

(١) نقول؛ إنّه قد يقع عن الأجسام التي قِبَلَنا أفعالٌ وحركاتٌ، فنجد بعضها صادرة عن أسباب خارجة عنها توجب فيها تلك الأفعال والحركات، مثل تسخّن الماء وصعود الحجر. ونجد بعضها تصدر عنها لأنفسها من غير أنْ يستند صدورها عنها، إلى سببٍ غريبٍ كالماء؛ فإنّا إذا سخّناه ثم خلّينا عنه يبرد بطباعه. والحجر إذا أصعدناه ثم خلّينا عنه يهبط بطباعه. وعسى أنْ يكون ظنّنا بالبذور في استحالتها نباتاً، والنُطف في تكوّنها حيوانات، قريباً من هذا الظّن. ونجد أيضاً الحيوانات تتصرف في أنواع حركاتها بإرادتها، ولا نرى أنَّ قاسراً لها من خارج يصرفها تلك التصاريف. فيرتسم في أنفسنا تخيل أنَّ تلك الحركات – وبالجملة الأفعال والانفعالات الصادرة عن الأجسام – قد تكون بسببٍ خارجٍ غريب، وقد تكون عن ذاتها لا من خارج.

(2) Moreover, we initially deem it possible that [(1)] some of [the motions and actions] that result from the things themselves without an external agent hold to a single course from which they do not deviate, while [(2)] others change[1] and vary their courses. We additionally deem it possible that both cases might be through volition as well as not through volition (and, rather, are like the bruising that arises from a falling stone or the burning from a blazing fire), and so these two are also impressed on our soul. Furthermore, what becomes known to us after diligent [inquiry] is that there are those bodies that we come across [seemingly] without external movers that are [in fact] moved and acted upon only by an external mover that we neither perceive nor recognize. Instead, [that mover] might be some imperceptible separate thing, or perhaps something perceptible in itself but having an imperceptible influence. In other words, there is an imperceptible relation between it and what is acted on by it indicating that it necessitates [the effect]. An example would be anyone who has never sensibly observed a magnet's attracting iron or who does not intellectually recognize that it attracts iron (since the intellect's inquiry [alone] cannot grasp that). In this case, when he sees the iron being moved toward [the magnet], he will most likely suppose that [the iron] is undergoing motion as a result of itself. Whatever the case, it should be obvious that what is producing the motion is not in fact the body *qua* body but, rather, the result of a power in [the body].

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1. Following **Z**'s *mufannin* (**T**'s *mutafannin,* "to be changed or vary"; Latin *instituta ad multa*), which is omitted in **Y**.

(٢) ثـم الذي يكون عن ذاتها لا من خارج؛ فنحن ، في أول الأمر ؛ نجوّز أنْ يكون بعضه لازماً طريقة واحدة لا ينحرف عنها ، وبعضه يكون مفنن الطرائق ، مختلفة الوجوه . ومـع ذلك فنجوّز أنْ يكـون كلّ واحدٍ من الوجهين صادراً بإرادة ، وصادراً لا عن إرادة ، بل كصدور الرّض عن الحجر الهابط ، والإحراق عن النار المشـتعلة ؛ فهذا ما يرتسـم في أنفسـنا . ثم ما يدرينا أنْ تكون هذه الأجسـام ، التي لا نجد لها محركات من خارج ، إنّما تتحرّك وتنفعل عن محرّكٍ من خارج لا ندركه ولا نصل إليه ، بل عساه أن يكون مفارقاً غير محسوس ، أو عساه أنْ يكون محسوس الذات غير محسوس التأثير ، أي غير محسرس النسـبة التي بينه وبين المنفعل عنه الدالّة على أنّه موجبٌ له ؛ كمَنْ لم يرَ مَغناطيس يجذب الحديد حسّـاً ، أو لم يعرف عقلاً أنَّه جاذبٌ للحديـد – إذ ذلك كالمتعذر إدراكه بطلب العقل – فإذا رأى الحديد يتحرك إليه لم يبعد أنَّ يظّن أنه يتحرّك إليه عن ذاته . أي أنَّه من الظاهر أنَّ المحرّك لا يصح أنْ يكون جسماً بما هو جسم ، وإنَّما يحرّك بقوةٍ فيه .

(3) We set it down as a posit, which the natural philosopher accepts and the metaphysician demonstrates, that the bodies undergoing these motions are moved only as a result of powers in them that are principles of their motions and actions.[2] They include [(1)] a power that brings about motion and change and from which the action proceeds according to a single course, without volition; [(2)] a power like that, with volition; [(3)] a power that, without volition, varies in the motion and action it produces; and [(4)] a power that, with volition, varies in the motion and action it produces. (The same divisions also hold with regard to rest.) The first division is like what belongs to the stone in falling and coming to rest at the center and is called a *nature*. The second is like what belongs to the Sun in its rotations, [at least] according to the view of accomplished philosophers, and is called a *celestial soul*. The third is like what belongs to plants in their generation, growth, and ceasing to grow further (since they involuntarily move in various directions in the form of branching and the spreading of trunks in both breadth and height) and is called a *vegetative soul*. The fourth is like what belongs to animals and is called an *animal soul*. Sometimes the term *nature* is applied to every power from which its action proceeds without volition, in which case the vegetative soul is called a *nature*. Sometimes *nature* is applied to everything from which its action proceeds without deliberation or choice, so that the spider [may be said] to weave by nature; and the same holds for similar animals. The nature by which natural bodies are natural and that we intend to examine here, however, is nature in the first sense.

2. See *Ilāhīyāt* 9.2.

(٣) لكنا نضع وضْعاً يتسـلّمه الطبيعي ويبرهن عليه الإلهي ؛ أنَّ الأجسـام المتحرّكة هـذه الحركات إنّما تتحرّك عـن قُوى فيها ؛ هي مبادىء حركاتها وأفعالها . فمنها قوة تحرّك وتغيّر ويصدر عنها الفعل على نهجٍ واحدٍ من غير إرادة ، وقوة كذلك مع إرادة ، وقوة متفنّنة التحريك والفعل من غير إرادة ، وقوة متفنّنة التحريك والفعل مع إرادة ، وكذلك القسمة في جانب السـكون . فالأول من الأقسـام كما للحجر في هبوطه ووقوفه في الوسط ويسمّى طبيعة ، والثاني كما للشـمس في دورانها عند محصّلي الفلاسفة ، ويسمّى نفساً فلكية ، والثالـث كما للنباتات في تكوّنها ونشـوئها ووقوفها ، إذ تتحـرك لا بالإرادة حركات إلى جهات شـتى ، تفريعاً وتشعيباً للأُصول ، وتعريضاً وتطويلاً ؛ وتسمّى نفساً نباتية ، والرابع كما للحيوان وتسمّى نفساً حيوانية . ربّما قيل إسم الطبيعة على كلّ قوةٍ يصدر عنها فعلها بلا إرادة ، فتسمى النفس النباتية طبيعة . وربّما قيل طبيعة لكل ما يصدر عنه فعله من غير رويةٍ واختيار ، حتى يكون العنكبوت إنّما يشبك بالطباع ، وكذلك ما يشبهه من الحيوانات . لكن الطبيعة التي بها الأجسـام الطبيعية طبيعية ، والتي نريد أنْ نفحص عنها ها هنا هي الطبيعة بالمعنى الأول .

(4) The statement, "The one who seeks to prove [that nature exists] deserves to be ridiculed,"[3] is odd. I suppose [that] what is meant is that the one who seeks to prove it while engaged in investigating the science of physics should be ridiculed, since he is trying to demonstrate the principles of a discipline from within that discipline itself. If this or some other related interpretation is not what was meant, and [if] instead the intention was that this power's existence is self-evident, then it is not something that I am willing to listen to and support. How could it be, when we frequently find ourselves forced to undertake a great deal of preparatory work to prove that every [body] undergoing motion has a mover? How, then, could we ridicule the one who sees a motion and looks for the argument proving that it has a mover, let alone [one who] clearly shows that there is a mover and makes it external? Still, the claim that nature exists is, as a matter of fact, a principle of the science of physics, [and so] it is not up to the natural philosopher to address anyone who denies it. Proving [that natures exists] belongs only to the metaphysician, whereas it belongs to the natural philosopher to study its essence.[4]

(5) Nature has been defined as *the first principle of motion and rest in that to which it belongs essentially rather than accidentally*[5]—not in the sense that in everything there must be a principle of motion and rest together, but in the sense that it is an essential principle of anything having a certain motion, if there is motion, or rest, if there is rest. One who came afterwards found this description inadequate and decided to add to it, claiming that [the initial account] indicated only the nature's action, not its substance, since it indicates only its relation to what proceeds from it.[6] So, to its definition, [he thought,] one must also add the words *nature is a power permeating bodies that provides the forms and temperament, which is a principle of* . . . and so forth. We begin by explaining the

3. Cf. Aristotle, *Physics* 2.1.193a3.
4. Cf. *Ilāhīyāt* 9.5.
5. Aristotle, *Physics* 2.1.192b21–23.
6. Cf. Philoponus, *In Phys. ad* 192b8ff. For a discussion of Philoponus's reinterpretation of Aristotle's definition of nature, see E. M. Macierowski and R. F. Hassing, "John Philoponus on Aristotle's Definition of Nature: A translation from the Greek with Introduction and Notes," *Ancient Philosophy* 8 (1988): 73–100.

(٤) وما أعجب ما قيل إن الباحث عن إثباتها من حقه أن يهزأ به، وأظنّ أن المراد بذلك أن الباحث عن إثباتها – وهو فاحصٌ عن العلم الطبيعي – يجب أنْ يستهزأ به ؛ إذ يريد أنْ يبرهنِ من الصناعة نفسها على مبادئها . وأمّا إنْ لم يرد هذا ، أو تأويل آخر مناسب لهذا ، بل أُريد أنْ وجود هذه القوة بيّنٌ بنفسه؛ فهو مما لا أصغي إليه ولا أقول به . وكيف وقد تلزمنا كُلْفة شاقّة في أنْ نثبت أنَّ لكلّ متحرّكٍ محرّكاً ، وقد تجشّم ذلك مفيدنا هذه الآراء تجشّماً يُعند به، فكيف يُستهزأ بمَنْ يرى حركة ويلتمس الحجّة على إثبات محرّكٍ لها فضلاً عن أنْ يسلّم محرّكاً ويجعله خارجاً؟ إلاّ أنَّ الحقَّ هو أنَّ القول بوجود الطبيعة مبدأ للعلم الطبيعي، ليس على الطبيعي أنْ يكلّم مَنْ ينكرها ، وإنّما إثباتها على صاحب الفلسفة الأولى، وعلى الطبيعي تحقيق ماهيّتها .

(٥) وقد حُدّت الطبيعة بأنَّها مبدأ أول لحركة ما يكون فيه وسكونه بالذات لا بالعرض. ليس على أنَّها يجب في كلّ شيء أنْ تكون مبدأ للحركة والسكون معاً ، بل على أنَّها مبدأ لكلّ أمرٍ ذاتي يكون للشيء من الحركة إنْ كانت، والسكون إنْ كان. ثمَّ بدا لبعض مَنْ ورد من بَعْدُ أنْ استنقص هذا الرسم، وتوخى أنْ يزيد عليه زيادة فقال: إنَّ هذا إنّما يدلّ على فعل الطبيعة لا على جوهرها ، فإنَّه إنّما يدل على نسبتها إلى ما يصدر عنها ، ويجب أنْ يزاد في حدّها فيقال إنَّ الطبيعة قوةٌ ساريةٌ في الأجسام تفيد الصور والخلق ،

sense of the description taken from the First Master[7] and thereafter turn to whether the addition is worth all this effort, making clear that what [this later philosopher] did was disastrously flawed and that neither it nor his emendation is required.

(6) So we say: The meaning of *principle of motion* is, for instance, an efficient cause from which proceeds the production of motion in another (namely, the moved body), and the meaning of *first* is that it is proximate, with no intermediary between it and the production of the motion. So perhaps the soul is the principle of certain motions of the bodies in which it is, albeit mediately. One group, however, supposed that the soul produces local motion through the intermediacy of the nature. I, however, do not think that the nature is altered so as to become the limbs' mover, obeying the soul contrary to what it itself requires. If the nature were so altered, then it would be able to perform [any] action that the soul imposes upon it, [even if that action] is different from what is proper to [the nature], and what is proper to the soul would never be at odds with what is proper to the nature. If it is meant that the soul brings about a certain inclination and through the inclination produces motion, then the nature does that as well, as we shall make clear to you.[8] It is as if, for instance, this inclination is not a mover, but something through which the mover produces motion. So if the soul has some intermediary in producing motion, then that will not involve the production of local motion, but generation and growth. Now, if this is meant to be a general definition applying to the production of any motion, then *first* is added to it. [That] is because, although soul may be in that which is moved and may produce motion in that in which it is, so as to bring about growth and change, it does not do so as *first*, but rather does so by

7. That is, Aristotle.
8. This is the general thesis of 4.12 below.

هي مبدأ لكذا وكذا . ونحن مبتدئون بإبانة معنى الرسم المأخوذ عن الإمام الأول، ثم نقبل على كفاية هذا المتكلّف للزيادة كلفته موضحين أنَّ ما فعله رديء فاسد غير محتاجٍ إليه ولا إلى بدله .

(٦) فنقول : إنَّ معنى قولنا مبدأ للحركة ؛ أي مبدأ فاعلي يصدر عنه التحريكُ في غيره، وهو الجسم المتحرّك . ومعنى قولنا أوّل إنّه قريب لا واسطة بينه وبين التحريك . فعسى أنْ تكون النفس مبدأ لبعض حركات الأجسام التي هي فيها ولكن بوساطة . وقد ظنَّ قومٌ أنَّ النفس تفعل حركة الانتقال بتوسط الطبيعة، ولا أرى الطبيعة تستحيل محرّكة للأعضاء خلاف ما توجبه ذاتها طاعة للنفس . ولو استحالت الطبيعة كذلك، لما حدث الإعياء عند تكليف النفس إياها غير مقتضاها ، ولما تجاذب مقتضى النفس ومقتضى الطبيعة . وإنْ عنى بذلك أنَّ النفس تُحدث ميلاً وبالميل تحرّك، فالطبيعة تفعل ذلك أيضاً ، على ما سيتضح لك، وكأنَّ مثل هذا الميل ليس هو المحرّك بل أمرٌ به تحرّك المحرّك . فإنْ كان للنفس متوسطٌ في التحريك، فذلك في غير التحريكات المكانية، بل في تحريك الكون والإنماء ، وإذا أُريد أنْ يكون هذا الحدّ عاماً لكل تحريك زيد فيه الأول . فإنَّ النفس قد تكون في المتحرّك وتحرّك ما هي فيه، تحريكها الإنماء والإحالة ؛ ولكن لا أولاً ، بل

using the natures and qualities, which we shall explain to you later.[9] The phrase *in that to which it belongs* is [needed] to distinguish nature, art, and agents that act by force. His use of *essentially* was predicated in two ways, one of which is in relation to the mover [and] the other in relation to what is moved. The first way of predicating it is that the nature produces motion, whenever it is immediately producing motion, owing to itself and not as the result of some agent compelling it to do so by force. So it is impossible that [the nature] not produce a given motion, apart from forced motion, if nothing is hindering it. The second way that [*essentially*] is predicated is that the nature produces motion owing to what is moved of itself and not as a result of some external agent. His use of *accidentally* was also predicated in two ways, one of which is in relation to the nature and the other in relation to what is moved. Now, the way that it is predicated in relation to the nature is that the nature is a principle of that whose motion is real and not accidental, where *accidental motion* is like the motion of one who is standing still on a boat while the boat is moving him. The other way is when the nature moves the statue, and so moves it accidentally, because it essentially produces motion in the copper, not the statue; so the statue *qua* statue is not something moved naturally, like stone is. That is why the knowledge of the physician is not a nature when [the physician] cures himself. It is the medical knowledge in him that produces the change, because [that knowledge] is in him not *qua* patient, but *qua* physician; for when the physician cures himself and so is healed, his being healed is not as a physician, but rather because he is the one who underwent a cure. So he is one thing *qua* one who applies the cure and [another] *qua* one who undergoes the cure, for *qua* one who applies the cure he produces the cure that he knows, whereas *qua* one who undergoes the cure he is a patient who receives the cure.

9. See, for instance, *Kitāb al-nafs* 1.1, where Avicenna provides a general account of the soul's role when it is a principle of natural body.

باســـتخدام الطبائع والكيفيات، ويتبيّن هذا لك بعد. وقوله ما يكون فيه ليفرق بين الطبيعة والصناعة والقاســـرات. وأمّا قوله بالذات فقـــد حُمل على وجهين: أحدهما بالقياس إلى المحرّك، والآخـــر بالقياس إلى المتحرّك. ووجه حمله على الوجه الأول؛ أنَّ الطبيعة تحرّك لذاتها حين ما تكون بحال تحريك لا عن تســـخير قاســـر فيستحيل أنْ لا تحرّك إنْ لم يكن مانع حركة مباينة للحركة القاســـرة. وحمله على الوجه الثاني أنَّ الطبيعة تحرّك لما يتحرّك عـــن ذاته لا عن خـــارج. وقوله بالعرض قد حُمل أيضاً على وجهـــين: أحدهما بالقياس إلـــى الطبيعة والآخـــر بالقياس إلى المتحرّك، ووجه حمله الـــذي يحمل عليه بالقياس إلى الطبيعـــة، أن الطبيعة مبدأ لما كانـــ‹ت› حركته بالحقيقة لا بالعرض، والحركة بالعرض مثل حركة الســـاكن في السفينة تحرّكه السفينة. والوجه الآخر، أنّه إذا حركت الطبيعة صنماً فهـــي تحرّكه بالعرض؛ لأنَّ تحريكهـــا بالذات للنحاس لا للصنم، فليس الصنم من حيث هو صنمٌ متحركاً بالطبيعة كالحجر. فلذلك لا يكون الطبيب طبيعة إذا عالج نفســـه، وحرّك الطب ما هو فيه، لأنَّه فيه لا من حيث هو مريض، بل من حيث هو طبيب. فإنَّ الطبيب إذا عالج نفســـه فبرىء لم يكن برؤه لأنّه طبيب، بل لأنّه متعالج. فإنَّه من حيث هو معالج شيء، ومن حيث هو متعالج، فإنّه من حيث هو معالج صانع العلاج عالم به، ومن حيث هو متعالج قابل للعلاج مريض.

(7) The addition that one of the successors of the Ancients thought to add was done in vain, for the power he took to be like a genus in the description of nature is the active power, which is defined as the principle of motion from another in another as other. Now, the sense of *power* is nothing but a principle of producing motion that is in something, and the sense of *permeating* is nothing but being in something. Also, the sense of *providing the temperament and form* is already included in *producing motion*, and the sense of *preserving the temperament and form*[10] is already included in *producing rest*. If this man had said that nature is a principle existing in bodies so as to move them to their proper perfections and make them rest therein, which is a first principle of motion and rest of what it is in essentially, not accidentally, it would be only a repetition of a lot of unnecessary things. Similarly, when he replaced this phrase with a single term that has the same meaning as that phrase, he had unwittingly repeated a lot of things. Additionally, since this man wanted to correct an alleged defect in this description [namely, that the initial account of *nature* describes it only relative to its actions rather than what it is in itself], he reckoned that when he used *power,* he had indicated a certain entity that is not related to anything. He did not, for nothing more is meant by *power* than a principle of producing rest and motion. Also, *power* is described only with respect to relative association. So his belief that he had escaped that by introducing *power* is not at all true, and so what this man thought is just idle chatter.

10. Avicenna has shifted from the standard, philosophical Arabic term for form, *ṣūra* (used in par. 5 when he first introduced Philoponus's position) to the nontechnical term *shakl*, which frequently means just "shape."

(٧) فأمّـا الزيادة التي رأى بعض اللاحقين بالأوائل أنْ يزيدها ؛ فقد فعل باطلاً . فإنَّ القوة التي جعلها كالجنس في رسم الطبيعة هي القوة الفاعلة ، وإذا حُدّتْ حُدّتْ بأنَّها مبدأ الحركة من آخر في آخر بأنَّه آخر . وليس معنى القوة إلاّ مبدأ تحريك يكون في الشـيء ، وليس معنى السريان إلاّ الكون في الشيء ، وليس معنى التخليق والتشكيل إلاّ داخلاً في معنى التحريك ، وليس معنى حفظ الخَلق والأشـكال إلاّ داخلاً في ‹معنى› التسـكين . ولو كان هذا الرجل قال إنّ الطبيعة هي مبدأ موجودٌ في الأجسـام لتحريكها إلى كمالاتها وتسـكينها عليها . هو مبدأ أول لحركة ما هو فيه وسكونه بالذات لا بالعرض ، لم يكن إلاّ مكرّراً لأشـياء كثيرةٍ من غير حاجةٍ إليها . فكذلـك إذا أورد بدل طائفةٍ من كلامه لفظاً مفرداً مواطئاً لتلك الطائفة ، فيكون قد كرّر أشياء كثيرة وهو لا يشعر . ومع ذلك فإنَّ هذا المتدارك لخلل هذا الرسم ، بزعمه قد حسب أنّه إذا قال قوة فقد دلَّ على ذاتٍ غير مضافةٍ إلى شـيء ؛ وما فعل . فإنَّ المفهوم من القوة هو مبدأ التحريك والتسكين لا غير ، والقوة لا ترتسـم إلاّ من جهة النسـبة الإضافية ، فلا يكون ما ظنّه حقاً من أنّه هَرَب من ذلك بإيراد القوة ، فما عمله هذا الرجل باطلٌ فاسد .

(8) Finally, the one who first proposed the definition—namely, that it is a principle of motion and rest—did not mean the principle that belongs to local motion to the exclusion of the principle that belongs to qualitative motion. On the contrary, he meant that every principle of any essential motion whatsoever is a nature, such as motion in [the categories of] quantity, quality, place, and any other, if there is such. (The kinds of motion will be explained to you later.)[11] So a principle of motion with respect to quality is the nature's state that determines either an increase of rarefaction and extension in the volume or a condensation and contraction in the volume, since this produces a motion from one quantity to another. If you wish to make augmentation natural and apply the term *nature* to it, taking nature in one of the aforementioned senses, then do so. A principle of motion with respect to quality is like the state of water's nature when the water accidentally acquires some foreign quality that is not proper to its nature (coolness being proper to its nature), and then, when the impediment is removed, its nature returns and transforms it into its proper quality and preserves it therein. Similarly, when the humoral mixtures of bodies deteriorate, once their nature becomes strong, it returns them to the proper humoral balance. The case with respect to place is obvious—namely, like the state of the stone's nature when it moves it downward, and the state of fire's nature when it moves it upward. A principle of motion with respect to substance is like nature's state that brings about motion toward the form, being prepared by the modification of quality and quantity, as you will learn.[12] It might be the case, however, that the nature does not actually bring about the form but is only disposed to it, acquiring it from elsewhere. This, however, is more fittingly learned in another discipline.[13]

(9) This, then, is the definition of *nature,* which is like the generic [sense] and provides each of the natures beneath it with its meaning.

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11. See 2.3.

12. Cf. 2.3, where he discusses substantial change, and *Kitāb al-ḥayawān* 9.5, where much of the same material is treated again in more detail, albeit specifically in relation to substantial changes during prenatal development.

13. "Another discipline" certainly refers to metaphysics, and the reference seems be to *Ilāhīyāt* 9.5, where the "Giver of Forms" (*wāhib al-ṣuwar*) is discussed.

(٨) ثـم معنى قول الحادّ الأول إنّه مبدأ للحركة والسـكون؛ ليس يعني المبدأ الذي للحركـة المكانية دون المبـدأ الذي للحركة في الكيف، بل يعنـي أن كلّ مبدأ لأي حركةٍ كانت بالذات فهو طبيعة. كالمبدأ للحركة التي في الكم والتي في الكيف والتي في المكان وفـي غير ذلك – إن كان حركة – وسـيتضح لك بعد أصناف الحـركات. فأمّا كونها مبدأ للحركة في الكمّ؛ فهو حال الطبيعة الموجبة لزيادة تخلخلٍ وانبسـاطٍ في الحجم، أو تكاثـفٍ وانقباضٍ في الحجم؛ فإنَّ هذا تحريكٌ عن كميّة إلى كميّة. وإنْ شـئت أنْ تجعل النمو بالطبيعة وتطلق إسم الطبيعة على ذلك، وتأخذ الطبيعة على أحد المعاني المذكورة، فافعـل. وأمّـا كونه مبدأ للحركة في الكيف؛ فمثل حال طبيعـة الماء إذا عرض للماء أنْ استفاد كيفية غريبة لم تكن مقتضى طبيعة – لكون البرودة مقتضى طبيعته – فإنَّ العائق إذا زال ردّته طبيعته إلى كيفيته وأحالته إليها وحفظته عليها. وكذلك الأبدان إذا سـاءتْ أمـزجتها وقويت طبيعتها؛ ردّتها إلى المزاج الموافـق. وأمّا في المكان فظاهرٌ، وهو مثل حال طبيعة الحجر إذا حركته إلى أسـفل، وحال طبيعة النار إذا حركتها إلى فوق. وأمّا كونـه مبدأ للحركة في الجواهر؛ فمثل حـال الطبيعة التي تحرّك إلى الصورة مُعدّة بإصلاح الكيف والكم، على ما تعلم. وأمّا حصول الصورة فعسـى أنْ لا تكون الطبيعة مفيدتها، بل تكون مهيئة لها، وتُسـتفاد من مواضع أُخر، والأوّلى أنْ يُعلم هذا من صناعةٍ أُخرى.

(٩) فهـذا هو حـدّ الطبيعة التي كالجنسـية، ويُعطى كلّ واحدٍ مـن الطبائع التي تحتها معناها.

Chapter Six

On nature's relation to matter, form, and motion

(1) Every body has a nature, form, matter, and accidents. Its nature, again, is the power that gives rise to its producing motion and change, which are from [the body] itself, as well as its being at rest and stable. Its form is its essence by which it is what it is, while its matter is the thing bearing its essence. Accidents are those things that, when [the body's] form shapes its matter and completes its specific nature, either necessarily belong to it as concomitants or accidentally belong to it from some external agent.

(2) In some cases, the nature of the thing is just its form, whereas in others it is not. In the case of the simples [that is, the elements], the nature is the very form itself, for water's nature is [for example] the very essence by which it is water. Be that as it may, it is a nature only when considered in one way, whereas it is a form when considered in another. So when it is related to the motions and actions that proceed from it, it is called *nature;* whereas, when it is related to its bringing about the subsistence of the species water, and if the effects and motions that proceed from it are not taken into account, it is then called *form.* So the form of water, for instance, is a power that makes the water's matter to subsist as a species—namely, water. The former [namely, the nature] is imperceptible, but the effects that proceed from it are perceptible—namely, perceptible coolness and weight (which is actually the inclination and does not belong to the body while it is in its natural location). So the nature's action in, for example, the substance of water is either relative to its passive influence and so is coolness; or is relative to its active influence, giving it its shape, and so is wetness; or is relative to its proximate place and so brings about motion; or is relative to its proper place and so brings about rest. Now, this coolness and wetness are necessary accidents of this nature, given that there is no impediment. Not all accidents in

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في نسبة الطبيعة إلى المادة والصورة والحركة

(١) إنَّ لكل جسم طبيعة وصورة ومادة وأعراضاً، فطبيعته هي القوة التي يصدر عنها تحرّكه أو تغيّره الذي يكون عن ذاته، وكذلك سكونه وثباته، وصورته هي ماهيّته التي بها هو ما هو، ومادته هي المعنى الحامل لماهيّته، والأعراض هي الأمور التي إذا تصورت مادته بصورته وتمّت نوعيته، لزمته أو عرضت له من خارج.

(٢) وربّما كانت طبيعة الشيء هي بعينها صورته، وربّما لم تكن. أمّا في البسائط؛ فإنَّ الطبيعة هي الصورة بعينها، فإنَّ طبيعة الماء هي بعينها الماهيّة التي بها الماء هو ماء، لكنها إنّما تكون طبيعة باعتبار، وصورة باعتبار: فإذا قيست إلى الحركات والأفعال الصادرة عنها سميت طبيعة، وإذا قيست إلى تقويمها لنوع الماء – وإنْ لم يُلتفت إلى ما يصدر عنها من الآثار والحركات – سُميت صورة. فصورة الماء مثلاً قوة أقامت هيولى الماء نوعاً هو الماء، وتلك غير محسوسة وعنها تصدر الآثار المحسوسة من البرودة المحسوسة والثقل الذي هو الميل بالفعل الذي لا يكون للجسم وهو في حيّزه الطبيعي، فيكون فعل الطبيعة مثلاً في جوهر الماء. أما بالقياس إلى المتأثّر عنه فالبرودة، وأمّا بالقياس إلى المؤثر فيه المشكل له فالرطوبة، وأمَّا بالقياس إلى مكانه القريب فالتحريك، وبالقياس إلى مكانه المناسب فالتسكين. وهذه البرودة والرطوبة أعراضٌ تلزم هذه الطبيعة إذا لم يكن هناك عائق. وليس كلّ الأعراض تتبع الصورة في الجسم، بل ربّما كانت الصورة

the body follow upon the form; and in fact, frequently the form is something that prepares the matter in order that it be acted upon by some cause from an external agent that is accidental, just as it is prepared to receive artificial as well as numerous natural accidents.

(3) In the case of composite bodies, the nature is something like the form but not the true being of the form. [That] is because composite bodies do not become what they are by a power belonging to them that essentially produces motion in a single direction, even if they inevitably have those powers inasmuch as they are what they are. So it is as if those powers are part of their form and as if their form is a combination of a number of factors, which then become a single thing. An example would be humanness, since it includes the powers of nature as well as the powers of the vegetative, animal, and rational soul; and when all of these are in some way "combined," they yield the essence of humanness. (The particulars of this manner of combining are more fittingly explained in first philosophy.)[1] If, however, we do not intend *nature* in the sense that we defined it but instead mean anything from which something's activities proceed in whichever way it by chance may be, whether according to the previously mentioned condition of nature or not, then perhaps the nature of each thing is its form. Our present intention in using the term *nature,* however, is the definition that we previously gave.[2]

(4) Some of those accidents happen to be from an external agent. Others accidentally occur from the thing's substance, some of which might follow upon the matter—such as, for example, the blackness of the Negro, the scars left by wounds, and standing upright. [Still] others frequently follow upon the form—such as wit, mirth, risibility, and the like in humans (for even if the existence of risibility inevitably requires

1. See *Ilāhīyāt* 2.2–4.

2. See 1.5.3: "a power that brings about motion and change and from which the action proceeds according to a single course, without volition."

معدّة للمادة لأنْ تنفعل عن سببٍ من خارجٍ يعرض، كما تعدّ لقبول الأعراض الصناعية ولكثيرٍ من الأعراض الطبيعية.

(٣) وأمّا في الأجسام المركّبة. فالطبيعة كشيءٍ من الصورة ولا تكون كُنْه الصورة؛ فإنَّ الأجسام المركّبة لا تصير هي ما هي بالقوة المحركة لها بالذات إلى جهةٍ وحدها، وإنْ كان لا بدّ لها في أن تكون هي ما هي من تلك القوّة. فكأن تلك القوى جزء من صورتها، وكأن صورتها تجتمع من عِدّة معانٍ فتتحد كالإنسانية؛ فإنّها تتضمن قوى الطبيعة وقوى النفس النباتية والحيوانية ‹والناطقة›، وإذا اجتمعت هذه كلّها نوعاً من الاجتماع أعطت الماهيّة الإنسانية. وأمّا كيفية نحو هذا الاجتماع فالأولى أنْ يبيّن في الفلسفة الأولى اللّهم إلاّ أنْ نعني بالطبيعة لا هذا الذي حدّدناه، بل كل ما يصدر عنه أفاعيل الشيء، على أي نحو اتفق وكان، على الشرط المذكور في الطبيعة، أو لم يكن. فعسى أن تكون طبيعة كلّ شيء صورته، ولكن غرضنا ها هنا في إطلاق اسم الطبيعة هو ما حدّدناه.

(٤) ومن هذه الأعراض ما يعرض من خارج، ومنها ما يعرض من جوهر الشيء. وقد يتبع بعضها المادّة كالسواد في الزنجي، وآثار القروح، وانتصاب القامة، وقد يتبع بعضها الصورة كالذّكاء والفرح وقوة الضحك، وغير ذلك، في الإنسان. وقوة الضحك – فإنَّ هذه وإنْ لم يكن بُدّ في وجودها عن أنْ تكون مادة موجودة – فإنَّ انبعاثها من الصورة

matter's existence, it originates and begins with the form). You will also discover that some accidents that necessarily follow upon the form (whether originating from it or accidentally occurring owing to it) do not require the participation of matter, which the science of psychology will verify for you.[3] Some accidents jointly begin owing to both [matter and form], like being asleep and being awake, although some of them are closer to the form, like being awake,[4] whereas others are closer to the matter, like being asleep. The accidents that follow on the part of the matter might remain after the form, such as the scars caused by wounds or the Ethiopian's blackness when he dies.

(5) So the true nature is that to which we have gestured, where the difference between it and form is what we have indicated, and the difference between it and motion is even all that much more obvious. Still, the term *nature* might be used in many ways, three of which we shall mention [as] deserving that title most. So [(1)] *nature* is said of the principle, which we mentioned;[5] [(2)] *nature* is said of that by which the substance of anything subsists; and [(3)] *nature* is said of the very being of anything. Now, when by *nature* one means *that by which the substance of anything subsists,* there will inevitably be differences of opinion about it according to the various schools of thought and beliefs. So whoever thinks that the part is more entitled than the whole substance to be [considered as] that which makes it to subsist—namely, its [elemental] component or material—will say that anything's nature is its [elemental] component. Whoever thinks that the form is worthier of that will make [form] the thing's nature. Among the speculative thinkers,[6] there might even be a group who supposed that motion is the first principle providing substances with their subsistence. Now, whoever thinks that anything's nature is its form will, in the case of simple substances, make it their simple essence and, in the case of composites, make it the [elemental or

3. The reference may be to *Kitāb al-nafs* 2.2, where Avicenna discusses the role of material accidents in making things particular and then the degrees of abstraction from matter that are involved in the various kinds of perception (*idrāk*).

4. Reading with **Z**, **T**, and the Latin equivalent *wa-in kāna qad yakūnu baʿḍuhā aqrab ilá al-ṣūrah mithl al-yaqaẓah,* corresponding with "although some . . . being awake," which is (inadvertently) omitted in **Y**.

5. See chapter 1.5.5–6.

6. The locution *ahl al-baḥth* may be a synonym for *ahl al-naẓar,* in which case the reference would be to the Islamic speculative theologians.

وابتداءها منها . وستجد أعراضاً تلزم الصورة وتنبعث منها أو تعرض لها بوجهٍ آخر لا تحتاج إلى مشاركة المادة؛ وذلك إذا حُقّق لك علم النفس . وقد تكون أعراضٌ مشتركةٌ تبتدىء من الجهتين جميعاً كالنوم واليَقَظَة ، وإن كان قد يكون بعضها أقرب إلى الصورة مثل اليقظة وبعضها أقرب إلى المادة مثل النوم . والأعراض اللاحقة من جهة المادة ، قد تبقى بعد الصورة كأنداب القروح وسواد الحبشي إذا مات .

(٥) فالطبيعة الحقيقية هي التي أومأنا إليها ، والفرق بين الصورة وبينها ما أشرنا إليه ، والفرق بين الحركة وبينها أظهر بكثير . لكن لفظ الطبيعة قد يستعمل على معانٍ كثيرة؛ أحقّ ما نذكر منها هو ثلاثة : فيقال طبيعة للمبدأ الذي ذكرناه ، ويقال طبيعة لما يتقوّم به جوهر كلّ شيء ، ويقال طبيعة لذات كلّ شيء . وإذا أُريد بالطبيعة ما يتقوّم به جوهر كلّ شيء حُقّ أنْ يُختلف فيها بحسب اختلاف المذاهب والآراء ؛ فمَنْ رأى أنْ يجعل الجزء الأحق من كلّ جوهر بأنَّ تقوّمه هو عنصره وهيولاه ، قال إنَّ طبيعة كلّ شيء عنصره ، ومَنْ رأى أنْ يجعل الصورة أحرى بذلك جعلها طبيعة للشيء . وعسى أنْ يكون في أهل البحث قومٌ ظنّوا أنَّ الحركة هي المبدأ الأول لإفادة الجواهر قواماتها ، فجعلوها طبيعة كل شيء . ومَنْ جعل طبيعة كل شيء صورته جعلها في البسائط ماهيّتها البسيطة ، وفي المركبات المزاج .

humoral] mixture. (Although you will later learn what *mixture* is, for now we will just quickly point you in the right direction.[7] So we say that that *mixture* is the quality resulting from the interaction of contrary qualities in neighboring bodies.)

(6) The earliest of the Ancients were quite ardent in giving preference and support to matter and making it nature. Among them was Antiphon, whom the First Teacher [that is, Aristotle] mentioned, relating that he insisted that matter is the nature and that it is what makes substances subsist.[8] [He defended this by] saying that if the form were the nature in the thing, then when a bed decomposes and reaches the point where it would sprout forth branches and grow, it would sprout forth a bed. That, however, is not the case, and instead it reverts to the nature of the wood, and wood grows. It is as if this man thought that nature is the matter—but not just any matter, but, rather, whatever is itself preserved through every change, as if he had not distinguished between the artificial form and nature. In fact, he did not even distinguish between what is accidental and the form, not recognizing that what makes something subsist must inevitably be present while the thing exists, not that it is what must inevitably be present when the thing ceases to exist, which does not separate but remains even when the thing ceases to exist. What need have we for something that remains during changes but whose existence is not enough actually to result in something? This is like the material, which does not provide the actual existence of anything but, rather, provides only its potential existence, whereas it is in fact the form that actually makes it [exist]. Don't you see that when the wood and bricks exist, then the house has a certain potential existence; however, it is its form that provides it with its actual existence to the extent that, were it possible for its form to subsist without the matter, then one could do away with [the matter]? Moreover, it escaped this man's notice that the woodiness is a form and that when there is growth, [this form] is being preserved. So, if the important thing for us to bear in mind when considering the conditions for something's being a nature is that it provide the thing with its substantiality, then the form deserves that [title] most.

7. See, for instance, 1.10.7 and *Kitāb fī al-kawn wa-l-fasād* 6–7.
8. Cf. Aristotle, *Physics* 2.1.193a12–17.

وســتعلم بعد أنَّ المزاج ما هو ، ونرشدك إليه الآن يسيراً فنقول : إنَّ المزاج هو كيفيّة تحصل من تفاعل كيفيات متضادّة في أجسام متجاورة .

(٦) وقــد كان الأقدمون من الأوائل شــديدي الشــغف بتفضيل المــادة والقول بها وتصيّرها طبيعــة ، ومنهم ‹أنْطيفن› الذي يذكره المعلم الأول ؛ ويحكي عنه أنَّه أصرَّ على أنَّ المــادة هــي الطبيعة وأنّها هي المقوّمة للجواهر . ويقول لو كانت الصورة هي الطبيعة في الشــيء لكان السرير إذا عَفَن وصار بحيث يُفرع غصناً وينْبته فرّع سريراً ؛ وليس كذلك ، بل يرجع إلى طبيعة الخشبية فينبت خشباً ، كأن هذا الرجل رأى أنَّ الطبيعة هي المادة ، ولا كلّ مادة ، بل المحفوظ ذاتها في كل تغيّر ، وكأنه لم يفرّق بين الصورة الصناعية وبين الطبيعة بل لم يفرّق بين العارض وبين الصورة ، ولم يعرف أنَّ مقومّ الشيء يجب أنْ لا يكون منه بُدّ عند وجود الشــيء ، ليس أنَّه الذي لا بُدّ منه عند عدم الشيء ولا انفكاك ويكون ثابتاً ، أو يكون ثابتاً عند عدم الشــيء . وما يغنينا أنْ يكون الشيء ثابتاً في الأحوال ، ووجوده لا يكفــي في أنْ يحصل الشــيء بالفعل ؛ مثل هذا الذي هو الهيولــى التي لا تفيد وجود الشــيء بالفعل ، بل إنّما تفيد قوّة وجوده ، بل ‹و› الصورة هي التي تجعله بالفعل . ألا ترى أنَّ الخشب واللَّبِن إذا وُجدا كان للبيت وجودٌ ما بالقوة ، ولكن وجوده بالفعل مستفادٌ من صورته ، حتى لو جاز أنْ تقوم صورته لا في المادة لا ســتغنى عنها . وهذا الرجل ذهب عليه أيضاً أنَّ الخشبية صورة ، وأنَّها عند الإنْبات محفوظة . فإنْ كان الذي يهمّنا في مراعاة شــرائط كون الشيء طبيعة ؛ هو أنْ تكون مفيدة للشيء جوهريته ، فالصورة أولى بذلك .

(7) Now, since simple bodies are actually what they are through their forms and not through their matter (otherwise they would not differ), then clearly, nature is not the matter. In simple substances, it is the form, and it is a certain form in itself, not a certain matter. As for composites, you are well aware that the defined nature and its definition do not yield their essences but are together with certain additional factors; nevertheless, their perfecting forms are synonymously called *nature,* in which case *nature* is predicated in common of both this case and the first one. As for motion, it is the farthest removed from the nature of things, for, as will become clear,[9] it arises in the case of deficiency and is foreign to the substance.

9. See 4.9.5.

(٧) ولما كانت الأجسام البسيطة هي ما هي بالفعل بصورها ، ولم تكن هي ما هي بموادّها ، وإلاّ لما اختلفت ، فبيّنٌ أنَّ الطبيعة ليست هي المادة ، وأنّها هي الصورة في البسائط ، وأنها في نفسها صورة من الصور ليست مادة من المواد . وأمّا في المركبات فغير خافٍ عليك أنَّ الطبيعة المحدودة وحدّها لا يعطي ماهيّاتها ، بل هي مع زوائد . إلاّ أنْ تسمى صورتها الكاملة طبيعة على سبيل الترادف ، فتكون الطبيعة تقال حينئذ على هذه وعلى الأُولى بالاشتراك . وأمّا الحركة فهي أبعد من أنْ تكون طبيعة للأشياء ، فإنَّها – كما يتضح – طارئة ، في حال النقص ، وغريبة عن الجوهر .

Chapter Seven

Of certain terms derived from nature and an explanation of their status

(1) Here are some terms used: *nature, natural, what has a nature, what is by nature, what is naturally,* and *what follows the natural course. Nature* has already been defined;[1] and as for the *natural,* it is whatever is related to nature. Now, whatever is related to nature is either that in which there is the nature or that which is from the nature. *That in which there is the nature* is either that which is informed by the nature or that which is the nature, like a part of its form. *That which is from the nature* is effects and motions as well as things of the same kind falling under place, time, and the like. That which in itself has something like this principle is *what has a nature*—namely, the body that is moved and is at rest by its natural dispositions. As for *what is by nature,* it is anything whose actual existence or actual subsistence is from the nature, whether existing primarily, like natural individuals, or existing secondarily, like natural species.[2] *What is naturally* is whatever necessarily follows upon the nature, however it might be, whether as resembling the intention (such as the individuals and species of substances) or [as] its necessary concomitant (such as necessary and[3] incidental accidents). *What follows the natural course* is, for example, the motions and rests that the nature of itself necessitates essentially and that do not lie outside of what is proper to it. Now, *what lies outside what is proper to it* sometimes results from some foreign cause and sometimes is from [the nature] itself through some cause receptive to its action, namely the matter. So, [for example], the oversized head and additional finger do not follow the natural course, and yet they [occur] naturally and are by nature, since their cause is the nature, albeit not of itself but only accidentally, namely [because] the matter is in a certain state with respect to its quality and quantity so as to be susceptible to that.

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1. See 1.5.5–6.

2. The text's literal "by the first existence" and "by the second existence" are probably references to *Kitāb al-madkhal* 1.2, where Avicenna distinguishes two existences: the first is in concrete particulars and the second is in conceptualization.

3. Reading *wa,* which is omitted in **Y**, with **Z** and **T**; the Latin reads *aut,* which corresponds with the Arabic *au* (or).

<الفصل السابع>

في ألفاظ مشتقة من الطبيعة وبيان أحكامها

(١) هــا هنا ألفاظٌ تُســتعمل فيقــال: الطبيعة، والطبيعي، وما لــه الطبيعة، وما بالطبع، وما يجري المجرى الطبيعي. فالطبيعة قد عرفتها، وأمّا الطبيعي فهو كل منسوبٍ إلى الطبيعة، والمنســوب إلى الطبيعة هو إمّا ما فيه الطبيعة، وإمّا ما عن الطبيعة، والذي فيه الطبيعة فالمتصــوّر بالطبيعة أو الذي الطبيعة كالجزء من صورته. وأمّا ما عن الطبيعة فالآثــار والحركات وما يجانس ذلك من المكان والزمان وغيــره. وأمّا ما له الطبيعة؛ فهو الذي له في نفسه مثل هذا المبدأ؛ وهو الجسم المتحرّك بطباعه والساكن بطباعه. وأمّا ما بالطبيعة فهو كلّ ما وجوده بالفعل عن الطبيعة، أو قوامه بالفعل عن الطبيعة بالوجود الأول كالأشــخاص الطبيعية، أو بالوجود الثاني كالأنــواع الطبيعية. وأمّا ما بالطبع؛ فهو كلّ ما يلزم الطبيعة كيف كان – على مُشاكلة القصد كالأشخاص والأنواع الجوهرية، أو لازماً لها كالأعراض اللازمة والحادثة. وأمّا ما يجري المجرى الطبيعي؛ فمثل الحركات والسكونات التي توجبها الطبيعة بنفســها لذاتها لا خارجة عن مقتضاها. والخارج عن مقتضاها ربّما كان بســببٍ غريب، وربّما كان عنها نفســها بســببٍ قابل فعلها وهو المادة. فإنَّ الرأس المُسَــفَّط والإصبع الزائدة ليسا جاريين على المجرى الطبيعي، ولكنهما بالطبع وبالطبيعة، إذْ ســببهما الطبيعة، ولكن ليس لنفسها بل عارضٍ؛ وهو كون المادة بحالٍ – في كيفيتها أو كميّتها – تقبل ذلك.

(2) *Nature* is predicated in the manner of a particular and a universal. That which is predicated in the manner of a particular is the nature proper to each of the individuals, whereas the nature that is predicated in the manner of a universal is sometimes a universal relative to a species and sometimes a universal absolutely. Neither of these has an existence in concrete particulars as subsisting entities, except[4] in conceptualization. In fact, however, only the particular has existence. The first of the two [universals] is what our intellects recognize as a principle proper to the management necessary for the conservation of a species, whereas the second is what our intellects recognize as a principle proper to the management necessary for the conservation of the universe according to its order.

(3) Some had supposed that each of these two is a certain existing power: the first permeating the individuals of the species, and the other permeating the universe.[5] Others supposed that each one of these, [considered] in itself as an emanation from the first principle, is one, but is divided by the divisions of the universe, varying with respect to the recipients.[6] None of this should be listened to, since only the various powers that are in recipients exist, and they were never united and thereafter divided. Certainly, they have some relation to a single thing; but the relation to the single thing, which is the principle, does not eliminate the essential difference resulting from the things, nor do the things that result from the relation [namely, the universals] subsist separately in themselves. In fact, nature in this sense has no existence, neither in

4. Reading *illā* with **Z**, **T**, and the Latin (*nisi*), which has been (inadvertently) omitted in **Y**.

5. It is not clear what the source is for the present position or that of the next sentence. Neither position appears in Aristotle's *Physics* nor in what I have seen in the extant commentaries on the *Physics* available in Arabic. The first position has certain similarities in content and terminology with Alexander of Aphrodisias's *The Principles of the Universe in Accordance with the Opinion of Aristotle;* see ed. and trans., Charles Genequand, *Alexander of Aphrodisias on the Cosmos,* Islamic Philosophy, Theology and Science Texts and Studies 44 (Leiden: E. J. Brill, 2001), §§278ff.

6. This position has certain affinities with that of Plotinus and the Neoplatonists; see Plotinus, *Enneads* 3.2. Concerning Plotinus as a possible source, it should be noted that a redaction of his Enneads 4–6 was made in Arabic under the title *The Theology of Aristotle,* for a discussion of the *Theology of Aristotle* see Peter Adamson, *The Arabic Plotinus, A Philosophical Study of the "Theology of Aristotle"* (London: Duckworth, 2002).

(٢) والطبيعة تقال على وجه جزئي، وتقال على وجه كلّي؛ فالتي تقال على وجه جزئي هي الطبيعة الخاصّة لشخص شخص، والطبيعة التي تقال بوجه كلّي فربّما كانت كلّية بحسب نوعٍ وربّما كانت كلّية على الإطلاق، وكلاهما لا وجود لهما في الأعيان ذواتاً قائمة إلا في التصوّر، بل لا وجود إلاّ للجزئي. أمّا أحدهما فهو ما نعقله من مبدأ مقتضى التدبير الواجب في استحفاظ نوع، والثاني ما نعقله من مبدأ مقتضى التدبير الواجب في استحفاظ الكل على نظامه.

(٣) وقد ظنَّ بعضهم أنَّ كل واحدٍ منهما قوة موجودة؛ أمّا الأولى فسارية في أشخاص النوع، والأخرى فسارية في الكل. وظنَّ بعضهم أنَّ كل واحدٍ منهما هو في ذاته، وفيضانه عن المبدأ الأول واحدٌ، ومنقسمٌ بانقسام الكل، ويختلف في القوابل. وليس من هذا شيءٌ يجب أن يُصغى إليه، فإنَّه لا وجود إلاّ للقوى المختلفة التي في القوابل، ولم تكن البتة متحدة ثم انقسمت. نعم لها نسبة إلى شيء واحد؛ والنسبة إلى الشيء الواحد – الذي هو المبدأ – لا ترفع الاختلاف الذاتي عن الأشياء، ولا تقوّم المنسوبات مجردة بأنفسها، بل لا وجود للطبيعة بهذا المعنى؛ لا في ذات المبدأ الأول – فإنَّه من

the First Principle itself (for it is impossible that there be in it itself anything other than it itself, as you will learn)[7] nor in the manner of the procession to other things, as if it were an emanation but has not yet arrived. It has no existence in things as some uniform thing without difference; rather, everything's nature is something either specifically or numerically different. Moreover, the example they give of the Sun's shining is not at all like that, since nothing that subsists separately departs from the Sun, neither a body nor an accident. Quite the contrary, its ray comes to be in the recipient and in every other numerically different recipient. It is neither the case that that ray exists in anything other than the recipient nor that some part of the whole ray of the Sun's substance has sunk down toward and then spread over bits of matter. It is true that, if there were not different recipients, but only one, there would in that case be only one effect. (The confirmation of all of this will be explained to you in another discipline.)[8] If there were a universal nature of this kind, however, it would not be *qua* nature, but, rather, *qua* intelligible object vis-à-vis the first principles from which the management of the universe emanates, or *qua* nature of the first of the heavenly bodies through whose mediation the order [of the universe] is conserved. There simply is no nature of a single essence permeating different bodies. So, it is in this way that you must conceive the universal and particular nature.

7. Cf. *Ilāhīyāt* 8.3–5.

8. Cf. *Kitāb al-nafs* 3.2, where he critiques the view that rays of light move and so are bodies.

المحال أنْ يكون في ذاته شيء غير ذاته، كما ستعلم – ولا في طريق السلوك إلى الأشياء كأنَّه فائض، لكنه بعد لم يصل ولا له وجودٌ في الأشياء متحدّاً بلا اختلاف، بل طبيعة كلّ شـــيء، شيء آخر تقوم بالنوع أو بالعدد. ولا أيضاً ما يمثّلونه من شروق الشمس كذلك، فإنَّ الشمس لا ينفصل عنها شيء يقوم واحداً لا جسم ولا عرض، بل إنّما يحدث شعاعها في القابل، ويحدث في كل قابل آخر بالعدد، وليس لذلك الشّعاع وجودٌ في غير القابل، ولا هو شـــيء من جملة شعاع جوهر الشمس قد انحدر منه إلى المواد فغشيها. نعم، لو لم يختلف القابل، وكان واحداً، لكان الأثر واحداً بحسبه حينئذ. ويتبيّن لك تحقيق هذا كلـــه في غير هذه الصناعة. لكن إنْ كانت طبيعـــة كلّية من هذا الجنس؛ فلا تكون على أنَّها طبيعة، بل على أنَّها أمرٌ معقولٌ عند الأوائل والمبادىء التي منها يفيض تدبير الكلّ، أو على أنَّها طبيعة جرم أول من الأجرام السماوية الذي يتوسطه يستحفظ النظام، ولا تكون البتّة طبيعة واحدة الماهيّة ســـارية في الأجسام الأخرى، فهكذا يجب أن تُتصور الطبيعة الكلّية والجزئية.

(4) Next, you know that what lies outside the natural particular course frequently does not lie outside the natural universal course; for even if death is not what is intended with respect to the particular nature that is in Zayd, it is in certain ways what is intended with respect to the universal nature. One of these ways is that [death] frees the soul from the body for the sake of flourishing among the blessed, which is [the soul's] aim and for which the body was created, and should [the soul] fail to achieve that, it is not because of the nature, but owing to evil choice. Another [way that death is something that the universal nature intends] is that other people deserve a share in existence just like this individual; for if the former ones did not die, there would not be space and food to go around for the latter ones. Also, those latter ones—namely, the ones deserving a share of something like this existence—have something [almost] owed them on the part of matter's potential, [since] they no more deserve perpetual nonexistence than the former deserve never to die. So this and others are certain things intended by the universal nature. The same is true of the additional finger, since it is something intended by the universal nature, which requires that any matter that is prepared for some form receive it and that [that form] not be hindered; so when there is excessive matter deserving the form of fingerness, it will not be denied and wasted.

(٤) ثم تعلم أنَّ كثيراً مما هو خارج عن مجرى الطبيعة الجزئية ليس بخارجٍ عن مجرى الطبيعة الكلّية. فإنَّ الموت - وإنْ كان غير مقصودٍ في الطبيعة الجزئية التي في زيد - فهو مقصودٌ في الطبيعة الكلّية من وجوهٍ: منها أنْ تتخلّص النفس عن البدن للسعادة في السعداء وهي المقصودة ولها خُلِقَ البدن، وإذا أخلفت فليس بسببٍ من الطباع، بل لسوء الاختيار. ومنها أنْ يكون لقومٍ آخرين حالهم في استحقاق الوجود؛ حال هذا الشخص وجوداً، فإنَّه إنْ خَلُدَ هؤلاءً لم يسع الآخرين مكانٌ ولا قوت. وفي قوة المادة فضلٌ للآخرين وهم يستحقون مثل هذا الوجود، وليسوا أولى بالعدم الدائم من هؤلاء بالخلود، فهذه - وغيرها - مقاصد في الطبيعة الكلّية. وكذا الإصبع الزائدة فهي مقصودة في الطبيعة الكلّية التي تقتضي أنْ تكْسى كل مادةٍ ما تستعد لها من الصورة ولا تعطّل، فإذا فضلتْ مادة تستحق الصورة الإصبعية لم تُحرم ولم تضيع!

Chapter Eight

On how the science of physics conducts investigation and what, if anything, it shares in common with the other sciences

(1) Since nature and issues related to nature have been defined, it will have become abundantly clear to you which things physics investigates. Now, since delimited magnitude is among the necessary concomitants of this natural body and its essential attributes (I mean the length, breadth, and depth to which one can point) and [since] shape is among the necessary concomitants of magnitude, then shape is also among the accidents of the natural body. Since, however, the subject of the geometer is magnitude, his subject is one of the accidents pertaining to the natural body, and the accidents that he investigates fall under the accidents of this accident [namely, magnitude]. In this way, geometry is, in a certain way, a part of natural science, albeit pure geometry and natural science do not share in common the [same] set of questions.[1] Arithmetic is the least likely to share something in common, [owing to] its greater simplicity. These two, however, have other subalternate sciences, such as the science of weights, music, spherics,[2] optics, and astronomy, all of which are closely related to the science of physics. Spherics is the simplest of them, and its subject matter is the *moving* sphere. Now, on the one hand, motion, on account of its continuity, is closely associated with magnitudes, even if its continuity is not essential but [is so associated] because of distance and time

1. "Pure geometry" would consider only those mathematical factors found, for example, in Euclid's *Elements,* whereas geometry considered as a part of natural science might roughly correspond with engineering, which must include not only geometrical knowledge, but also knowledge relevant to the material and form.

2. Literally, "the science of the moved spheres." See the Introduction to *Ptolemy's Almagest,* trans. G. J. Toomer (Princeton, NJ: Princeton University Press, 1998), 6, which briefly describes this science as dealing "with the phenomena arising from the rotation of stars and Sun about a central, spherical earth, e.g., their risings, settings, first and last visibilities, periods of invisibility, etc., using elementary geometry, but arriving mainly at qualitative rather than quantitative results." This science was considered to be quite basic, which matches Avicenna's own description of it below.

<الفصل الثامن>

في كيفية بحث العلم الطبيعي
ومشاركاته لعلوم أُخرى إنْ كانت تشاركه

(١) وإذْ قد عرفت الطبيعة وعرفت الأُمور الطبيعية، فقد اتضح لك فضْل اتضاحٍ أنَّ العلم الطبيعي عن أي الأشياء يبحث. ولمّا كان المقدار المحدود من لوازم هذا الجسم الطبيعي وعوارضه الذاتية؛ أعني الطول والعرض والعمق المشار إليها - وكان الشكل من لوازم المقدار - كان الشكل أيضاً من عوارض الجسم الطبيعي. ولمّا كان المهندس موضوعه المقدار، فموضوعه عارضٌ من عوارض الجسم الطبيعي، والعوارض التي يبحث عنها هي من عوارض هذا العارض. فمن هذه الجهة تصير الهندسة الجزئية بوجهٍ مّا عند العلم الطبيعي، ولكن الهندسة الصرفة لا تشارك العلم الطبيعي في المسائل. وأمّا علم الحساب فهو أبعد من المشاركة وأشدّ بساطة. بل ها هنا علومٌ أخرى تحتهما كعلم الأثقال وعلم الموسيقى وعلم الأُكر المتحرّكة وعلم المناظر وعلم الهيئة. وهذه العلوم أقرب مناسبة إلى العلم الطبيعي، وعلم الأُكر المتحرّكة أبسطها؛ وموضوعه كرة متحركة. والحركة شديدة المناسبة للمقادير لاتصالها، وإنْ كان اتصالها لا لذاتها، بل بسبب مسافةٍ أو زمانٍ - كما

(as we shall make clear later);[3] whereas, on the other hand, the demonstrations in the science of spherics do not use any physical premises. The subject matter of music is musical notes and intervals, and it has principles from both physics and arithmetic; and the same holds for the science of weights. Likewise, optics, whose subject matter is magnitudes related to a certain point of vision, draws its principles from both physics and geometry. Now, none of these sciences shares the [same] set of questions in common with physics; and although all of them consider the things belonging to them insofar as they possess quantity and have the accidents of quantity, their being conceived as such does not require that we make them some quantity in a natural body in which there is a principle of rest and motion, and neither do we need that.

(2) The subject matter of astronomy is the more significant portions of the subject matter of physics, and its principles are both physical and geometrical. The physical ones are, for example, that the motion of the heavenly bodies must be preserved according to a single system and other such things that are frequently used at the beginning of the *Almagest*.[4] As for the geometrical ones, they are well known. [Astronomy] differs from the other sciences in that it equally shares the [same] questions in common with physics, and so the questions it raises are a subset of the questions physics raises. Likewise, what is referred to in it and in the questions of physics is some accident or other belonging to the natural body—as, for example, that the Earth is a sphere and the Heavens are a sphere and the like. So it is as if this science is a mixture of something physical and something mathematical, as if the purely mathematical is something abstracted and not at all in matter, while that one [namely, what is physical] is an instantiation of that abstract thing in a determinate matter. Still, the astronomer and natural philosopher have different

3. The reference appears to be to 3.6 below, where, after having shown that there are no spatial magnitudes that are composed of atomic units, Avicenna argues that, given the mutual relation among distance (a spatial magnitude), time, and motion, none of them can have a discrete or atomic structure, and so all must be continuous.

4. The astronomical treatise of Ptolemy, translated during the reign of the ʿAbbāsid caliph al-Manṣūr (754–775). The *Almagest,* with its system of embedded spheres, deferents, and epicycles, provided the basis for virtually all medieval astronomy until Copernicus. For an account of the Ptolemaic system see Thomas Kuhn, *The Copernican Revolution: Planetary Astronomy in the Development of Western Thought* (Cambridge, MA: Harvard University Press, 1957).

نبيّن نحن من بعد ، ثم البراهين في علم الأُكر المتحرّكة لا تستعمل فيها المقدمات الطبيعية البتة . وأمّا علم الموسيقى فموضوعه النَغَم والأزمنة ، وله مبادىء من علم الطبيعين ومباديء من علم الحساب . وكذلك علم الأثقال وعلم المناظر أيضاً ‹ف› موضوعه مقادير منسوبة إلى وَضْع مّا من البصر ، وله مبادىء من الطبيعيات ومن الهندسة . وهذه العلوم كلّها لا تشارك العلمَ الطبيعي في المسائل البتة ، وكلّها تنظر في الأشياء التي لها من حيث هي ذوات كمّ ، ومن حيث لها عوارض الكمّ التي لا توجب تصور عروضها للكمّ أنْ نجعلها كمّاً في جسم طبيعي فيه مبدأ حركة وسكون ، ولا نحتاج إلى ذلك .

(٢) وأمّا علم الهيئة فموضوعه أعظم أجزاء موضوع العلم الطبيعي ، ومبادؤه طبيعية وهندسية ؛ أمّا الطبيعية فمثل أنَّ حركة الأجرام السماوية يجب أنْ تكون محفوظة على نظام واحدٍ وما أشبه ذلك ، ممّا استُعمِل كثيرٌ منه في أول المجسطي . وأمّا الهندسية فممّا لا يخفى ، ويخالف سائر تلك العلوم في أنَّه يشارك الطبيعي في المسائل أيضاً ؛ فيكون موضوع مسائله شيئاً من موضوعات مسائل العلم الطبيعي ، والمحمول فيه أيضاً عارضٌ من عوارض الجسم الطبيعي ومحمولٌ أيضاً في مسائل العلم الطبيعي ؛ مثل الأرض كُرية والسماء كُرية ، وما أشبه ذلك . فهذا العلم كأنه ممتزج من طبيعي ومن تعليمي ، فإنّ التعليمي المحض مجرد لا في مادة البتة ، وكأن هذا موقع لذلك المجرد في مادةٍ معيّنة . لكن المقدمات المُبرهن بها على المسائل المشتركة لصاحب الهيئة والطبيعي مختلفة ، أمّا مقدمات

premises by which they construct their demonstrations for the commonly shared questions: mathematical premises involve astronomical observation,[5] optics, and geometry, while physical premises are taken from whatever the nature of the natural body requires. Sometimes the natural philosopher combines [the two] and so introduces mathematical premises into his demonstrations; and the same for the mathematician, when he introduces physical premises into his demonstrations. When you hear the natural philosopher say, "If the Earth were not a sphere, then the remnant left during the Moon's eclipse would not be a crescent," know that he has combined [physical and mathematical premises]; and when you hear the mathematician say, "The noblest body has the noblest shape—namely, that which is circular," and "Portions of [the] Earth are moved rectilinearly," know that he has provided a mixed [demonstration]. Now, consider how the natural philosopher and mathematician differ in demonstrating that a certain simple body is spherical. To prove that, the mathematician uses what he discovers about the states of planets with respect to their rising, setting, elevation on the horizon, and declination, all of which would be impossible unless the Earth is spherical. The natural philosopher, however, says that the Earth is a simple body, and so its natural shape, which necessarily results from its homogeneous nature, cannot be something in which there are dissimilarities, such that part of it is angular and another part rectilinear, or such that part of it has one kind of curve and another its opposite. So you find that the first produced proofs that draw on the relation of oppositions, positions, and conjunctions without needing to turn to some power of nature that is necessary in order to make sense of them, while the second advanced premises drawn from what is proper to the nature of the natural body *qua* natural. The first has provided the *fact that* but not the cause, whereas the second has provided the cause and the *reason why*.[6]

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5. See Dozy, *Supplément aux Dictionnaires Arabes,* 2 vols. (Leiden: E. J. Brill, 1881; reproduced, Beirut: Librairie du Liban, 1991), s.v. *raṣd* for this reading of *raṣdīya*.

6. In other words, the astronomer provides a demonstration *quia,* whereas the natural philosopher provides the demonstration *propter quid.* For Avicenna's discussion of this Aristotelian distinction, see *Kitāb al-burhan,* 1.7.

التعليمي فرضْدية مُناظرية أو هندسية، وأمّا مقدمات الطبيعي فمأخوذة ممّا توجبه طبيعة الجسم الطبيعي. وربّما خلط الطبيعي فأدخل المقدمات التعليمية في براهينه، وخلط التعليمي فأدخل المقدمات الطبيعية في براهينه وإذا سمعت الطبيعي يقول: لو لَمْ تكن الأرض كُرية؛ لم يكن فضل الكسوف القمري هلالياً – فأعلم أنَّه قد خلط. وإذا سمعتَ التعليمي يقول: وأشرف الأجرام له أشرف الأشكال وهو المستدير، وأنَّ أجزاء الأرض تتحرك إليه على الاستقامة – فأعلم أنَّه قد خلط. وانظر كيف يختلف الطبيعي والتعليمي في البرهان على أنَّ جُرْماً مّا من البسائط كُري؛ أمّا التعليمي فيستعمل في بيان ذلك ما يجد عليه حال الكواكب في شروقها وغروبها، وارتفاعها عن الأفق وانخفاظها، وأنَّ ذلك لا يمكن إلاّ أن تكون الأرض كُرية. والطبيعي يقول إنَّ الأرض جِرْمٌ بسيطٌ، فشكله الطبيعي الذي يجب عن طبيعةٍ متشابهة مستحيل أنْ يكون مختلفاً فيه؛ فيكون في بعضه زاوية وفي بعضه خطٌ مستقيم، أو يكون بعضه على ضَرْبٍ من الانحناء والآخر على خلافه. فتجد الأول قد أتى بدلائل مأخوذة من مناسبة المقابلات والأوضاع والمحاذيات، من غير أنْ تكون محتاجة إلى أنْ يكون فيها تعرضٌ لقوةٍ طبيعيةٍ موجبة فيها لمعنى، وتجد الثاني قد أتى بمقدماتٍ مأخوذة من مقتضى طبيعة الجسم الطبيعي – بما هو طبيعي. والأول يكون قد أعطى الإنّية ولم يعطِ العِلّة، والثاني أعطى العِلّة واللّميّة.

(3) Numbers *qua* numbers might exist in natural existents, since one unit and then another is found in them. Now, [the fact] that each one of [the natural existents] is a unit is different from its being water, fire, earth, or the like; rather, the unity is some necessary concomitant belonging to [the natural existent] extrinsic to its essence. The consideration of those two units, insofar as they are together in some manner of existence, is the form of duality in that existence. The same holds for the other numbers as well. This is the numerable number, which also might exist in non-natural existents, which will be shown to have a certain "that-ness" and subsistence. So number is not included in physics, because it is neither a part nor species of the subject matter of [physics], nor is it some accident proper to it. Consequently, its identity does not require any dependence relation upon either natural or non-natural things—where *dependence relation* means that its existence is proper to that of which it is said to be dependent as something requiring it—but, rather, it is distinct from either one of the two in subsistence and definition. It is dependent (if it is and it is necessary) on what exists commonly and so is among the necessary concomitants of it. So the nature of number is fittingly understood by the intellect as something wholly abstracted from matter. Now, on the one hand, the consideration of it *qua* the nature of number and what is accidental to it from that perspective is a consideration of something abstracted from matter, while, on the other hand, it may have certain accidental states that someone who is counting considers, [while] it does not have those accidental states except inasmuch as they are necessarily dependent upon matter to subsist, even though [the nature of number] is necessarily not dependent upon [matter] by definition and is not something properly belonging to a determinate matter. So the consideration of the nature of number, as such, is a mathematical consideration.

(٣) والأعداد، بما هي أعــداد، قد توجد في الموجودات الطبيعة، إذ يوجد فيها واحدٌ وواحدٌ آخر، وكون كلّ واحدٍ منها واحداً؛ ليس كونه ذاته من ماء أو نار أو أرض أو غيــر ذلك، بــل الوحدة أمرٌ لازمٌ له خارج عن ماهيَّته، واعتبار ذينك الواحدين – من حيــث همــا في نحوٍ من أنحاء الوجــود معاً – هو صورة الإثْنينيــة في ذلك الوجود، وكذلــك في غير ذلك من الأعــداد، وهذا هو العدد المعدود، وقد يوجد في الموجودات ‹غير› الطبيعية التي سيتضح أنَّ لها إنِّيَةً وقواماً. فليس العدد داخلاً في العلم الطبيعي؛ لأنــه لا هو جزء ولا هو نوع من موضوعه، ولا هــو عارض خاصّ به، فهويته لا تقتضي تعلّقاً لا بالطبيعيات ولا بغير الطبيعيات. ومعنى التعلّق أنْ يكون وجوده خاصّاً بما قيل إنَّه متعلقٌ به مقتضياً إياه، بل هو مباينٌ لكل واحدٍ منهما بالقوام وبالحدّ ويتعلق – إنْ كان ولا بُــدّ – بالموجود العام؛ فيكون من الأمور اللازمة له. فطبيعة العدد تصلح أنْ تُعقل مجرّدة عن المادة أصلاً، والنظر فيها من حيث هي طبيعة العدد وما يعرض لها من هذه الجهة، نظرٌ مجرّدٌ عن المادة. ثم قد تعرض لها أحوال ينظر فيها الحاسبو تلك الأحوال لا تعرض لها إلاّ وقد وجب تعلّقها بالقوام بالمادة وإنْ لم يجب تعلّقها بها بالحدّ، ولم تكون ممّا تُخصّصها بمادةٍ معيّنة، فيكون النظر في طبيعة العدد – من حيث هى كذلك – نظراً رياضياً.

(4) Magnitudes are common to those things dependent upon matter but distinct from it. They are common to those things dependent upon matter because magnitudes are among the features that absolutely subsist in matter, whereas they are distinct from it in a number of ways. One way is that among the natural forms, there are some that it is immediately obvious cannot belong to just any matter, as chance would have it. An example would be the form that belongs to water *qua* water, for it simply cannot exist in stony matter as such, given its [elemental] mixture—unlike being round, which can inhere in both materials, as well as any other matter. Also, the form and nature of human-ness cannot exist in woody matter. This is not something that requires a great deal of mental effort to confirm, but can be grasped readily. There are other [natural forms] whose chancing to belonging to just any matter would not at first glance seem impossible—as, for example, white, black, and things of that kind (for the mind does not find this repugnant). Despite that, however, intellectual consideration will subsequently affirm that the nature of white and black belongs only to a certain mixture and a specific disposition and that what is disposed to turning black—in the sense of [naturally] becoming colored, not [artificially] being dyed—is not susceptible to turning white, which in the former sense [that is, the sense of naturally becoming colored] is due to something in its [elemental] mixture and inherent disposition. Even if the two are like that, however, neither of them is mentally conceptualized without being joined to a certain thing, which is not [color]. That thing is surface or magnitude, which is distinct from the color in the way it is affected.

(٤) وأمّا المقادير فإنَّها تشـــارك المتعلّقات بالمادة وتباينها . أمّا مشـــاركتها للمتعلّقات بالمـــادة فلأنَّ المقادير هي من المعاني القائمة في المادة لا محالة ، وأمّا مباينتها فمن جهات . من ذلك أنَّ من الصور الطبيعية ما يظهر من أمره في أول الأمر أنَّه لا يصلح أنْ يكون عارضاً لكل مادة اتفقت ، مثل الصورة التي للماء من حيث هي ماء ؛ فإنَّها مستحيلة أنْ توجد في المادة الحجرية من حيث هي على مزاجها ، لا كالتدوير الذي يصح أن يحلّ المادتين جميعاً وأي مادة كانت . والصورة الإنسانية وطبيعتها فإنَّها مستحيلة أنْ توجد في المادة الخشبية ، وهـــذا أمرٌ لا يلـــزم الذهن في تحقّقه كثير تكلّف ، بل يقرب منالـه . ومنها ما لا يســـتحيل ، في بادىء النظر ، أنْ يعرض لأي مادة اتفقت – مثل البياض والســـواد وأشـــياء من هذا الجنس – فإنَّ الذهن لا يستوحش من إحلالها أيّة مادة اتفقت ، لكن العقل والنظر يوجبان مـــن بعد أنَّ طبيعة البياض والســـواد غير عارضةٍ إلاّ لمزاجٍ واســـتعدادٍ مخصوص ، وأنَّ المستعدّ للتسوّد – بمعنى التلّون لا بمعنى التصبّغ – ليس قابلاً للبياض الذي بذلك المعنى لأمرٍ في مزاجه وغريزته ، لكنهما ، وإنْ كانا كذلك ، فلا يُتصور ولا واحدٌ منهما في الذهن إلاّ مقارناً لأمرٍ ليس هو هو ، وذلك الأمر هو الســـطح أو المقدار المباين للّون في المفعول .

(5) Moreover, the two forgoing divisions [of natural forms] frequently share a certain thing in common: namely, the mind receives one of [those divisions of forms] only when there is attached to it a specific relation to another thing, like the subject, which is joined to the thing itself. So when the mind brings up the form of human-ness, it necessarily brings it up together with its relation to a certain specific matter, appearing in the imagination only like that. Similarly, when it conceptually brings up white, it brings it up together with a certain extension in which [the white] necessarily is, and [the mind] refuses to conceptualize a given white unless it conceptualizes a given amount. Now, it is known that being white is not being a certain amount, but we do make the relation of being white to being an amount similarly to *x*'s relation to *y,* which is *x*'s subject.

(6) Magnitude is distinct from these two classes of things with respect to that which the two share in common, since the mind receives magnitude as something abstract. How could it do so otherwise, when a thorough investigation is needed in order to reveal that magnitude exists only in matter? It is distinct from the first division [of natural forms] by virtue of something peculiar to it—namely, that [even] when the mind finally discovers magnitude's relation to matter, it is not forced to consider its having a specific matter. It is distinct from the second division in that, [as with the first division,] in conceptualizing magnitude, the mind is not forced to make it have a specific matter; but additionally, neither do deduction and the intellect force it to that, since the intellect, in the same act of conceptualizing magnitude, can dispense with conceptualizing it in matter. Similarly, deduction does not require that magnitude have some unique relation to some species-specific matter because magnitude is never separate from [all the various kinds of] material things, and so it is not proper to some determinate [kind] of matter.

(7) Besides that, one has no need of matter in order to imagine and define [magnitude]. Now, it has been supposed that this is the status of white and black as well, but that is not so. [That] is because neither conceptualization in imagination nor descriptions nor definitions are

(٥) ثم قد يتشارك أيضاً هذان القسمان المذكوران في أمرٍ وهو أنَّ الذهن لا يقبل واحداً منهما إلاّ وقد ‹لحقته› خاصّية نسبةٍ إلى أمرٍ آخر يقارن ذاته كالموضوع، فإنَّ الذّهن إذا أحضر صورة الإنسانية لزمه أنْ يحضر معها نسبة لها إلى مادةٍ مخصوصةٍ لا تُتخيّل إلاّ كذلك. والبياض أيضاً إذا أحضره التصوّر أحضر معه إنبساطاً هو فيه ضرورة، وأبى أنْ يتصور بياضاً إلاّ تصوّر قدراً، ومعلومٌ أنَّ البياضية غير القدرية. ونجعل نسبة البياضية إلى القدرية شبيهة بنسبة شيءٍ إلى أمرٍ موضوعٍ له.

(٦) ثم المقدار يفارق هذين الصنفين فيما يشتركان فيه، وإذ الذهن يقبل المقدار على أنّه مجرّد، وكيف لا يقبله وهو محتاجٌ إلى استقصاءٍ في البحث حتى ينكشف أنَّ المقدار لا يوجد إلاّ في مادة؟ ويفارق القسم الأول بشيءٍ يخصّه وهو أنَّ الذهن إذا تكلّف نسبة المقدار إلى المادة لم يضطر إلى أنْ تُعدّ له مادة مخصوصة، ويفارق القسم الثاني بأنَّ الذّهن – وإنْ لم يضْطر في تصوّر المقدار إلى أنْ يجعل له مادة مخصوصة – فالقياس والعقل لا يضطره إليها أيضاً، إذ الذّهن يستغني في نفس تصوّر المقدار عن تصوّره في المادة. والقياس لا يوجب أيضاً أنْ يكون للمقدار اختصاصٌ بمادةٍ نوعيةٍ معيّنة؛ لأنَّ المقدار لا يفارق شيئاً من المواد، فليس ممّا يكون خاصّاً بمادة معيّنة.

(٧) ومع ذلك فهو مستغنٍ في التوهّم والتحديد عن المادة. وقد ظُنَّ أنَّ البياض والسواد هذا حكمهما أيضاً وليس كذلك؛ فإنّه لا التصوّر التخيّلي ولا الرسوم ولا الحدود

provided for them that are totally free of that when it is thoroughly investigated. The two are abstract only in another sense—namely, that matter is not a part of their subsistence, as it is a part of the subsistence of the composite; however, it is a part of their definition. Many things are part of something's definition while not being part of its subsistence, when its definition includes a certain relation to something external to the thing's existence. This point has been explained in the *Book of Demonstration*.[7]

(8) So, in the construction of demonstrations in the disciplines of arithmetic and geometry, neither discipline needs to turn to natural matter or take premises that refer to matter in any way. In contrast, the disciplines of spherics, music, optics, and astronomy progressively take matter, or some accident or other of matter, more and more [in their premises] because they are involved in investigating its states and so must take it into account. That is because these disciplines investigate either something's number or magnitude or some shape in a thing, where number, magnitude, and shape are accidents of all natural things. Now, occurring together with number and magnitude are also the things that essentially follow upon number and magnitude; and so, when we want to investigate the states in a given natural thing that are accidental to number and magnitude, we must necessarily take into account that natural thing. It is as if the physical sciences were a single discipline and mathematics—which is pure arithmetic and pure geometry—were a single discipline; and what is begot between the two are disciplines whose subject matter is from one discipline, while the things taken up in answering their set of questions are from another. When some of the sciences related to mathematics require that the mind turn toward matter, owing to the relation between them and the objects of physics, then how much greater should be your opinion about physics itself! What utter rot, then, is the ungrounded opinion that in physics we should focus solely on the form to the exclusion of matter!

7. The reference appears to be to *Kitāb al-burhān* 4.4.

المعطاة لهما تُغني عن ذلك إذا حُقّق واستُقْصي، وإنّما يتجردان بمعنى آخر؛ وهو أنَّ المادة ليس جزء قوامهما كما هي جزء قوام المركّب لكنها جزء حدّهما. وكثيرٌ من الأشياء يكون جزء حدّ الشيء ولا يكون جزءاً من قوامه – إذا كان حدّه يتضمن نسبة مّا إلى شيءٍ خارجٍ عن وجود الشيء – وقد شُرح هذا المعنى في كتاب البرهان.

(٨) فصناعة الحساب وصناعة الهندسة؛ صناعتان لا تحتاجان في إقامتهما البراهين أن تتعرضا للمادة الطبيعية، أو تأخذا مقدماتٍ تعرض للمادة بوجه. لكن صناعة الكُرة المتحرّكة – وأشدّ منها صناعة الموسيقى وأشدّ منها صناعة المناظر وأشدّ من ذلك صناعة الهيئة – تأخذ المادة أو شيئاً من عوارض المادة. وذلك لأنَّها تبحث عن أحوالها، فمن الضرورة أنَّها تأخذها؛ وذلك لأنَّ هذه الصناعات إمّا أنَّ تبحث عن عددٍ لشيء، أو مقدارٍ أو شكلٍ في شيء، والعدد والمقدار والشكل عوارض لجميع الأمور الطبيعية. ويعرض مع العدد والمقدار اللّواحق الذاتية أيضاً بالعدد والمقدار، فإذا أُريد أنْ نبحث عمّا يعرض من أحوال العدد والمقدار في أمرٍ من الأمور الطبيعية، لزم ضرورة أنْ نلتفت إلى ذلك الأمر الطبيعي؛ وكأنَّ الصناعة الطبيعية صناعة بسيطة. والصناعة التعلمية، التي هي حسابٌ صِرف وهندسةٌ صِرفة؛ صناعةٌ بسيطة، ويتولّد ما بينهما صنائع موضوعاتها من صناعة؛ ومحمولات المسائل فيها من صناعة. وإذا كان بعض العلوم المنسوبة إلى الرياضة ممّا يحوج الذّهن إلى إلتفاتٍ نحو المادة، لمناسبةٍ بينه وبين الطبيعيات، فكيف ظنّك بالعلم الطبيعي نفسه! وما أفسد ظنَّ مَنْ يظنّ أنَّ الواجب أنْ نشتغل في العلم الطبيعي بالصورة، ونخلّي عن المادة أصلاً.

Chapter Nine

On defining the causes that are of the greatest interest to the natural philosopher in his investigation

(1) Some natural philosophers, of whom Antiphon was one, wholly dismissed form from consideration, believing that matter is what must be acquired and known [as the proper object of physics]; and when it is in fact acquired, what is subsequent to that is an infinite number of accidents and concomitants that are beyond the mastery [of the natural philosopher]. It would appear that this matter to which they restricted their inquiry is corporeal matter [already] impressed with a nature to the exclusion of Prime [Matter], as if they were oblivious to Prime [Matter]. Some of them at times appealed to one of the crafts, and drew a comparison between physics and some menial trade, saying that the iron miner toils to acquire iron without a thought for its form, and the pearl diver toils to acquire the pearl without a thought for its form.

(2) For our part, what makes it obvious that this opinion is wrong is that it would strip us of the opportunity to learn the specific and generic properties of natural things, which are their forms. Also, the very proponent of this school contradicts himself. So, on the one hand, if simply learning about formless material is enough to content him, then with respect to science he should sit perfectly happy in the knowledge of "something" that has no actual existence but, rather, is like some mere potential. On the other hand, in what way will he reach an awareness of it, since he has dismissively turned away form and accidents, whereas it is the forms and accidents themselves that lead our minds to affirm [this potential thing]? If, then, simply learning about formless material

<الفصل التاسع>

في تعريف أشْدّ العلل اهتماماً للطبيعي في بحثه

(١) قد رفض بعض الطبيعيين، ومنهم <أنْطيفن>، مراعاة أمر الصورة رفضاً كلّياً، واعتقدَ أنَّ المادة هي التي يجب أنْ تحصّل وتعرف. فإذا حصلت تحصيلاً فما بعد ذلك أعراض ولواحق غير متناهية لا تُضبط. ويشبه أنْ تكون هذه المادة التي قصر عليها هؤلاء نظرهم هي المادة المتجسمة المنطبعة دون الأولى، فكأنَّهم عن الأولى غافلون. وربّما احتجّ بعض هؤلاء ببعض الصنائع، وقايس بين الصناعة الطبيعية وبين الصناعة المهنية؛ فقال: إنَّ مستنبط الحديد وكده تحصيل الحديد وما عليه من صورته، والغوّاص وكده تحصيل الدُّرَّة وما عليه من صورتها.

(٢) والذي يُظهر لنا فساد هذا الرأي إفقاده إيانا الوقوف على خصائص الأمور الطبيعية ونوعياتها التي هي صورها، ومناقضة صاحب المذهب نفسِه نفسَه فإنَّه إنْ أقنعه الوقوف على الهيولى <غير> المصورة فقد قنع من العلم بمعرفة شيء لا وجود له بالفعل، بل كأنَّه أمرٌ بالقوة. ثم من أي الطرق يسلك إلى إدراكه إذ قد أعرض عن الصورة والأعراض صفْحاً، والصور والأعراض هي التي تجر أذهاننا إلى إثباته. فإنْ لم يقنعه الوقوف على

is not enough to content him, and he seeks a form belonging to the material, such as the form of water, air, or the like, then he will not have set aside[1] the inquiry into form. Also, his belief that the iron miner is not forced to consider form is false, for the subject of the iron miner's trade is not iron—which, in fact, is a certain end in his trade—but mineral bodies with which he busies himself through excavation and smelting, where his doing that is the form of his trade. Again, acquiring iron is a certain end of his trade, whereas it is something just taken for granted by the other trades whose master craftsmen are [only] coincidentally concerned with it as a result of their right to dispose of it by imposing a certain form or accident upon it.

(3) Alongside these, another group who were given to physical speculation also arose, but they attached absolutely no importance to matter. They said that its sole purpose for existing is that form may be made manifest through its effects, and that what is primarily intended is form, and that whoever scientifically comprehends form no longer needs to turn to matter, unless to dabble[2] in what is no concern of his. These equally exaggerate on the side of rejecting matter as the first had done on the side of rejecting form.

(4) Aside from the inadequacy of what they say with respect to the physical sciences (at which we already gestured in the previous chapter),[3] they remain happily ignorant of the relations between forms and the [kinds of] matter, since not just any form is conducive to just any matter,

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1. Reading *kharaja* with **Z** and **T** for **Y**'s *taḥarraja* (to refrain); the Latin has *praetermisit* (to pass over).

2. Reading with **Z**, **T**, and the Latin *ʿalá sabīl shurūʿ*, literally "by way of making an attempt . . . ," for **Y**'s *ʿalá sabīl mashrūʿ* (by the attempted way).

3. See 1.8.4–6.

الهيولى ‹غير› المصوّرة ورام للهيولى صورة مثل صورة المائية والهوائية أو غير ذلك؛ فما خرج عن النظر في الصورة. وظنّه أنَّ مستنبط الحديد غير مضطرٍ إلى مراعاة أمر الصورة ظنٌّ فاسد، فإنَّ مستنبط الحديد ليس موضوع صناعته هو الحديد، بل هو غايةٌ في صناعته، وموضوعه الأجسام المعدنية التي يُكبُّ عليها بالحفْر والتذويب؛ وفعله ذلك هو صورة صناعته، ثم تحصيل الحديد غاية صناعته، وهو موضوعٌ لصنائع أُخرى أربابها لا يُغنيهم مصادفة الحديد عن التصرّف فيه بإعطائه صورةً أو عرضاً.

(٣) وقد قام بإزاء هؤلاء طائفة أخرى من الناظرين في علم الطبيعة، فاستخفوا بالمادة أصلاً وقالوا إنَّها إنّما قصدت في الوجود لتظهر فيها الصورة بآثارها، وأنَّ المقصود الأول هو الصورة؛ وأنَّ مَنْ أحاط بالصورة علماً فقد استغنى عن الالتفات إلى المادة إلاّ على سبيل شروعٍ فيما لا يعنيه. وهؤلاء أيضاً مسرفون في جَنْبة إطّراح المادة، كما أولئك كانوا مسرفين في جنْبة إطّراح الصورة.

(٤) وبعد تعذّر ما يقولونه في العلوم الطبيعية – على ما أومأنا إليه قبل هذا الفصل – فقد قنعوا بأنْ يجهلو المناسبات التي بين الصور وبين المواد. إذ ليس كلّ صورة

nor does just any matter conform to just any form. Quite [to] the contrary, in order for the natural species-forms actually to exist in the natures, they need [different kinds] of matter that are species-specific to the forms [and] for the sake of which their being prepared for those forms was completed. Also, how many an accident does the form produce that is only commensurate with its matter? Also [again], when real and complete scientific knowledge comprehends something as it is and what necessarily follows upon it, and the essence of the species-form is something needing a determinate matter or whose existence necessarily follows upon the existence of a determinate matter, then how can our scientific knowledge of form be perfect when this aspect of [the form] is not something that we investigate? Or how can this aspect of it be something that we investigate when we do not take into account the matter, where there is no matter more generally shared in common with it and yet none more further removed from form than Prime Matter?

(5) It is in our scientifically knowing [matter's] nature—namely, that it is potentially all things—that we acquire a scientific knowledge that when the form which is in some particular instance of this matter passes away, there must be the succession of some other [form]; otherwise, there would be some wholly nebulous possible thing. Now, which of the accounts of which we ought to have scientific knowledge is nobler than the state of something with respect to its very existence and that either is fixed or is not? In fact, the natural philosopher is lacking in his demonstration and needs to comprehend fully both the form and the matter in order to complete his discipline. Still, forms provide him with a greater scientific understanding of the actual being of the thing than the matter, whereas the matter more frequently provides him with scientific knowledge of its potential existence, while from both of them together the scientific knowledge of a thing's substance is completed.

مساعدة لكلّ مادّة، ولا كلّ مادة متمهدة لكل صورة؛ بل تحتاج الصور النوعية الطبيعية، في أنْ تحصل موجودة في الطباع، إلى مواد نوّعيةٍ متخصّصةٍ بصورٍ لأجلها ما استتم استعدادها لهذه الصور؛ وكم من عرضٍ إنّما يحصل عن الصورة بحسب مادتها. وإذا كان العلم التّام الحقيقي هو الإحاطة بالشيء كما هو وما يلزمه، وكانت ماهّية الصورة النوعية أنَّها مفتقرة إلى مادة معيّنة أو لازمٌ لوجودها وجود مادة معيّنة؛ فكيف يستكمل علمنا بالصورة إذا لم يكن هذا من حالها متحقّقاً عندنا؟ أو كيف يكون هذا من حالها متحقّقاً عندنا، ونحن لا نلتفت إلى المادّة، ولا مادة أعمّ اشتراكاً منها وأبعد عن الصورة من المادة الأُولى؟

(٥) وفي علمنا بطبيعتها، وأنَّها بالقوة كل شيءٍ، بكتسب علماً بأنَّ الصورة – التي في مثل هذه المادة – إمّا واجبٌ زوالها بخلافةِ أخرى غيرها، أو ممكنٌ غير موثوقٍ به. وأي معنى أشرف من المعاني التي من حقّها أنْ نعلم؛ من معنى حال الشيء في وجود نفسه وإنَّه وثيقٌ أو قلقٌ؟ بل الطبيعي مفتقر في براهينه، ومحتاجٌ في استتمام صناعته إلى أنْ يكون محصّلاً للإحاطة بالصورة والمادة جميعاً؛ لكن الصور تكسبه علم هوية الشيء بالفعل أكثر من المادة، والمادة تكسبه العلم بقوة وجوده في أكثر الأحيان، ومنهما جميعاً يستتم العلم بجوهر الشيء.

Chapter Ten

On defining each of the four kinds of causes

(1) In what preceded, we indicated that natural bodies have certain material, efficient, formal, and final causes. It is now fitting that we define the states of these causes, which in turn facilitates our coming to know natural effects.

(2) [Proving] that there are existing causes for everything that is subject to generation and corruption or undergoes motion or is some composite of matter and form, and that these causes are only four [in number], is not something that natural philosophers undertake—[this] falls [instead] to the metaphysician;[1] however, it is indispensable for the natural philosopher to affirm the essences of [the causes] and to indicate their states as a posit. So we say that the causes that are essential to natural things are four: the agent, matter, form, and end. In natural things, *agent* is often said of the principle of another's motion insofar as it is other.[2] By *motion,* we mean here whatever passes from potency to act in a given matter. This agent is that which is a certain cause for the transition of another, producing within it a motion from potency to act. Similarly, when the physician cures himself, he is a certain principle of motion in another insofar as he is other, because he produces a motion in the patient, and the patient is different from the physician precisely from the perspective of being a patient, whereas he cures only from the perspective that he is what he is (I mean, inasmuch as he is a physician). Now, he undergoes or receives the cure and the cure produces motion in him not from the perspective that he is a physician, but only from the perspective that he is a patient.

1. See *Ilāhīyāt* 6.1–5.
2. Cf. Aristotle, *Metaphysics* 5.12.1019a15ff.

<الفصل العاشر>

في تعريف أصناف عِلّةٍ عِلّةٍ من الأربع

(١) قد استعملنا فيما سلف إشاراتٍ دلّتْ على أنَّ للجسم الطبيعي علّة عنصرية وعلّة ‹فاعلة› وعلّة صورية وعلّة غائية. فحريٌّ بنا الآن أنْ نعرف أحوال هذه العلل، فنستفيد منها سهولة سلوك السبيل إلى معرفة المعلولات الطبيعية.

(٢) أمَّا أنَّ لكل كائنٍ فاسد؛ أو لكل واقعٍ في الحركة؛ أو لكل ما هو مؤلّف من مادة وصورة عللاً موجودة، وأنَّها هذه الأربع لا غير، فأمرٌ لا يتكفله نظر الطبيعيين، وهو إلى الإلهي، وأمّا تحقيق ماهيّتها والدلالة على أحوالها وضْعاً فأمرٌ لا يستغني عنه الطبيعي؛ فنقول: إنَّ العلل الذاتية للأمور الطبيعية أربعٌ؛ الفاعل والمادة والصورة والغاية. والفاعل في الأمور الطبيعية قد يقال لمبدأ الحركة في آخر غيره من جهة ما هو آخر؛ ونعني بالحركة ها هنا كل خروجٍ من قوةٍ إلى فعلٍ في مادة، وهذا المبدأ هو الذي يكون سبباً لا حالة غيره وتحريكه عن قوةٍ إلى فعل. والطبيب أيضاً إذا عالج نفسه فإنَّه مبدأ حركةٍ في آخَر بأنَّه آخَر، لأنَّه إنما يحرّك العليل؛ والعليل غير الطبيب من جهة ما هو عليل، وهو إنّما يعالج من جهة ما هو هو؛ أعني من جهة ما هو طبيب، فأمّا تَعالُجه وقبوله العلاج وتحرّكه بالعلاج فليس من جهة ما هو طبيب بل من جهة ما هو عليل.

(3) The principle of motion is either what prepares or what completes. What prepares is that which makes the matter suitable, like what moves semen during the preparatory states; whereas what completes is that which gives the form. It would seem that the Giver of that form by which the natural species subsist is outside of the natural order, and it does not fall to the natural philosopher to investigate that, beyond positing that there is that which prepares and there is a Giver of Form.[3] Without doubt, what prepares is a principle of motion, as is what completes, because it is what in fact brings about the emergence from potency to act.

(4) The auxiliary and guiding [principles] also might be numbered among the principles of motion. The auxiliary [principle] is like a part of the principle of motion, as if the principle of motion is the sum of the primary and auxiliary [principles], except that the difference between the primary and auxiliary is that the primary produces motion for a given end, while the auxiliary produces motion either for a certain end that is not for its own sake, but for the sake of the primary [principle], or for some end that itself is not the end that the primary achieves by its producing motion but is for some other end, such as gratitude, pay, or charity. As for the guiding [principle], it is an intermediary principle of motion, for it is a cause of the form characteristic of that soul[4] that is the principle of the first motion of something having volition. So it is the principle of the principle. As far as issues related to physics are concerned, this is the efficient principle; however, when the efficient principle is not concerned with issues of physics, but, instead, with existence itself, the sense is more general than this one, where whatever is a cause of some separate existence is essentially as such separate and as such that existence[5] is not for the sake of that efficient cause.

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3. For discussions of the role of the "Giver of Forms" (*wāhib al-ṣuwar*) in the processes of generation and corruption, see *Kitāb fī al-kawn wa-l-fasād* 14 and *Ilāhīyāt* 9.5.

4. Literally, "psychic form."

5. Reading *dhālika al-wujūd* with **Z**, **T**, and the Latin (*illud esse*) for **Y**'s simple *dhālika* (that).

(٣) ومبـدأ الحركة إمّا مهيِّىء وإمّا متمّم، والمهيـىء هو الذي يصلح المادة كمحرّك النُطْفة في الإحالات المعدّة، والمتمّم هو الذي يعطي الصورة. ويُشبه أن يكون الذي يعطي الصـورة المقوّمة للأنواع الطبيعية خارجـاً عن الطبيعيات، وليس على الطبيعي أنْ يتحقّق ذلـك بعد أنْ يضـع أنَّ ها هنا مُهيئاً، وها هنا معطي صورة. ولا شـك أنَّ المهيىء مبدأ حركة، والمتمّم أيضاً هو مبدأ الحركة، لأنَّه المخرج بالحقيقة من القوة إلى الفعل.

(٤) وقد يُعدّ المعين والمشـير في مباديء الحركة؛ أمّا المعين فيشـبه أنْ يكون جزءاً مـن مبدأ الحركة، كأنَّ مبدأ الحركة جملة الأصـل والمعين؛ إلاّ أنَّ الفرق بين الأصل والمعين أنَّ الأصْل يُحرّك لغايةٍ ما، والمعين يحرّك لغايةٍ ليسـت له بل للأصْل، أو لغايةٍ ليسـت نفس غاية الأصل الحاصلة بالتحريك، بل ‹ل› غايةٍ أُخرى؛ كشُـكْرٍ أو أجْرٍ أو برّ. وأمّا المشير فهو مبدأ الحركة بتوسـط؛ فإنَّه سبب للصورة النفسانية التي هي مبدأ الحركة الأولى لأمرٍ إرادي؛ فهو مبدأ المبدأ، فهذا هو المبدأ الفاعلي بحسـب الأمور الطبيعية. وأمّا إذا أُخذ المبدأ الفاعلي لا بحسـب الأمور الطبيعية، بل بحسب الوجود نفسه، كان معنى أعمّ من هذا، وكان كل ما هو سـبب لوجودٍ مباينٍ لذاتـه من حيث هو مباين، ومن حيث ليس ذلك الوجود لأجله عِلّة فاعلة.

(5) Let us now discuss the material principle and say that it has an equivocal meaning—namely, that it is naturally disposed to bearing things foreign to it, having one relation to the thing composed from it and those essences and another to those essences themselves. An example is that the body has a certain relation to what is a composite (namely, to white [for example]) and a certain relation to what is not a composite (namely, to whiteness [for example]). Its relation to the composite is always a relation of a cause, because it is part of what makes the composite subsist, and the part in itself is prior to the whole as well as to that which subsists by it essentially.

(6) As for [the material principle's] relation to those latter things [namely, what is simple and not composite], there are only three logical possibilities. The first is that it is neither prior nor posterior to them in existence; [by this] I mean [that] they do not need some other thing in order to subsist, nor does that other thing [namely, the material principle] need them in order to subsist. The second is that the matter needs something like that [simple and incomposite] thing [call it *F*] in order to actually subsist, where *F* is essentially prior in existence to [the matter]. It is as if *F*'s existence is not dependent upon matter, but on different principles; however, when it exists, it necessarily entails that its matter subsist and [that] it make [the matter] actual, just like many things whose subsistence is through one thing, and after it subsists, it necessarily entails that something else subsist. Still, sometimes what makes it subsist is through something essentially separate from it, and at other times its subsistence[6] is through something essentially mixed with it, an example of which is called *form,* either having a share in making the matter to subsist by essentially being joined with it, or being whatever is a proximate cause of subsistence, which will be explained in metaphysics.[7] The

6. Reading *taqawwum* with **Z** for **Y**'s *taqwīm* (to make subsist); it should be noted that there is an almost equal split among the MSS on this point. The Latin's active indicative *constituet* would suggest that *taqwīm* was in that translator's exemplar.

7. See *Ilāhīyāt* 2.2–4.

(٥) ولنقل الآن في المبدأ المادي؛ فنقول: إنَّ المباديء المادية تشترك في معنى وهي أنَّها في طبائعها حاملة لأمورٍ غريبة عنها، ولها نسبة إلى المرّكب منها ومن تلك الماهيّات، ولها نسبة إلى تلك الماهيّات نفسها. مثلاً أنَّ الجسم له نسبة إلى المركّب؛ أي إلى الأبيض، ونسبة إلى البسيط أي إلى البياض، ونسبته إلى المركّب نسبة علّة أبداً؛ لأنَّه جزءٌ من قوام المركب، والجزء في ذاته أقدم من الكلّ ومقوّم لذاته.

(٦) وأمّا نسبته إلى تلك الأمور فلا تُعقل إلاّ على أقسام ثلاثة: إمّا أنْ يكون لا يتقدمها في الوجود ولا يتأخّر عنها؛ أعني لا هي محتاجة إلى الأمر الآخر في التقوُّم، ولا ذلك الأمر محتاج إليها في التقوّم. والقسم الثاني أنْ تكون المادة محتاجة إلى مثل ذلك الأمر في التقوّم بالفعل، والأمر يكون متقدماً عليها في الوجود الذاتي، كأنَّ وجوده ليس متعلقاً بالمادة بل بمبادىء أُخرى، ولكنه يلزمه إذا وجد أنْ يقوّم مادته ويجعلها بالفعل. كما أنَّ كثيراً من الأشياء يكون تقوّمه بشيءٍ، ويلزمه بعد تقوّمه أنْ يقوِّم شيئاً آخر، لكنه ربّما كان ما يقوّمه بمفارقة لذاته، وربّما كان تقوّمها بمخالطةٍ من ذاته، ومثل هذا الأمر يسمّى صورة وله قسطٌ في تقويم المادة بمقارنة ذاته، أو هو كل المقوّم القريب؛ وبيان

third is that the matter subsists in itself and is fully actual, being prior to *F* and making it subsist; and this thing is what we properly call an *accident,* even if we sometimes call all of those dispositions *accidents.* So the first division requires a relation of simultaneity, and the latter two require a relation of priority and posteriority. In the first case, what is in the matter is prior; while in the second case, the matter is prior. The first class does not obviously exist and would (if there is an instance of it at all) be like the soul and Prime Matter when they come together in order to make the human subsist. As for the latter two [namely, form and accidents], we have already spoken about them repeatedly.[8]

(7) There is another way to consider the relation of matter together with what is generated from it, of which [the matter] is a part. This relation can be transferred to the form. [That] is because, on the one hand, the matter alone might be sufficient in that it is the material part of what possesses matter, where that concerns a certain kind of things. On the other hand, it might not be sufficient unless some other matter is united[9] with it, so that from it and the other there is a combination like the single matter that is for the sake of perfecting something's form, where that concerns [another] kind of things, such as drugs for the sake of the poultice and gastric juices for the sake of the body. When something occurs from the matter alone in that [that thing] is together with it and nothing else, then it is according to one of the following. [(1)] It might be according to the combination only—as, for example, individual people for the sake of the military and homes for the city. [(2)] It might be according[10] to only the combination and composition together—as, for example, bricks and wood for the sake of the house. [(3)] It might be according to the combination, composition, and alteration—as, for

8. See, for example, 1.2.16–17.

9. Reading *lam tanḍammi* with **Z**, **T**, and the Latin for **Y**'s *lam tanẓim* (not arranged).

10. Reading *bi-ḥasabi* with **Z**, **T**, and the Latin for **Y**'s *bi-ḥaddi* (by definition).

ذلك في الصناعة الأُولى. والقسم الثالث هو أنْ تكون المادة متقوّمة في ذاتها وحاصلة بالفعل، وأقدم من ذلك الشيء وتقوِّم ذلك الشيء؛ وهذا الشيء هو الذي نسميه عَرَضاً بالتخصيص. وإنْ كنّا ربّما سمّينا جميع هذه الهيئات أعراضاً. فيكون القسم الأول يوجب إضافة المعيّة، والقسمان الآخران إضافة تقدم وتأخّر، لكن في الأول منهما التقدّم لما في المادة، وفي الثاني منهما التقدّم للمادة، والقسم الأول ليس بظاهر الوجود؛ وكأنَّه إنْ كان له مثالٌ فهو النفس والمادة الأُولى إذا اجتمعا في تقويم الإنسان، وأمّا القسمان الآخران فقد أخبرنا عنهما مراراً.

(٧) وللمادة مع المتكوّن عنها، التي هي جزءٌ من وجوده، نوعٌ آخر من اعتبار المناسبة. ويصلح أيضاً أنْ تُنقل هذه المناسبة إلى الصورة، فإنَّ المادة قد تكفي وحدها في أنْ تكون هي الجزء المادي لما هو ذو مادة وذلك في صنْفٍ من الأشياء، وقد لا تكفي ما لم تنضمّ إليها مادة أخرى فتجتمع منها ومن الأخرى كالمادة الواحدة لتمامية صورة الشيء، وذلك في صنفٍ من الأشياء كالعقاقير للمعجون والكيموسات للبدن. وإذا كانت المادة إنّما يحصل منها الشيء بأنْ يكون معها غيرها؛ فإمّا أنْ يكون بحسب الاجتماع فقط؛ كأشخاص الناس للعسكرية والمنازل للمدينة، وإمّا بحسب الاجتماع والتركيب معاً فقط، كاللَّبِن والخشب للبيت، وإمّا بحسب الاجتماع والتركيب والاستحالة، كالأُسْطُقسّات

example, the elements for the sake of the things subject to generation. [That] is because neither the very combination of the elements nor there being a composition from them (be it by touching, meeting, and receiving shape) is sufficient for things to be generated from them. Instead, it is that some of them act upon others, while others are acted upon, becoming stabilized for the sake of the whole as a homogeneous quality, which is called an [*elemental* or *humoral*] *mixture,* in which case it is prepared for the species-form. This is why, when the ingredients of an electuary[11] or the like are mixed, combined, and composed, it is not yet an electuary, nor does it have the form of the electuary until a certain period of time elapses, during which some [of the ingredients], as a result of their various qualities, act upon others and are acted upon by others, after which a single quality stabilizes as something homogeneous with respect to all of them, and by sharing [in all those qualities], a single activity arises from them. So the essential forms of these [ingredients] remains conserved, while the accidents by which they interact so as to bring about an alteration change and undergo alteration such that as any excess that is in any of its individual [ingredients] decreases until the quality of the overpowering [ingredient] stabilizes in it, falling below the point where it overpowers.

(8) The common practice is to say that the relation of the premises to the conclusion resembles the relation of the materials and forms.[12] It seems more likely that the form of the premises is their figure, where the premises through their figure resemble the efficient cause. [That] is because they are like the efficient cause of the conclusion, and the conclusion, *qua* conclusion, is something that emerges from them. Since

11. Literally, a theriaca, which is a paste used in the ancient and medieval periods as an antidote to poison, particularly snake venom. It was made up of some sixty or seventy different ingredients mixed and combined with honey.

12. Cf. Aristotle, *Posterior Analytics* 2.11.94a24–35, *Physics* 2.3.195a16–21, and *Metaphysics* 5.2.1013b20–21. Avicenna briefly touches on this point again in his *Ilāhīyāt* 6.4.

للكائنات. فإنَّ الأُسْطُقُسّات لا يكفي نفس اجتماعها ولا نفس تركيبها – بالتّماس والتلاقي وقبول الشكل – لأنْ تكون منها الكائنات، بل بأنْ يفعل بعضها في بعض، وينْفعل بعضها من بعض، ويستقر للجملة كيفية متشابهة تسمّى مزاجاً، فحينئذ تستعد للصورة النوعية. ولهذا ما كان الترياق وما أشبهه؛ إذا خُلطت أخلاطه واجتمعت وتركّبت لم تكن ترياقاً بعد، ولا له صورة الترياقية، إلى أنْ تأتي عليه مدّة في مثلها يفعل بعضها في بعض وينفعل بعضها عن بعض بكيفياتها، فتستقر كيفية واحدة كالمتشابهة في جميعها، فيصدر عنها فعلٌ واحدٌ بالمشاركة. وهذه؛ فإنَّ صورها الذاتية تكون ثابتة محفوظة، والأعراض التي بها تتفاعل التفاعل الاستحالي فتتغيّر وتستحيل استحالة بأنْ تنتقص كل إفراطٍ يكون في كل مفرد منها إلى أنْ تستقر فيها كيفية الغالبات أنقص ممّا في الغالب.

(٨) وقد جرت العادة بأنْ يقال إنَّ المقدمات نسبتها إلى النتيجة مشاكلة لمناسبة المواد والصور، والأشبه أنْ تكون صورة المقدمات شكلها، وتكون المقدمات بشكلها تشاكل السبب الفاعل، فإنَّها كسببٍ فاعلٍ للنتيجة، والنتيجة – من حيث هي نتيجة – شيء

they found, however, that when the minor and major terms are properly distributed, the conclusion follows, and that the two [terms] before that had been in the syllogism, it was supposed that the subject of the conclusion is in the syllogism;[13] and that, in turn, was taken to the extreme in the belief that the syllogism itself is that in which the conclusion inheres. The fact is that the natures of the minor and major terms are subjects for certain forms, for they are subjects for the form of the conclusion. Now, in the case where there are no minor and major terms and subjects, so as to be a minor term and a major term, there will similarly be no subjects for the conclusion, because when each of them has a certain kind of relation to the other, there is a minor term and major term. That kind is [(1)] that both actually have a determinate relation to the middle [term] and [(2)] that they potentially have a relation to the conclusion. When [they] have another kind [of relation], they are actually subjects of the conclusion. The latter kind is that they stand to one another according to the relation of predicate and logical subject or antecedent and consequent after having had a certain relation. Despite that, what itself is in the syllogism, whether as a major term or minor term, is not also potentially the subject of the conclusion, but is something else of the same species as it; for we cannot say that, numerically, one thing accidentally happens to be a subject for the sake of its being a major and a minor term, while it is a subject for the sake of its being a part of the conclusion. So I simply do not understand how we should make the premises a subject for the conclusion. [That] is because when we compare the matter to what comes to be from it, sometimes the matter is a matter susceptible to generation, and sometimes it is susceptible to alteration, and sometimes it is susceptible to combination and composition, and sometimes it is susceptible to both composition and alteration. So this is what we have to say about the material cause.

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13. The Arabic *mawḍūᶜ* is used both in the sense of "logical subject" (as opposed to the logical predicate) and the sense of "[material] subject" or "underlying thing" (cf. 1.2.3, 6). Since the immediate issue is why some thought that the premises stood to the conclusion as matter to form, the sense of *mawḍūᶜ* is almost certainly that of "material subject" or "underlying thing," even if the vocabulary is otherwise that of logic.

خــارج عنها . لكنهــم لمّا وجدوا الحدّ الأصغر والحدّ الأكبــر إذا التأما حصلت النتيجة ، وقــد كانا قبل ذلك في القياس ، وقع الظنّ بأنَّ في القياس موضوع النتيجة ، فتخطّى ذلك إلى أنْ ظنّ أنَّ القياس نفســه موضوع النتيجة . لكن الحدّ الأصغر والحدّ الأكبر طبيعتاهما موضوعتان لصورٍ ، فإنَّهما موضوعتان لصورة النتيجة ، وليستا حينئذ الحدّ الأصغر والحدّ الأكبــر ، وموضوعتان لأنْ يكونا حــدّاً أصغر وحدّاً أكبر ، وليســتا حينئذ موضوعتين للنتيجة ، لأنَّ كل واحدٍ منهما إذا كان على نمطٍ من النسبة إلى الآخر كان حدّاً أكبر وحدّاً أصغر ؛ وذلك النمط هو أنْ يُنْسبا معاً بالفعل نسبة معيّنة إلى الأوسط ، وأنْ تكون لهما إلى النتيجة نســبة إلى شيءٍ بالقوة . وإذا كانا على نمطٍ آخر ؛ كانا موضوعين للنتيجة بالفعل ، وذلك النمط هو أنْ ينسب كل واحدٍ منهما إلى الآخر نسبة الحَمْل والوضْع أو التلو والتقدّم بعد نســبةٍ كانت لهما . ومع ذلك فليس أيضاً عين ما هو في القياس حدّاً أكبر أو ‹حدّاً› أصغر هو بالقوة موضوع النتيجة ، بل آخر من نوعه . فليس يمكن أنْ نقول إنَّ شيئاً واحداً بالعدد يعرض له أنْ يكون موضوعاً لكونه حدّاً أكبر وحدّاً أصغر ، وموضوعاً لكونه جزء النتيجة ! فلســتُ أفهم كيف ينبغي أنْ نجعل المقدمات موضوعة للنتيجة ، فإذا قسنا المادة إلــى ما عنها يحدث ؛ فقد تكون المادة مادة لقبول الكون ، وقد تكون لقبول الاســتحالة ، وقد تكون لقبول الاجتماع والتركيب ، وقد تكون لقبول التركيب والاســتحالة معاً ، فهذا ما نقول في العلّة المادية .

(9) The *form* may be said of the essence—which, when it occurs in the matter, makes a species subsist—as well as being said of the species itself. *Form* is sometimes said specifically of the shape and outline. [At] other times, it is said of the combination's disposition, like the form of the army and the form of conjunctive premises, as well as being said of the regulative order, such as the law. *Form* might be said of every disposition, however it might be, as well as being said of any thing, whether a substance or an accident, that is separate in the species (for this is said of the highest genus). *Form* may even be said of the intelligibles that are separate from matter. The form taken as one of the principles is relative to what is composed of it and the matter—namely, that it is a part of it that necessitates its being actual in its instance, whereas the matter is a part that does not necessitate its being actual (for the existence of the matter is not sufficient for the actual generation of something, but only for something's potential generation). So the thing is not what it is through the matter; rather, it is through the existence of the form that something becomes actual. As for the form that makes the matter subsist, it stands above [any] other kind. The formal cause might be related to either a genus or species—that is, the form that makes matter to subsist. It also might be related to the class—that is, it is not the form that makes the matter subsist as a species, but it is coincidental to it, such as the form of the shape belonging to the bed and the whiteness in relation to a white body.

(10) The end is the thing for the sake of which the form occurs in the matter—namely, either the real or apparent good. So any production of motion that proceeds—not accidentally, but essentially—from an agent is one whereby he intends some good relative to himself. Sometimes it is truly good, and at other times it is [only] apparently good, for either it is such or appears to be such.

(٩) وأمّا الصورة؛ فقد يُقال للماهيّة التي إذا حصلت في المادة قوّمتها نوعاً، ويُقال صورة لنفس النوع، ويُقال صورة للشكل والتخطيط خاصّة، ويُقال صورة لهيئة الاجتماع كصورة العسكر وصورة المقدمات المقترنة، ويُقال صورة للنظام المستحفظ كالشريعة، ويُقال صورة لكل هيئة كيف كانت، ويُقال صورة لحقيقة كل شيء كان جوهراً أو عرضاً ويفارق النوع؛ فإنَّ هذا قد يقال للجنس الأعلى، وربّما قيل صورة للمعقولات المفارقة للمادة، والصورة المأخوذة إحدى المباديء هي بالقياس إلى المركّب منها ومن المادة؛ إنَّها جزء له يوجبه بالفعل في مثله، والمادة جزء لا يوجبه بالفعل. فإنَّ وجود المادة لا يكفي في كون الشيء بالفعل بل في كون الشيء بالقوة، فليس الشيء هو ما هو بمادته، بل بوجود الصورة يصير الشيء بالفعل، وأمّا تقويم الصورة للمادة فعلى نوعٍ آخر. والعلّة الصورية قد تكون بالقياس إلى جنسٍ أو نوعٍ، وهو الصورة التي تقوّم المادة، وقد تكون بالقياس إلى الصنْف، وهو الصورة التي قد قامت المادة دونها نوعاً وهو طارىء عليها؛ كصورة الشكل للسرير، والبياض بالقياس إلى جسمٍ أبيض.

(١٠) وأمّا الغاية؛ فهي المعنى الذي لأجله تحصل الصورة في المادة، وهو الخير الحقيقي أو الخير المظنون. فإنَّ كلَّ تحريكٍ يصدر عن فاعلٍ لا بالعرض بل بالذات؛ فإنَّه يروم به ما هو خيرٌ بالقياس إليه، فربّما كان بالحقيقة وربّما كان بالظنّ؛ فإنَّه إمّا أنْ يكون كذلك، أو يُظنّ به ظنّاً.

Chapter Eleven

On the interrelations of causes

(1) In a certain respect, the agent is a cause of the end; and how could it be otherwise, when the agent is what makes the end exist? In another respect, however, the end is a cause of the agent; and how could it be otherwise, when the agent acts only for the sake of [the end] and otherwise does not act? So the end moves the agent so as to be an agent. This is why, when it is asked, "Why did he exercise?" and we say, "For the sake of health," then this is an answer, just as when it is asked, "Why are you healthy?" and I say, "Because I exercised," it is an answer. Exercise is an efficient cause of health, and health is a final cause of exercise.

(2) If it is asked, "Why is health sought?" and it is said, "For the sake of exercise," it is not, in fact, an answer resulting from true choice; however, if it is asked, "Why was exercise sought?" and it is said, "In order that I be healthy," it is, in fact, an answer. Now, the agent is neither the cause of the end's becoming an end nor of the end's essence in itself; rather, it is a cause of the end's essence existing concretely in particulars, where there is a difference between essence and existence, as you have learned.[1] So the end is a cause of the agent's being an agent and so is a cause of its being a cause, whereas the agent is not a cause of the end with respect to its being a cause. This is something that will be explained in First Philosophy.[2]

1. A possible reference is *Kitāb al-madkhal* 1.6.
2. See *Ilāhīyāt* 6.5.

<الفصل الحادي عشر>

في مناسبات العلل

(١) الفاعل من جهةٍ سببٌ للغاية، وكيف لا يكون كذلك والفاعل هو الذي يحصّل الغايــة موجودة. والغاية من جهةٍ هي ســببٌ للفاعل، وكيف لا تكون كذلك؛ وإنّما يفعل الفاعل لأجلها؛ وإلاّ لما كان الفعل. فالغاية تحرّك الفاعل إلى أنْ يكون فاعلاً؛ ولهذا إذا قيل: لِمَ يرتاض؟ فنقول: ليصح، فيكون هذا جواباً. كما إذا قيل: لِمَ صَحَحتَ؟ فيقول: لأني ارتضتُ، ويكون جواباً. والرياضة سببٌ فاعلي للصحة، والصحة سببٌ غائي للرياضة.

(٢) ثــم إنْ قيــل: لِمَ تطلب الصحــة؟ فقيل: لأرتاض، لم يكــن جواباً صحيحاً عــن صادق الاختيار. ثم إنْ قيل: لِمَ تطلــب الرياضة؟ فقيل: لكي أصح؛ كان الجواب صحيحاً. والفاعل ليس علّة لصيرورة الغاية غاية، ولا لماهيّة الغاية في نفسها، ولكن علّة لوجود ماهيّة الغاية في الأعيان؛ وفرقٌ بين الماهيّة والوجود كما علمته. والغاية علّة لكون الفاعــل فاعلاً؛ فهو علّة له في كونه علّــة، وليس الفاعل علّة للغاية في كونها علّة، وهذا سيتضح في الفلسفة الأولى.

(3) Next, the agent and end are like nonproximate principles of the caused composite. [That is] because, on the one hand, the agent either prepares the matter and so causes the existence of the effect's proximate matter while not [itself] being a proximate cause of the effect, or it provides a form and so is a cause of the proximate form's existence. On the other hand, the end is a cause of the agent as an agent, and a cause of the form and matter by means of its producing motion in the agent that brings about the composite.

(4) Next, the proximate principles of a thing are the material and form, with no intermediary between them and [that] thing; rather, they are the causes of it as two parts that make it subsist without intermediary (even if [the role] each one plays in making it subsist is different, as if *this* cause is different from the one that is *that*). It might accidentally happen, however, that matter and form are a cause both through an intermediary and without an intermediary from two [different] perspectives. As for the matter, when the composite is not a species but a class (that is, the form is not the form in the proper sense of the term but is an accidental disposition), then the matter is a cause of that accident that causes that class, as a class, to subsist, and so is a certain cause of the cause. Even so, however, insofar as the matter is a part of the composite and a material cause, there is no intermediary between the two. As for the form, when it is a true form (namely, belonging to the category of substance) and is causing the matter actually to subsist (where matter is a cause of the composite), then this form is a cause of the cause of the composite. Even so, however, insofar as the form is a part of the composite and a formal cause, there is no intermediary between the two. So when the matter is the cause of the cause of the composite, it is not, as such, a material cause of the composite; and when the form is the cause of the cause of the composite, then, as such, it is not a formal cause of the composite.

(٣) ثـم الفاعل والغاية كأنهما مبدآن غير قريبين من المركّب المعلول؛ فإنَّ الفاعل إمّا أنْ يكون مهيئاً للمادة فيكون سبباً لإيجاد المادة القريبة من المعلول لا سبباً قريباً من المعلول، أو يكون معطياً للصورة فيكون سـبباً لإيجاد الصورة القريبة. والغاية سبب للفاعل في أنَّه فاعل، وسببٌ للصورة والمادة بتوسط تحريكها للفاعل المركّب.

(٤) فالمبادىء القريبة من الشـيء هـي الهيولى والصورة ولا واسـطة بينهما وبين الشـيء؛ بل هما عِلّتاه، على أنّهما جزءآن يقوّمانه بلا واسـطة – وإنْ اختلف تقويم كلّ منهما – وكأنَّ هذا علّة غير العلّة التي هي ذاك، لكنه ربّما عرض أنْ كانت المادة والصورة علّة بواسـطة وبغير واسـطة معاً من وجهين. أمّا المادة؛ فإذا كان المركّب ليس نوعاً بل صِنْفاً، وكانت الصورة لا التي تُخص باسـم الصورة، بـل هيئة عرضية، فحينئذ تكون المـادة مقوّمـة لذات ذلك العرض الذي يقومّ ذلك الصنـف من حيث هو صنف، فيكون علّـة مّا للعلّة، لكـن – وإنْ كان كذلك – فمن حيث المادة جزء من المركّب وعلّة مادية فلا واسـطة بينهما. وأمّا الصورة؛ فإذا كانت الصورة صورة حقيقية ومن مقولة الجوهر، وكانت تقوّم المادة بالفعل – والمادة علّة للمركّب – فتكون هذه الصورة علّة لعلّة المركّب. لكنه، وإنْ كان كذلك، فمن حيث الصورة جزء من المركّب وعلّة صورية، فلا واسـطة بينهمـا. فالمـادة إذا كانت علّة علّـة المركّب فليس من حيث هي علّـة مادية للمركّب، والصورة إذا كانت عِلّة علّة المركّب فليس من حيث هي علّة صورية للمركّب.

(5) Now, it may perchance be that the essence of the agent, form, and end is a single essence,[3] but that it should be an agent, form, and end is accidental to it. For in the father, there is a principle for generating the human form from semen. Now, that is not everything there is to the father, but only his human form, and it is only the human form that exists in the semen. Also, the end toward which the semen is moved is nothing but the human form. Insofar as [the human form][4] subsists with the matter of the human species, however, it is a form, whereas insofar as the semen's motion terminates at it, then it is an end, and insofar as its composition begins from it, then it is an agent. Again, when it is related to the matter and composite, it is a form. When it is related to the motion, then sometimes it is an end and at other times it is an agent: it is an end with respect to the motion's termination, which is the form that is in the son, while it is an agent with respect to the motion's beginning, which is the form that is in the father.

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3. Cf. Aristotle, *Physics* 2.7.

4. Reading *lākinhā* with **Z** and **T** for **Y**'s *lākinhumā*, which would make the referent "the two" but would cause the verb "to subsist" to be incorrectly conjugated.

(٥) وقــد يتفق أنْ تكون ماهيّــة الفاعل والصورة والغاية ماهيّة واحدة، فتكون هي التي يعرض لها أنْ تكون فاعلاً وصورة وغاية. فإنَّ في الأب مبدأ لتكوّن الصورة الإنسانية من النُطْفة، وليس ذلك كل شــيءٍ من الأب؛ بل صورته الإنســانية، وليس الحاصل في النُطْفة إلاّ الصورة الإنسانية. وليست الغاية التي تتحرّك إليها النُطْفة إلاّ الصورة الإنسانية؛ لكنها من حيث تُقوّم مع المادة نوع الإنســان؛ فهي صــورة، ومن حيث تنتهي إليها حركة النُطْفــة فهي غاية، ومــن حيث يبتدىء منه تركيبها فهي فاعلة. وإذا قيســت إلى المادة والمركّــب كانت صورة، وإذا قيســت إلى الحركة كانت غاية مــرّة وفاعلة مرّة؛ أمّا غاية فباعتبــار انتهاء الحركة وهي الصورة التي فــي الإبن، وأمّا فاعلة فباعتبار ابتداء الحركة؛ وهي الصورة التي في الأب.

Chapter Twelve

On the divisions of causal states

(1) Each one of the causes may be essential or accidental, proximate or remote, specific or general, particular or universal, simple or compound, potential or actual, as well as some combination of these.

(2) Let us first illustrate these states with respect to the efficient cause. So we say that the essential efficient cause is, for example, the physician when he heals, and fire when it heats. That is, the cause is a principle of that very act itself and taken insofar as it is its principle. The accidental efficient cause is whatever is not in keeping with that and is of various sorts. Among these is that the agent performs some action such that that action removes a certain contrary [*x*] that is holding its [opposing] contrary [*y*] in check. In that case [the agent's action] strengthens [*y*] so that the action of [*y*] is attributed to [the accidental efficient cause]—as, for example, scammony when, by purging bile, it cools.[1] Alternatively, the agent might remove something hindering a thing from its natural action, even if it does not require a contrary together with the hindrance—as, for example, one who removes the pillar from some tall building, since it is said that he destroys the building. Another [instance of accidental agency] is when a single thing is considered in various respects because it has varying attributes, and insofar as it has one of them, it is an essential principle of a certain action; but then [the action] is not attributed to [that attribute], but to one joined to it. For example, it is said that the physician builds—that is, what is posited of the physician is the [attribute of] building; however, he builds because he is a builder, not because he is a physician. Or what is posited alone

1. The example may strike modern readers as odd, and so must be understood against the background of ancient and medieval humoral medicine. Health and illness for most early physicians were understood in terms of a balance or imbalance of one of the four basic humors: blood, phlegm, black bile, or yellow bile. Yellow bile was seen as a substance essentially possessing the powers hot and dry. When one ingests scammony, the scammony essentially produces a yellowish, burning diarrhea, which was associated with the purging of yellow bile. Again, since this was believed to be a hot-dry humor, it was thought that there would be an accidental cooling effect.

<الفصل الثاني عشر>

في أقسام أحوال العلل

(١) إنَّ كل واحدٍ من العِلل قد يكون بالذات وقد يكون بالعرض، وقد يكون قريباً وقد يكون بعيداً، وقد يكون خاصّاً وقد يكون عاماً، وقد يكون جزئياً وقد يكون كلّياً، وقد يكون بسيطاً وقد يكون مركّباً، وقد يكون بالقوة وقد يكون بالفعل، وقد يتركب من بعض هذه مع بعض.

(٢) لنصور هذه الأحوال أولاً في العلة الفاعلة فنقول: إنَّ العلّة الفاعلة بالذات هي مثل الطبيب إذا عالج والنار إذا سخّنت، وهو أنْ تكون العلّة مبدأ لذات ذلك الفعل وأُخذت من حيث هي مبدأ له. والعلّة الفاعلة بالعرض ما خالف ذلك و<هي> على أصناف: من ذلك أنْ يكون الفاعل يفعل فعلاً؛ فيكون ذلك الفعل مزيلاً لضدّ ممانع ضدّه فيقوى الضدّ الآخر فينسب إليه فعل الضدّ الآخر؛ مثل السَّقَمُونْيا إذا برد بإسهال الصفراء. أو يكون الفاعل مزيلاً لمانع شيئاً عن فعله الطبيعي، وإنْ لم يكن يوجب مع المنْع ضدّاً؛ مثل مزيل الدعامة عن هدفٍ، فإنَّه يقال إنَّه هو هادم الهدف. ومنه أنْ يكون الشيء الواحد معتبراً باعتباراتٍ لأنَّه ذو صفات، ويكون من حيث له واحدة منها مبدأ بالذات لفعلٍ فلا ينسب إليها بل إلى بعض المقارنة لها؛ كما يقال إنَّ الطبيب يبني، أي الموضوع الذي للطبيب هو بناءٌ فيبني، لأنَّه بنّاء لا لأنَّه طبيب، أو يؤخذ الموضوع وحده غير مقترنٍ بتلك

can be taken without that attribute, and so it is said that the man builds. Also among [the kinds of accidental efficient causes] is the agent, whether natural or voluntary, which is directed toward a certain end and then either reaches it or does not; however, together with [that end], there is accidentally another end—as, for example, the stone that splits open a head. Now, that is accidental to it precisely because it belongs essentially to [the stone] to fall, in which case it was just by happenstance that a head was passing by and so, through [the stone's] weight, it landed on it and so fractured the head.[2] Something might also be called an accidental efficient cause even if it does not do anything at all, save that its presence is frequently attended by something laudable or dangerous, and so it is recognized by that. So its being close at hand is deemed desirable if there attends it something laudable, which is auspicious; or keeping one's distance is deemed desirable if there attends it something dangerous, which is inauspicious, where it is supposed that its presence is a cause of that good or evil.

(3) As for the proximate agent, there is no intermediary between it and its effect (as, for example, the sinew in moving the limbs), while between the remote [agent] and the effect there is an intermediary (as, for example, the soul in moving the limbs). The specific agent involves only that single thing alone by which precisely one thing is acted upon (as, for instance, the medicine that Zayd ingests), whereas the general agent is that which is common among many things with respect to being acted upon by it (as, for example, the ambient air that produces change in many things).[3] The particular [agent] is either the individual cause of an individual effect (like *this* physician for *this* cure), or the specific

2. The phrase "because it belongs essentially to [the stone] to fall, in which case it was just by happenstance that a head was . . . ," is absent in **Y** but is confirmed by **Z**, **T**, and the Latin.

3. Literally, "air's producing change in many things, even without an intermediary"; however "ambient air" is almost certainly the intended sense, given the preceding medical example and the fact that ambient air played a central role in the maintenance of health in Galenic medicine (a medical system, one might add, that Avicenna adopted in general).

الصفة؛ فيقال: إنَّ الإنسان يبني. ومن ذلك أنْ يكون الفاعل بالطبع أو الإرادة متوجهاً إلى غايةٍ مّا فيبلغها أو لا يبلغها، لكن تعرض معها غاية أُخرى؛ مثل الحجر ليشجّ، وإنّما عرض له ذلك لأنه بذاته يهبط فاتفق أن وقعت هامة في ممرّه فأتى عليها بثقله فشجّها. وقد يقال للشـــيء إنَّه فاعل بالعرض، وإنْ كان ذلك الشيء لم يفعل أصلاً، إلاَّ أنَّه يتفق أنْ يكون في أكثر الأمر يتبع حضوره أمرٌ محمودٌ أو مَحْذورٌ فيعرف بذلك، فيستحب قربه إنْ كان يتبعه أمرٌ محمودٌ يُتيمّن به، أو يُســتحب بُعْده؛ إنْ كان يتبعه أمرٌ محذور يُتطيّر منه، ويُظنّ أنَّ حضوره سببٌ لذلك الخير أو لذلك الشر.

(٣) وأمَّا الفاعل القريب فهو الذي لا واســطة بينه وبين المفعول؛ مثل الوتر لتحريك الأعضــاء، والبعيد هو الذي بينه وبين المفعول واســطة مثل النفــس لتحريك الأعضاء. وأمّــا الفاعل الخاص فهو الذي إنّما ينفعل عن الواحد منه وحده شــيءٌ بعينه؛ مثل الدواء الذي يتناوله زيدٌ في بدنه والفاعل العام فهو مثل الهواء المغيّر لأشــياء كثيرة، وإنْ كان بلا واسطة. وأمّا الجزئي فهو، إمّا العلّة الشخصية لمعلولٍ شخصي كهذا الطبيب لهذا العلاج،

cause of a specific effect, being equal to it in the degree of generality and specificity (as, for instance, doctor for cure). As for the universal [agent], that nature does not exactly mirror the effect but is more general, (as, for example, physician for *this* cure, or professional for cure). Simple [agency] involves the action's arising out of a single active power (as, for example, pushing and pulling in bodily powers), whereas compound [agency] is that the act arises from a number of powers, whether agreeing in species (like many men who move a ship) or differing in species (like hunger resulting from the faculty of desire and sensation). That which is actual is like the fire in relation to what it is burning, while that which is potential is like the fire in relation to what it has not [yet] burnt, but it is so suited as to burn it. Sometimes the potential is proximate and at other times remote, where the remote [potential] is like the young child's potential to write [someday], while the proximate [potential] is like the potential to write of the one who has [already] acquired the talent of writing. Also, these may be combined in any number of ways, which we leave up to you to imagine.

(4) Let us now present these considerations with respect to the material principle. The matter in itself is that which, of itself, is susceptible to some thing—as, for example, oil's [being susceptible] to burning. As for that which is accidental, it is of various kinds. One of these is that the matter exists together with a certain form that is contrary to some [other] form that passes away with [the certain form's] arrival, and so a certain matter belonging to the present form is considered[4] together with the passing form, just as it is said that water is the subject for air and semen is the subject for human. Here, it is not the case that the semen is a subject *qua* semen, since the semen ceases once there is the human.

4. Reading *ta'khudhu* with **Z**, **T**, and the Latin, for **Y**'s *yūjadu* (exists).

أو العلّة النوعية لمعلولٍ نوعي مساوٍ له في مرتبة العموم والخصوص؛ مثل الطبيب للعلاج. وأمّا الكلّي فأنْ تكون تلك الطبيعة غير موازية لما بإزائها من المعلول، بل أعمّ، مثل الطبيب لهذا العلاج، أو الصانع للعلاج. وأمّا البسيط فأنْ يكون صدور الفعل عن قوة ‹فاعلة› واحدةٍ مثل الدفع أو الجذب في القوى البدنية. وأمّا المركّب فأنْ يكون صدور الفعل عن عدّة قوى؛ إمّا متفقة النوع كعدّةٍ يحرّكون سفينة، أو مختلفي النوع كالجوع الكائن عن القوة الجاذبة والحاسّة. وأمّا الذي بالفعل؛ فمثل النار بالقياس إلى ما اشتعلت فيه. وأمّا الذي بالقوة؛ فمثل النار بالقياس إلى ما لَمْ تشتعل فيه ويصح اشتعالها فيه. والقوة قد تكون قريبة وقد تكون بعيدة، والبعيدة كقوة الصبي على الكتابة، والقريبة كقوة الكاتب المقتني للملكة الكتابية على الكتابة. وقد يمكنك أنْ تركّب بعض هذه مع بعض، وقد وكلناه إلى ذهنك.

(٤) ولنورد هذه الاعتبارات أيضاً في المبدأ المادي. فأمّا المادة بالذات فهي التي لأجل نفسها تقبل الشيء: مثل الدهن للإشعال، وأمّا التي بالعرض فعلى أصناف: من ذلك أنْ توجد المادة مع صورةٍ مضادّة لصورةٍ تزول بحلولها، فتؤخذ مع الصورة الزائلة مادة للصورة الحاصلة، كما يقال إنَّ الماء موضوعٌ للهواء والنُطْفة موضوعةٌ للإنسان، والنُطْفة ليست موضوعة بما هي نُطْفة؛ لأنَّ النُطْفية تبطل عند كون الإنسان. أو يؤخذ الموضوع مع صورة

Alternatively, the subject may be considered together with a form that does not enter into the subject's being a subject; and even if it is not a certain contrary of the final intended form, it is taken as a subject. An example would be our saying that the physician is cured, for he is not cured inasmuch as he is a physician, but only inasmuch as he is a patient, and so the subject of the cure is [the individual *qua*] patient, not physician. The proximate subject is, for example, the body's limbs, while the remote [subject] is like the [humoral and elemental] mixtures and, really, the four underlying elements. The specific subject of the human form, for example, is the human body with its humoral mixture, while the general [subject] is like the wood of the bed, chair, and the like. There is a difference between the proximate and the specific [subject], for the material cause might be proximate while being general—as, for instance, the wood of the bed. An example of the particular subject is *this* wood for *this* chair, or *this* substance for *this* chair. The[5] universal [subject] is like wood for this chair, or substance for chair. The simple subject is, for example, the material belonging to all things and perceptible wood to wooden things, while the composite [subject] is like the humoral mixtures of the living body and the drugs of the electuary. The actual subject of the human form, for example, is the human body, whereas its potential [subject] is like the semen or like the unworked wood for *this* chair. Here, again, the potential is sometimes proximate and sometimes remote.

5. Omitting the phrase *wa-l-ᶜāmm mithla hādhā al-khashab li-hādhā al-kursī,* (the general [subject] is, for example, *this* wood of *this* chair), which **Y** includes, noting that it was omitted in at least one manuscript and should probably not be retained. The phrase is not found in **Z**, **T**, or the Latin.

ليســت داخلة في كون الموضوع موضوعاً ، وإنْ لم يكن ضدّاً للصورة الأخرى المقصودة ، فيُجعل موضوعاً ؛ مثل قولنا : إنَّ الطبيب يتعالج ، فإنَّه ليس إنَّما يتعالج من حيث هو طبيب ولكن من حيث هو عليل ، فالموضوع للعلاج هو العليل لا الطبيب . وأمّا الموضوع القريب ؛ فمثــل الأعضاء للبدن ، والبعيد مثل الأخلاط بل الأركان ، والموضوع الخاص فمثل جســم الإنســان بمزاجه لصورته ، والعام مثل الخشب للسرير والكرسي ولغيره . وفرقٌ بين القريب والخاص ؛ فقد يكون الســبب المادي قريباً وعامّاً مثل الخشــب للسرير ، والموضوع الجزئي مثل هذا الخشب لهذا الكرسي ، أو هذا الجوهر لهذا الكرسي ، والكلّي مثل الخشب لهذا الكرســي أو الجوهر للكرسي . والموضوع البسيط ؛ فمثل الهيولى للأشياء كلّها أو الخشب عند الحسّ للخشــبيات ، والمركّب مثل الأخــلاط للبدن ومثل العقاقير للترياق . والموضوع بالفعــل مثل بدن الإنســان لصورته ، وبالقوة مثل النُطْفة لها ، أو الخشــب ‹غير› المصور بالصناعة لهذا الكرسي ، وهاهنا أيضاً قد تكون القوة قريبة وقد تكون بعيدة .

(5) As for these considerations on the part of the form, the form that is essential is, for instance, the chair shape belonging to the chair, while that which is accidental is like its whiteness or blackness. [The accidental form] might be something useful with respect to what is essential—as, for example, the wood's hardness in order that it receive the shape of the chair. Also, the form might be accidental because of vicinity, like the motion of one standing still on the boat, for it is said of the one standing still on the boat that he is moved and being carried along accidentally. The proximate form is, for example, the squareness of *this* square, while the remote [form] is its possessing angles (for instance). The specific form is no different from the particular (namely, for example, the definition, species difference, or property of something), nor is the general form different from the universal (namely, for example, the genus[6] of the property). The simple form is like the form of water and fire, which is form whose subsistence does not result from a combination of a number of forms, while the composite [form] is like the form of human, which does result from the combination of a number of powers and forms. The actual form is well known, whereas the potential form is, in a certain way, the potential together with the privation.

6. Following **Z**, **T**, and Latin (*genus*) that have *jins* for **Y**'s *khashab* (wood).

(٥) وأمـا هـذه الاعتبارات من جهة الصـورة؛ فالصورة التي بالذات مثل شـكل الكرسـي للكرسي، والذي بالعرض فمثل البياض أو السواد له. وربّما كان نافعاً في الذي بالذات، مثل صلابة الخشب لقبوله شكل الكرسي. وربّما كانت الصورة بالعرض وبسبب المجاورة؛ كحركة الساكن في السفينة؛ فإنَّه يقال لساكن السفينة متنقلٌ ومتحركٌ بالعرض. والصـورة القريبة؛ فمثل التربيع لهـذا المربع، والبعيدة مثل ذي الزاوية له. والصورة الخاصّة لا تخالف الجزئية؛ وهو مثل حدّ الشيء أو فصل الشيء أو خاصّة الشيء، و‹الصورة› العامة فلا تفارق الكلّية، وهو مثل الجنس للخاصّة، والصورة البسـيطة فمثل صورة الماء والنـار الذي هو صورة لم تتقوّم عن عِدّة صور مجتمعة. والمركّبة؛ مثل صورة الإنسـان التـي تحصل مـن عِدّة قوى وصورٍ تجتمع. والصورة بالفعـل معروفة، والصورة بالقوة من وجهٍ مّا فهي القوة مع العدم.

(6) As for considering these accounts from the vantage point of the end, the essential end is that toward which natural or voluntary motion tends for its own sake, not for another's—as, for example, the health due to medicine. The accidental end is, again, of varying sorts. One of them is what is intended, but not for its own sake, such as pulverizing the medicine for the sake of drinking, which is in turn for the sake of health. This might be either what is beneficial or what appears to be beneficial. The former is the good, the latter what appears to be good. Another sort is what the end either necessarily or accidentally entails. An example of what the end necessarily entails would be that the end of eating is a bowel movement, where that necessarily follows owing to the end but is not the end, which instead is to stave off hunger. What the end accidentally entails is, for example, the beauty that results from exercise, for, although beauty may be accidental to health, beauty is not what is intended by exercise. Another sort is when motion is not directed toward something but meets up with it on the way—as, for example, the head's being fractured owing to the falling rock, and whoever shoots at a bird and [instead] hits a man. Sometimes the essential end is found together with [the accidental end],[7] and sometimes it is not.

(7) The proximate end is like the [immediate] health owing to the medicine, whereas the remote [end] is like the [life of] flourishing on account of the medicine. The specific end is like Zayd's meeting his friend so-and-so, while the general [end] is like the purging of bile owing to drinking camelthorn,[8] since it is the end of drinking violet [root][9] as well. The particular end is like Zayd's collecting money from some debtor whom [Zayd] traveled to find, while the universal end is like his seeking justice from the unjust absolutely. As for the simple end, it is like eating to satisfy one's appetite, whereas the composite [end] is like wearing silk for the sake of beauty and to do away with lice,[10] which are really two [different] ends. The actual and potential ends are like the actual and potential forms.

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7. Alternatively, the pronoun *hā* might refer to "motion."
8. That is, *alhagi maurorum* or "Persian manna."
9. Large doses of the violet (*viola odorata*) root contain an alkaloid called violine, which is a purgative.
10. It was recognized that lice cannot hold onto the slippery surface of silk.

(٦) وأمّا اعتبار هذه المعاني من جهة الغاية، فالغاية بالذات هي التي تنحوها الحركة الطبيعيــة أو الإرادية لأجل نفســها لا غيرها؛ مثل الصحة للــدواء. والغاية بالعرض على أصناف: فمن ذلك ما يُقصد ولكن لا لأجله؛ مثل دق الدواء لأجل شــرب الدواء لأجل الصحــة، وهذا هو النافع أو المظنون نافعاً، والأول هو الخير أو المظنون خيراً. ومن ذلك ما يلزم الغاية أو يعرض لها؛ أمّا ما يلزم الغاية فمثل الأكل غايته التغوّط، وذلك لازمٌ للغاية لا غايــة؛ بل الغاية هو كفّ الجوع. وأمّا ما يعرض للغاية؛ فمثل الجمال للرياضة، فإنَّ الصحة قــد يعرض لها الجمال وليس الجمــال هو المقصود بالرياضة. ومن ذلــك ما تكون الحركة متوجهة لا إليه فيعارضها هو، مثل الشــجّة للحجر الهابط، ومثل مَنْ يرمي طيراً فيصيب إنساناً، وربّما كانت الغاية الذاتية موجودة معها وربّما لم توجد.

(٧) وأمّا الغاية القريبة فكالصحة للدواء، والبعيدة فكالســعادة للدواء. وأمّا الغاية الخاصّة فمثل لقاء زيد صديقه فلاناً، وأمّا العامة فكأسهال الصفراء لشرب الترنجبين، فإنَّه غاية له ولشــرب البنفسج أيضاً. وأمّا الغاية الجزئية فكقبض زيد على فلان الغريم المقصود كان في ســفره، وأمّا ‹الغاية› الكلّية فكأنتصافه من الظالم مطلقاً. وأمّا الغاية البســيطة فمثل الأكل للشــبع، والمركّبة مثل لبس الحرير للجمال ولقتل القُمّل، وهذا بالحقيقة غايتان. وأمّا الغاية بالفعل والغاية بالقوة فمثل الصورة بالفعل والصورة بالقوة.

(8) Know that the potential cause mirrors the potential effect; and so, as long as the cause is potentially a cause, the effect is potentially an effect. Also, each one of them might be essentially something else. An example would be that the cause is a human, while the effect is wood, since the man is potentially a carpenter and the wood is something potentially worked by the carpenter. What is not possible is that the effect itself should exist while the cause is entirely absent. What [seems] to throw doubt upon this is the case of a building and its remaining after the builder [departs]. So you must know that the building *qua* the effect of the builder does not remain after the builder [departs], for the effect of the builder is to move the parts of the building until they form an integral whole—[an action] that does not continue after he departs. As for the persistence of the integral whole and the presence of the shape, it persists as a result of certain existing causes that when they are destroyed, bring about the destruction of the building. The independent verification of this account and what in the preceding was like it will be deferred until first philosophy, and so wait until then.[11]

11. See *Ilāhīyāt* 6.2.

(٨) واعلــم أنّ العلة بالقوة بإزاء المعلــول بالقوة، فما دامت العلّة بالقوة عِلّة فالمعلول بالقوة معلولٌ. ويجوز أنْ يكون كل واحدٍ منهما بالفعل ذاتاً أخرى، مثل أنْ تكون العلّة إنساناً والمعلول خشباً، فيكون الإنسان نجاراً بالقوة، والخشب منجوراً بالقوة، ولا يجوز أنْ تكون ذات المعلول موجودة والعلّة معدومة البتة. والذي يشكل في هذا من أمر البناء وبقائه بعد البانــي. فيجب أنْ تعلم أنَّ البناء ليس يبقى بعد الباني، على أنَّ البناء معلول الباني؛ فإنَّ معلول الباني هو تحريك أجزاء البناء إلى الاجتماع وهو لا يتأخّر عنه. وأمّا ثبات الاجتماع وحصول الشــكل فيثبت عن عللٍ موجودة إذا فســدتْ فسد البناء. وتحقيق هذا المعنى وما يجري مجراه – ممّا سلف – موكول إلى الفلسفة الأولى، فليتربَّص به إلى ما هناك.

Chapter Thirteen

Discussion of luck and chance: The difference between them and an explanation of their true state

(1) Since we have been discussing causes and it is supposed that luck, chance, and what happens spontaneously are among the causes, we ought not to neglect considering these accounts and whether they are to be considered causes or not, and if they are, then what their manner of causality is.

(2) Now, the earliest Ancients differed concerning luck and chance. One group denied that luck and chance could be included among the causes and, in fact, denied that there was any sense at all in which they exist. They said that it is absurd that we should discover and observe that things have necessitating causes and then turn our backs upon [those causes], dismissing them as causes and going for unknown "causes" such as luck and chance. So, when someone who is digging a well stumbles across a treasure, the ignorant say with absolute conviction that good luck attended him, whereas if he slips into it and breaks a leg, they say with equal conviction that bad luck attended him. [This group said in response] that no luck attends him at all here [either good or bad]; but, rather, whoever digs where a treasure is buried will acquire it and whoever leans over a slippery edge will slip over it. Also, they say that when someone goes to market to tend shop and sees someone who owes him money and so collects what he is owed, that [might seem] to be an act of luck, but it is not; rather, it is because he went someplace where his debtor was and, having good eyesight, saw him.[1] They also said that even if his end in going to the market was not this one, it does not necessarily follow that going to the market was not a real cause of his collecting the money that was owed him, for a single action might have various ends. In fact, most actions are like that; however, the one who performs that action just happened to stipulate that one of those ends is [his] end and

1. Cf. Aristotle, *Physics* 2.5.196b33ff.

<الفصل الثالث عشر>

في ذِكْر البخْت والاتفاق والاختلاف فيهما وإيضاح حقيقة حالهما

(١) وإذ قد تكلمنا على الأسباب، وكان البخْت والاتفاق وما يكون من تلقاء نفسه؛ قد ظُنَّ بها أنَّها من الأسباب، فحريٌ بنا أنْ لا نُغْفل أمر النظر في هذه المعاني وأنَّها هل هي في الأسباب أو ليست في الأسباب، وإنْ كانت، فكيف هي في الأسباب؟

(٢) وأمّا القدماء الأقدمون فقد كانوا اختلفوا في أمر البخْت والاتفاق، ففرقة أنكرت أنْ يكون للبخْت والاتفاق مدخلٌ في العلل، بل أنكرت أنْ يكون لهما معنى في الوجود البتة. وقالت إنَّه من المحال أنْ نجد للأشياء أسباباً موجبة ونشاهدها فنعدل عنها ونعْزلها عن أنْ تكون عللاً، ونرتاد لها عللاً مجهولة من البخْت والاتفاق. فإنّ الحافر بئراً إذا عثر على كنْز جزم أهل الغباوة القول بأنَّ البخْت السعيد قد لحقه، وإنْ زلق فيه فانكسر جزموا القول بأنَّ البخْت الشقي قد لحقه، ولم يلحقه هناك بخْتٌ البتة، بل كل مَنْ يحفر إلى الدفين يناله، ومَنْ يميل على زلقٍ في شفير يزلق عنه. ويقولون إنَّ فلاناً لمّا خرج إلى السوق ليقعد في دكانه لمح غريماً له فظفر بحقه، فذلك من فعل البخْت، وليس كذلك، بل ذلك لأنّه قد توجّه إلى مكانٍ به غريمه، وله حُسْن بصرٍ فرآه. قالوا وليس–وإنْ كان غايته في خروجه غير هذه الغاية–يجب أنْ لا يكون الخروج إلى السوق سبباً حقيقياً للظفر بالغريم، فإنَّه يجوز أنْ يكون لفعلٍ واحدٍ غايات شتى، بل أكثر الأفعال كذلك. لكنه يعرض أنْ يجعل المستعمل لذلك الفعل إحدى تلك الغايات غاية فتتعطل الأخرى، بوضعه لا في

so renders the others ineffectual by stipulation, though not with respect to the thing itself (that is, the thing itself is [still] an end suitably disposed to being set up as an end and the others set aside). If this person were aware of the debtor's presence there and so went running after him so as to collect from him, why don't we say that that occurs by luck, when we say of other cases that they are by luck or chance? So, you see that to stipulate [only] one of the things to which *going out* leads as an end strips *going out* of being a cause in itself of whatever else it causes; but how can it be supposed that that changes simply by stipulation? This is one side.

(3) Another side, with many splinter groups, rose up in mirror opposition to them, which touted the significance of luck. Some said that luck is a divine, hidden cause that is beyond the grasp of our intellects. Some who believed this opinion took it to the point of setting up luck as something to draw near to or, by worshiping it, to draw near to God, being something for which a temple was built and in whose name an idol was made that was worshipped in the way that idols are worshipped.

(4) Another group went so far as [to make] luck like the natural causes in a certain way, and so they made the world come to be through luck. This is Democritus and those who followed him, for they believe the following: [(1)] the principles of the universe are atoms that are indivisible owing to their solidity and absence of [interstitial] void [space]; [(2)] [these atoms] are infinite in number and scattered throughout an infinitely extended void; [(3)] with respect to the nature of their substance, [atoms] are generically alike, whereas they differ by means of their shapes; [(4)] [these atoms] are in constant motion within the void, and so a group of them chanced to collide and so combine according to some configuration, from which then the world comes to be; and [(5)] there are an infinite number of worlds just like this one, arranged throughout an infinite void. Despite that, [Democritus further] thinks that [(6)] particular things like animals and plants do not come to be according to chance.

نفس الأمر، وهو في نفس الأمر غاية يصلح أنْ ينصبها غاية ويرفض ما سواها. أليس لو كان هذا الإنسان شاعراً بمقام الغريم هناك؛ فخرج يرومه فظفر به لم يقل أنَّ ذلك واقعٌ منه بالبخْت، بل قيل لما عداه أنَّه بالبخْت أو بالاتفاق؟ فترى أنَّ جَعْلَه أحد الأمور التي يؤدّي إليها خروجه غاية يُصرْف الخروج عن أنْ يكون في نفسه سبباً لما هو سببه، فكيف يُظن أنَّ ذلك يتغيّر بجعْل جاعل؟ فهؤلاء طائفة.

(٣) وقد قام بإزائهم طائفة أخرى عظموا أمر البخْت جداً وتشعبوا فرقاً، فقائل منهم إنَّ البخْت سببٌ إلهي مستور يرتفع عن أنْ تدركه العقول، حتى أنَّ بعض من يرى رأي هذا القائل؛ أحلَّ البخْت محل الشيء الذي يتقرب إليه أو إلى اللّه بعبادته، وأمر فبُنيَ له هيكلٌ، واتُّخذ باسمه صنمٌ يعبد على نحو ما تعبد عليه الأصنام.

(٤) وفرقة قدمت البخْت من وجهٍ على الأسباب الطبيعية، فجعلت كون العالم بالبخْت؛ وهذا هو ‹ديموكريتس› وشيعته؛ فإنَّهم يرون أنَّ مبادىء الكلّ هي أجرامٌ صغارٌ لا تتجزأ لصلابتها ولعدمها الخلاء، وأنَّها غير متناهية بالعدد ومبثوثة في خلاء غير متناهي القدر، وأن جوهرها في طباعه متشاكلٌ وبأشكالها مختلفٌ، وأنَّها دائمة الحركة في الخلاء، فيتفق أنْ تتصادم منها جملة فتجتمع على هيئةٍ، فيكون منه عالمٌ، وأنَّ في الوجود عوالم مثل هذا العالم غير متناهية بالعدد مرتبة في خلاء غير متناه. ومع ذلك فيرى أنَّ الأمور الجزئية مثل الحيوانات والنبات كائنة لا بحسب الاتفاق.

(5) Yet another group [namely, Empedocles and those following him] did not go so far as to make the world in its entirety come to be by chance, but they did make the things subject to generation come to be by chance from the elemental principles; and so the disposition of whatever's combination [that] is in some way suited by chance to survive and to reproduce survives and reproduces, whereas the one that by chance is not so suited, does not reproduce. [They also held] that at the beginning of evolution, there were engendered animals of various limbs of different kinds—as, for example, an animal that was half stag and half goat—and that the limbs of animals were not as they now are with respect to magnitude, natural disposition, and accidental qualities but, rather, were such as chance would have it. For example, they said that the incisors are not sharp for the sake of cutting, nor are molars wide for the sake of grinding; rather, the matter chanced to combine according to this form, and this form chanced to be useful in suiting one for survival, and so the individual derives the benefit of survival from that. Sometimes, through the mechanizations of reproduction, [that individual] chanced to have an offspring—not for the sake of the preservation of the species, but simply by chance.

(6) We ourselves say that some things always occur, while others occur for the most part[2]—as, for example, fire for the most part burns wood when put into contact with it, and whoever heads from his house to his garden for the most part reaches it—whereas other things [occur] neither always nor for the most part. The things that [occur] for the most part are those that are not seldom [in their occurrence]; and so their coming to be, when they do, is either the result of a certain regularity in the nature of the cause alone ordered toward them, or it is not. If, on the one hand, it is not [due to the cause considered alone], then either the cause needs to be joined with some [other] cause (whether a

2. The Arabic *fī akthar al-amr,* and its equivalents, corresponds with the Greek *hos epi to polu,* which is technical vocabulary within the Aristotelian and Galenic systems of thought. In normal parlance it simply means "usually"; however, modern scholarship has fixed upon the somewhat cumbersome phrase, "for the most part," which is adopted here.

(٥) فرقــةٌ أخرى لم تقدم على أنْ تجعل العالم بكلّيته كائناً بالاتفاق، ولكنها جعلت الكائنات متكونة عن المباديء الأُسْطُقسّية بالاتفاق، فما اتفق أن كان هيئة اجتماعه على نمطٍ يصلح للبقاء والنسْــل بقي ونســل، وما اتفق أنْ لم يكن كذلك لم ينسل. وأنَّه قد كان في ابتداء النشــوء؛ ربّما تتولد حيوانات مختلطة الأعضاء من أنواع مختلفة، وكأنْ يكون حيوانٌ نصفه أيّلٌ ونصفه عنْز، وأنَّ أعضاء الحيوان ليست هي على ما هي عليه من المقادير والخَلق والكيفيّات لأغراضٍ؛ بل اتفقت كذلك. مثلاً قالوا: ليست الثنايا حادّة لتقطع، ولا الأضــراس عريضة لتطحن، بل اتفقت أنْ كانت المادة تجتمع على هذه الصورة، واتفق أنْ كانت هذه الصورة نافعة في مصالح البقاء؛ فاستفاد الشخص بذلك بقاء، وبما اتفق له من آلات النسل نَسَلَ، لا ليسبحفظ به النوع؛ بل إتفاقاً.

(٦) فنقــول: إنَّ الأُمــور منها ما هي دائمة، ومنها ما هي فــي أكثر الأمر، مثل أنَّ النار في أكثر الأمر تُحرق الحطب إذا لاقته، وأنَّ الخارج من بيته إلى بستانه، في كثير من الأمــر، يصــل إليه. ومنها ما ليس دائماً ولا في أكثر الأمــر؛ والأمور التي تكون في أكثر الأمــر هي التي لا تكون فــي أقل الأمر، فكونها -إذا كانت- لا يخلــو إمّا أنْ تكون عن اطرادٍ في طبيعة الســبب إليها وحده، أو لا بكون كذلــك. فإنْ لم تكن كذلك، فإمّا أنْ يحتاج السبب إلى قرينٍ من سبب أو شريكٍ أوزوال مانعٍ أولا يحتاج. فإنْ لم يكن كذلك،

cooperative cause or the removal of some obstacle), or it does not. If it is not like that (namely, the cause does not need to be conjoined [with some other factor]), then the coming to be of [those things that occur for the most part] is no more apt to result from the cause than not, since neither the thing considered in itself and alone nor [the thing] considered along with what is joined to it selectively determines the coming to be from the not coming to be. So *x* is no more apt to result from *y* than not, and so it is not something subject to generation for the most part. If, on the other hand, it does not need the aforementioned cooperative cause, then it must in itself be something regularly ordered, unless some impediment hinders and opposes it and, owing to its being opposed, it occurs seldom.[3] From that, it is necessary that, when no impediment hinders and opposes [the cause], and its nature is unimpaired to continue along its course, then the difference between what always [occurs] and what [occurs] for the most part is that *what always* [*occurs*] never encounters opposition, while *what* [*occurs*] *for the most part* does encounter opposition. Also, following on that is that what [occurs] for the most part is necessary, on the condition that the obstacles and opposition have been removed. That is obvious with respect to natural things. It is equally the case with respect to volitional things; for, when the volition is firm and completely made up and the limbs are prepared to move and submit and there is no hindering cause or cause that undermines the resolve, and [moreover] the intended thing can be achieved, then it is clearly impossible that it not be achieved. Now, since what occurs always is not said to come to be by luck insofar as it always comes to be, then, likewise, it should not be said that what [occurs] for the most part comes to be by luck, for the two are alike in kind and in status. Certainly, when it is opposed, it turns away, and so it might be said that its being turned from its course comes to be by chance or luck; but you also know that people do not say that what results for the most part from one and the same cause or [occurs] always comes to be by chance or luck.

3. Literally, "it no longer fails to be seldom."

ولم يحتج السبب إلى قرينٍ، فليس كونها عن السبب أولى من لا كونها؛ إذ ليس في نفس الأمـــر، لا فيه وحده، ولا فيه، ولا في مقارنٍ له مـــا يرجح الكون على اللاكون، فيكون كون هذا الشـــيء عن الشـــيء ليس أولى من لا كونه، فليس كائناً على الأكثر. فإذن-إنْ لم يحتج إلى الشـــريك المذكور-فيجب أنْ يكون مطرداً بنفســـه إليه، إلاّ أنْ يعوق عائقٌ ويعارض معارضٌ ولمعارضته ما تخلّف في الأقل. ويجب من ذلك أنّه إذا لم يعق عائقٌ ولم يعارض معارضٌ وســـلمت طبيعته أنْ يستمر إلى ما ينحوه، فحينئذ يكون الفرق بين الدائم والأكثري أنَّ الدائم لا يعارضه معارضٌ البتة، وأنَّ الأكثري يعارضه معارضٌ. ويتبع ذلك أنَّ الأكثري-بشـــرط رفع الموانع وإماطة العوارض-واجبٌ، وذلك في الأمور الطبيعية ظاهرٌ وفي الأمور الإرادية أيضاً. فإنَّ الإرادة إذا صحّتْ وتمّتْ وآتتْ الأعضاء للحركة والطاعة، ولم يقع سببٌ مانعٌ أو سببٌ ناقضٌ للعزيمة، وكان المقصود من شأنه أنْ يوصل إليه؛ فبيّنٌ أنّه يستحيل أنْ لا يوصل إليه. وإذا كان الدائم، من حيث هو دائم، لا يقال إنَّه كائن بالبخْت، فالأكثري أيضاً لا يقال إنَّه كائنٌ بالبخْت، فأنه من جنسه وفي مثل حكمه. نعم إذا عورض فصـــرف فربّما قيل انصرافه عن وجهته كائن بالبخت أو بالاتفاق. وأنت تعلم؛ أنَّ الناس لا يقولون لما يكون كثيراً عن سببٍ واحدٍ بعينه أو دائماً إنه كائنٌ اتفاقاً أو بالبخْت.

(7) What remains for us to do is to consider what comes to be [and does not come to be] equally, and what comes to be seldom. Now, the issue concerning what comes to be equally seems to be whether or not to say it just chanced to be by chance or luck. Now, modern Peripatetics made it a condition of being by chance and luck that it only concerns things that seldom come to be from their causes,[4] whereas the one who worked out this course for them [namely, Aristotle] did not make that a condition and instead only made it a condition that it not come to be always and for the most part.[5] What incited the moderns to associate chance with things that seldom come to be to the exclusion of what comes to be equally was the form present in voluntary affairs, for these moderns say that eating and not eating, walking and not walking, and the like are things that proceed equally from their principles; and yet, when one voluntarily walks or eats, we do not say that that was a matter of chance.

(8) As for ourselves, we do not approve of any addition to the condition that their teacher made and shall lay bare the error of their position by something well known—namely, that in one respect and from one perspective, one and the same thing might come to be for the most part (in fact, be necessary), while in another respect and from another perspective, it comes to be equally. In fact, when certain conditions are made about what seldom comes to be and certain states are taken into account, it [too] becomes necessary. An example would be that during the coming to be of the embryonic palm, it is made a condition that the matter exceed that which is reserved for five fingers and that the divine power emanating into the bodies encounters a perfect preparedness in a given matter whose nature deserves a certain form, and also, having encountered that, [the divine power] does not forgo providing [the matter] with [the form]. In that case, an additional finger will necessarily be created.[6] This class, even if it is uncommon and the possibility is quite seldom in relation to the universal nature, it is not uncommon and seldom

4. Cf. Ibn al-Samḥ, who made this point clearly, and John Philoponus and Abū Bishr, who strongly suggested it in their comments to Aristotle's *Physics* 2.5.196b10ff. The commentaries of all these expositors can be found in *Arisṭuṭālīs: al-Ṭabīʿī*, ed. ʿA. Badawī, 2 vols. (Cairo: The General Egyptian Book Organization, 1964–65; henceforth, the Arabic *Physics*).

5. Aristotle, *Physics* 2.5.196b10–13.

6. Reading *yatakhallaqu* with **Z**, **T**, and the Latin (*creetur*) for **Y**'s *yatakhallafu* (to lag behind or be absent).

(٧) وقد بقي لنا ما يكون بالتساوي وما يكون على الأقل، والأمر مشتبه في الكائن بالتساوي أنَّه هل يقال فيه أنَّه اتفق إتفاقاً وكان بالبخْت، أو لا يقال؟ وقد اشترط متأخرو المشائين أنَّ ما يكون بالاتفاق والبخت فإنَّما يكون في الأمور الأقلّية الكون عن أسبابها. والذي رسم لهم هذا النهج لم يشترط ذلك، بل اشترط أنْ لا يكون دائماً ولا أكثرياً. <وإنَّ ما> دعا المتأخرين إلى أنْ جعلوا الاتفاق متعلقاً بالأمور الأقلّية دون المتساوية صورة الحال في الأمور الإرادية. فإنَّ هؤلاء المتأخرين يقولون إنَّ الأكل واللاّأكل والمشي واللامشي، وما أشبه ذلك، هي من الأمور المتساوية الصدور عن مبادئها، ثم إذا مشى ماش أو أكل آكل بإرادته لم يقل إنَّه اتفق ذلك.

(٨) وأمّا نحن فلا نستصوب زيادة على ما اشترطه معلّمهم، ونبيِّن بطلان قولهم بشيءٍ يسير وهو: أنَّ الشيء الواحد قد يكون بقياس واعتبارٍ أكثرياً بل واجباً، وبقياس واعتبارٍ آخر متساوياً، بل الأقلي إذا أُشترطت فيه شرائطُ واعتبرت أحوالٌ صار واجباً؛ مثل أنْ يُشترط أنَّ المادّة في كَوْن كف الجنين فضلت عن المصروف منها إلى الأصابع الخمس، والقوة الإلهية الفائضة في الأجسام صادفت استعداداً تاماً في مادةٍ طبيعية لصورة مستحقة، وهي أيضاً صادفت ذلك، لم تعطّلها عنها، فيجب هناك أنْ يتخلّق إصبعٌ زائدة فيكون هذا الباب– وإنْ كان هو أقلّي الإمكان ونادراً بالقياس إلى الطبيعة الكلّية– فليس أقلّياً ونادراً بالقياس إلى الأسباب التي ذكرناها، بل هو واجبٌ. ولعل الاستقصاء في

in relation to the causes we mentioned, but necessary. Perhaps a thorough investigation would reveal that the thing does not exist necessarily from its causes and does not come to exist from the nature of possibility; however, the explanation of this and what is like it will have to wait until first philosophy.[7]

(9) When the situation is like this, it is not improbable that a single nature in relation to one thing is for the most part, while in relation to another thing it is equal, for the gap between what is for the most part and what is equal is narrower than that between what is necessary and what is seldom. Again, when eating and walking are related to the will, which is assumed to be fully determined, then the two shift from coming to be equally to coming to be for the most part, and [once they] have so shifted, it is not at all correct to say that they are matters of chance and came to be by luck. When, however, they are not related to the will, but are considered in themselves at some time when eating and not eating are equal,[8] then it is correctly said, "I visited him, and as chance would have it he was eating," where that is related to the visiting [and] not to the will. The same holds should someone say, "I bumped into him while he chanced to be walking" or "I met him while he chanced to be sitting," for all of this is recognized and accepted and yet true. In general, when the thing that comes to be is considered in itself and is neither the object of attention nor what is expected (since, in that case, it would not be always and for the most part), it is correct to say of the cause leading to it that it is either by chance or luck—namely, when [the cause] is of such a character to lead to it, but does not lead to it, always and for the most part. When it absolutely and necessarily never leads to it, such as someone's sitting during a lunar eclipse, then we don't say that so-and-so's sitting chanced to be a cause of the lunar eclipse. It is correct, however, to say that [the two] occurred together by chance, in which case the sitting is not a cause of the eclipse, but it is an accidental cause of occurring together with the eclipse. To occur together with the eclipse, however, is not the same as [causing] the eclipse.

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7. See *Ilāhīyāt* 1.6 and 6.1–2.

8. Reading *yatasāwā* with **Z**, **T**, and the Latin (*aeque*), which seem to have been inadvertently omitted in **Y**.

البحث يبيّن أنَّ الشيء ما لم يجب أنْ يوجد من أسبابه ولم يخرج عن طبيعة الإمكان، لم يوجد عنها ؛ ولكن بيان هذا وأمثاله مؤخّر إلى الفلسفة الأُولى.

(٩) وإذا كان الأمر على هذا ، فغير بعيد أنْ تكون طبيعة واحدة بالقياس إلى شيءٍ أكثرية، وبالقياس إلى شيءٍ آخر متساوية، فإنَّ البُعْد ما بين الأكثري والمتساوي أقرب من البُعْد ما بين الواجب والأقلي. ثم الأكل والمشي إذا قيسا إلى الإرادة وفرضت الإرادة حاصلة؛ خرجا عن حدَّ الإمكان المتساوي إلى الأكثري، وإذا خرجا من ذلك لم يصح البتة أنْ يقال إنَّهما اتفقا أو كانا بالبخْت. وإمّا إذا لم يضافا إلى الإرادة ونظر إليهما نفسيهما في وقت يتساوى كوْن الأكل ولا كونه، فصحيح أنْ يقال: دخلتُ عليه واتفق أنْ كان يأكل، وذلك بالقياس إلى الدخول لا إلى الإرادة. وكذلك قول القائل: صادفته واتفق أنْ كان يمشي، ولقيته واتفق أنْ كان قاعداً ، فإنَّ هذا كلّه متعارفٌ مقبولٌ، ومع ذلك صحيح. وبالجملة إذا كان الأمر الكائن في نفسه غير متطلَّع ولا متوقع-إذ ليس دائماً ولا أكثرياً-فصالحٌ أنْ يقال للسبب المؤدي إليه أنَّه اتفاقٌ أو بخْتٌ، وذلك إذا كان من شأنه أنْ يؤدي إليه، وليس مؤدياً إليه ولا دائماً ولا أكثرياً . وأمّا إذا لم يكن مؤدياً إليه البتة ولا موجباًله؛ مثل قعود فلان عند كسوف القمر، فلا يقال إنَّ قعود فلان اتفق أنْ كان سبباً لكسوف القمر، بل يصلح أنْ يقال: اتفق أنْ كان معه فيكون القعود لا سبباً للكسوف بل سبباً بالعرض للكون مع الكسوف، وليس الكون مع الكسوف هو الكسوف.

(10) To sum up, when *x* is not at all of the character so as to lead to *y,* then it is not a chance cause of *y; x* is a chance cause of *y* only when *x* is of such a character as to lead to *y,* but not always and for the most part. Taken at its extreme, if the agent were aware of the course of the universe's motions and he truly intended to and chose to, then he would, in fact, make [that course] a given end. It is just as if someone were going to the market [and] were aware that somebody who owes him money was on the way [there as well]; he would, in fact, make [going to the market] an end. In this case, there is a shift away from occurring equally and seldom, since to take a course that one knows the debtor is presently taking does for the most part lead to encountering him, whereas inasmuch as he does not know [his debtor's whereabouts], going out might or might not lead [to encountering him]. It is by chance only in relation to going out without any additional condition, while it is not by chance when a certain additional condition [namely, knowing the whereabouts of the debtor] is added to going out. From this, it should be clear that when there are chance causes, they are for the sake of something, except that they are their efficient causes accidentally, and the ends are accidental ends and are included among the causes that are accidental. So chance is a cause of natural and volitional things accidentally, necessitating neither [their occurrence] always nor for the most part. In other words, it concerns what is for the sake of something whose cause does not necessitate it essentially. Also, something might happen to be neither by intention nor by chance—as, for example, leaving footprints on the ground when going to overtake the debtor, for even if that was not intended, it is a necessary effect of what was intended.

(١٠) وبالجملة إذا كان الشيء ليس من شأنه أنْ يؤدي لشيءٍ البتة، فليس سبباً اتفاقياً له. إنّما يكون سبباً اتفاقياً له؛ إذا كان من شأنه أنْ يؤدي إليه وليس دائماً ولا في أكثر الأمر، حتى لو فطن الفاعل بما تجري عليه حركات الكلّ، وصحّ أنْ يريد ويختار؛ لصحّ أنْ يجعله غاية. كما لو فطن الخارج إلى السوق أنَّ الغريم في الطريق؛ لصحّ أنْ يجعله غاية، وكان حينئذ خارجاً عن حدّ التساوي والأقلي، لأنَّ خروج العارف بحصول الغريم في جهة مخرجه؛ يؤدي فى أكثر الأمر إلى مصادفته، وأمّا خروج ‹غير› العارف من حيث هو غير عارف؛ فربّما أدى وربّما لم يؤدِ، وإنّما يكون إتفاقاً بالقياس إلى الخروج لا بشرطٍ زائد، ويكون غير إتفاقٍ بالإضافة إلى خروج بشرط زائد. ويتبيّن من هذا أنَّ الأسباب الاتفاقية تكون حيث تكون من أجل شيءٍ، إلاّ أنَّها أسبابٌ ‹فاعلة› لها بالعرض، والغايات غايات بالعرض، فهي داخلة في جملة الأسباب التي بالعرض. فالاتفاق سببٌ من الأمور الطبيعية والإرادية بالعرض، ليس دائم الإيجاب ولا أكثري الإيجاب، وهو فيما يكون من أجل شيء ليس له سببٌ أوجبه بالذات. وقد تعرض أمورٌ لا بقصدٍ وليست بالاتفاق؛ مثل تخطيط القدم على الأرض عند الخروج إلى أخذ الغريم، فإنَّ ذلك – وإنْ لم يُقصد – فضروري في المقصود.

(11) Now, one could claim that frequently we say that such-and-such happened by chance even though it occurs for the most part. An example would be one who says, "I sought Zayd for the sake of some need or other and I chanced to find him at home," which does not prevent him from saying, "Zayd is at home for the most part." The response is that this person says the latter not only by considering the thing in itself, but also by considering his belief about [Zayd]. So [for example] when his overwhelming opinion is that Zayd should be at home, then he would not say that [his being at home] is by chance, but, rather, he would say it was by chance if he did *not* find him at home. He says the former, however, only when it seems in his opinion, at that time and in that situation, that [Zayd] is equally either at home or not. So at *that* time his opinion is to judge [the two] as being equal and not as being for the most part or necessary, even if, in relation to the time generally, it is for the most part.

(12) Concerning many of the natural things whose existence is rare—such as the gold vein whose [amount of gold] defies being weighed or the sapphire of unprecedented magnitude—it might be supposed that they exist by chance, since they are seldom. That is not so. What seldom occurs enters into the ranks of what is by chance *not only* when it is considered in relation to existence generally, *but also* when it is considered in relation to its efficient cause, and so its existence seldom results from [that efficient cause]. That gold vein and that sapphire, however, proceeded from their efficient cause precisely because of its power and the two instances of a wealth of abundant matter. Given that that is the case, something like this action would proceed essentially and naturally, either always or for the most part.

(١١) لكـن لقائـل أنْ يقول إنَّا ربّما قلنا إنَّ كـذا كان بالاتفاق، وإنْ كان الأمر أكثرياً كقـول القائل: إنَّ فلاناً قصدته لحاجة كذا فاتفق أنْ وجدته في البيت، ولا يمنعه عن هذا القول كون زيد في أكثر الأمر في البيت. فالجواب أنَّ هذا القائل إنّما يقول ذلك لا بحسب الأمر في نفسه؛ بل بحسب اعتقاده فيه. فإنَّه إذا كان أغلب ظنّه أنَّ زيداً ينبغي أنْ يكون فـي البيـت، فلا يقول إنَّ ذلك اتفق؛ بل إنْ لم يجده يقـول إنَّ ذلك اتفق. ولكن إنّما يقول هذا إذا كان يتسـاوى عنده في ظنّه في ذلك الوقت وفي تلك الحال أنّه كائن في البيت أو غير كائنٍ، فيكون ظنّه في ذلك الوقت يحكم بالتساوي دون الأكثري والواجب، وإنْ كان بالقياس إلى الوقت المطلق أكثرياً.

(١٢) وقـد يُظّنّ في كثيرٍ من الأمور الطبيعة النـادرة الوجود – مثل الذهب الثابت على وزْنٍ من الأوزان أو الياقوته المجاوزة للمقدار المعهود – أنّه موجودٌ بالاتفاق لأنَّه أقلّي، وليس كذلك. فإنَّ كون الشـيء في الأقل إنّما يدخل الشـيء في الاتفاق، لا إذا قيس إلى الوجود المطلق، بل إذا قيس إلى السـبب الفاعل له، فكان وجوده عنه أقلّياً، والسـبب الفاعل لهذا الذهب والياقوت إنّما صدر عنه ذلك لقوته، ولوجدان المادة الوافرة. وإذا كان كذلك فيصدر مثل هذا الفعل عن ذاته دائماً أو في الأكثر صدوراً طبيعياً.

(13) We say that the chance cause might sometimes lead to its essential end and sometimes might not. For example, when the man leaves, headed for his shop, and then by chance comes across one who owes him money, that might interrupt his essential goal [of going to his shop], or it might not and instead he continues along his way until he arrives. Also, should a falling rock fracture a head, it might either lodge there or it might continue downward to its place of descent. So, if it reaches its natural end, it is an essential cause relative to it, while relative to the accidental end, it is a chance cause. If it does not reach it, it is [still] a chance cause relative to the accidental end; but relative to the essential end, it is in vain (just as they say, "he drank medicine in order to be purged, but he was not purged, and so he drank in vain"), while the accidental end relative to it is by chance. It might be supposed that certain things are and come to be, not for some end, but on a whim—though not by chance—such as a desire for a beard and the like. This is not so, and in first philosophy we shall explain the real state of affairs about such cases.[9]

(14) Now, chance is more general than luck in our language, for every instance of luck is an instance of chance, but not every instance of chance is an instance of luck. So it is as if *luck* is said only of what leads to something of account, where its principle is a volition resulting from rational and mature individuals having a choice. If [*luck*], then, is said of something other than one such as that—as, for example, it is said of the piece of wood that is split and whose one half is used for a mosque while its other half is used for a public lavatory, that its one half is fortunate, while its other half is unfortunate[10]—then it is said metaphorically. Anything whose principle is a nature is not said to come to be by luck and instead might be designated more properly as coming to be *spontaneously*, unless it is related to some other voluntary principle.

9. Cf. *Ilāhīyāt* 6.5.
10. Reading *shaqīy* with **Z**, **T**, and the Latin *infortunata* for **Y**'s *shayʾ* (thing).

(١٣) ونقول إنَّ السبب الاتفاقي قد يجوز أنْ يتأدى إلى غايته الذاتية وقد يجوز أنْ لا يتأدى؛ مثل أنَّ الرجل إذا خرج متوجهاً إلى متجره فلقي غريمه اتفاقاً، فربّما انقطع بذلك عن غايته الذاتية وربّما لم ينقطع، بل توجّه نحوها ووصل إليها. والحجر الهابط إذا شجَّ رأساً فربّما وقفَ وربّما هبط إلى مهبطه، فإنّه إذا وصل إلى غايته الطبيعية فيكون بالقياس إليها سبباً ذاتياً، وبالقياس إلى الغاية العرضية سبباً اتفاقياً. وأمّا إنْ لم يصل إليها فإنّه يكون بالقياس إلى الغاية العرضية سبباً اتفاقياً، وبالقياس إلى الغاية الذاتية باطلاً؛ كقولهم شرب الدواء ليسْهل فلم يسْهل، فكان شربه باطلاً، والغاية العرضية بالقياس إليها تكون ‹اتفاقاً›. وقد يظن أنَّه قد يكون وتحدث أمورٌ لا لغاية بل على سبيل العبث، ولا تكون اتفاقاً كالولوع باللحية وما أشبه ذلك، وليس كذلك – وسنبيّن في الفلسفة الأولى حقيقة الأمر فيها.

(١٤) ثم الاتفاق أعمّ من البخْت في لغتنا هذه؛ فإنَّ كل بخْتٍ اتفاقٌ، وليس كل اتفاقٍ بخْتاً، فكأنّهم لا يقولون بخْت إلاّ لما يؤدي إلى شيء يُعتدّ به، ومبدؤه إرادة عن ذي اختيار من الناطقين البالغين. فإنْ قالوا لغير ذلك؛ كما يقال للعود الذي يُشقّ نصفه لمسجدٍ ونصفه لكنيفٍ إنَّ نصفاً منه سعيد ونصفاً منه شقي؛ فهو مجاز. وأمّا ما مبدؤه طبيعي فلا يقال إنَّه كائن بالبخْت؛ بل عسى أنْ يُخصّ باسم الكائن من تلقاء نفسه، إلاّ إذا قيس

So chance events proceed according to various interactions that occur between two or more things. Now, with respect to each member of the interaction, either they both move until they collide and interact, or one of them is at rest and the other is moving toward it; for if they are both at rest in some noninteracting state as they were, then no[11] interaction between them will result. Consequently, there can be two motions from two principles (one of which is natural and the other volitional) that chance to interact vis-à-vis a single end, which in relation to the voluntary [agent] is either accounted good or evil, and so it has [either good or bad] luck, but in relation to the natural motion, it is not luck.

(15) There is a difference between bad luck and bad planning. Bad planning is to choose some cause that, for the most part, leads to some blameworthy end, whereas bad luck is such that the cause, for the most part, does not lead to some blameworthy end but, unfortunately, in the case of the one being held responsible for it, it did so [on this occasion]. A streak of good luck is that which, when it occurs, [brings about], as luck would have it, the repeated occurrence of a number of fortunate causes, whereas a streak of bad luck is that which, when it occurs, [brings about], as luck would have it, the repeated occurrence of a number of unfortunate causes. So, in the first case, one begins to expect the continual repetition of the good that had repeatedly occurred, while in the second case, one expects the continual repetition of the evil that had repeatedly occurred. Now, a single chance cause might have any number of chance ends; and thus, one does not guard against chance the way one guards against essential causes but [instead] seeks refuge in God against misfortune.

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11. **Y** seems to have inadvertently omitted the negation *lam*, which is verified in **Z**, **T**, and the Latin.

إلى مبدأ آخر إرادي. فإنَّ الأمور الاتفاقية تجري على مصادماتٍ شتّى تحصل بين شيئين أو أشياء، وكل مصادمة فإمّا أنْ يكون فيها كلا المتصادمين متحركين إلى أنْ يتصادما، أو يكون أحدهما ساكناً والآخر متحرّكاً إليه. فإنَّه إذا سكن كلاهما على حالٍ غير التصادم الذي كانا عليه لم ينتج ما بينهما تصادم. وإذا كان كذلك، فجائز أنْ تتفق حركتان من مبدأين أحدهما طبيعي والآخر إرادي، يتصادمان عند غاية واحدة تكون بالقياس إلى الإرادي خيراً يُعتدّ به أو شرّاً يعتدّ به، فيكون حينئذ بخْتاً له ولا يكون بالقياس إلى حركة الطبيعي بخْتاً.

(١٥) وفرقٌ بين رداءة البخْت وسوء التدبير فإنَّ سوء التدبير هو اختيار سببٍ في أكثر الأمر يؤدي إلى غايةٍ مذمومة. ورداءة البخْت هو أنْ يكون السبب في أكثر الأمر غير مؤدٍ إلى غايةٍ مذمومة ولكن تكون عند متولّيها السيء البخْت تؤدي إليه. والشيء الميمون هو الذي قد تكرّر حصول أسبابٍ مُسْعِدة بالبخْت عند حصوله، والشيء المَشْؤوم هو الذي تكرّر حصول أسبابٍ مُشْقِية بالبخْت عند حصوله فيستشْعر من حضور الأول عَوْد ما اعتيد تكرّره من الخير، ومن حضور الثاني عَوْد ما اعيبد تكرّره من الشّر. وقد يكون للسبب الواحد الاتفاقي غايات اتفاقية غير محدودة، ولذلك لا يتحرّز عن الاتفاق التحرّز عن الأسباب الذاتية. ويُستعاذ بالله من الشقاوة.

Chapter Fourteen

Some of the arguments of those who were in error concerning chance and luck and the refutation of their views

(1) Since we have explained the essence and existence of chance, we should indicate some of the arguments upon which rest the false views about the class of chance things, even if this explanation might more fittingly wait until metaphysics and first philosophy, since most of the premises that we adopt in explaining this simply have to be asserted [here]. Be that as it may, we shall accommodate tradition in this and certain other analogous cases.

(2) The view that denies chance outright and requires that everything have some known cause, and that we are not forced to contrive some cause that is [called] *chance,* rests upon a proof that does not strictly lead to the desired conclusion. [That] is because it does not follow that when everything has a cause, chance does not exist; rather, the existing cause of something that is not necessitated either always or for the most part is itself the chance cause inasmuch as it is such. Their claim that frequently a single thing has many simultaneous ends involves a fallacy of equivocation concerning the term *end,* for *end* might be said of whatever something ends at, however it might be, and it might be said of that which is actually intended, where both what is intended by nature and what is intended by volition are something definite. We mean here by *essential end* the latter. They say that the end does not cease to be an end by stipulation, such that when one stipulates *catching up with the debtor* as an end, it is not by luck, while if one stipulates *reaching the shop* as an end, it is by luck. The response is not to grant the claim that stipulation does not change the state of this class, unless you believe that the stipulation will make the thing in the one case occur for the most part, whereas in the other case [you believe that] it will occur seldom. Now, certainly, going out in order to catch up with a debtor whose whereabouts are known does, as such, lead for the most part to catching up with him, while going to the shop without such knowledge does not

<الفصل الرابع عشر>

في بعض حُجج مَنْ أخطأ في باب الاتفاق والبخْت ونقْض مذاهبهم

(١) وإذْ قد بيّنا ماهيّة الاتفاق ووجوده، فحريٌّ بنا أنْ نشير إلى <بعض> حجج المذاهب الفاسدة في باب الاتفاق؛ وإنْ كان الأحرى أنْ يؤخّر هذا البيان إلى ما بعد الطبيعة وإلى الفلسفة الأولى؛ فإنَّ المقدمات التي نأخذها في هذا البيان أكثرها مصادرات لكنّا ساعدنا في هذا الواحد، وفي بعض الأشياء الأُخرى، مجرى العادة؛

(٢) فنقول: أمّا المذهب المبطل للاتفاق أصلاً المحتجّ بأنَّ كل شيءٍ يوجد له سببٌ معلومٌ ولا نضطر إلى اختلاق سببٍ هو الاتفاق؛ فإنَّ احتجاجه ليس ينتج المطلوب، لأنَّه ليس إذا وجد لكل شيءٍ سببٌ لم يكن للاتفاق وجود، بل كان السبب الموجود للشيء الذي لا يوجبه على الدوام أو الأكثر هو السبب الاتفاقي نفسه من حيث هو كذلك. وأمّا قوله إنَّه قد يكون لشيءٍ واحد غايات كثيرة معاً، فإنَّ المغالطة فيه لاشتراك الاسم في الغاية؛ فإنَّ الغاية تقال لما ينتهي إليه الشيء كيف كان، وتقال لما يُقصد بالفعل. والمقصود بالحركة الطبيعية محدودٌ، والمقصود بالإرادة أيضاً محدودٌ، ونحن نعني بالغاية–ها هنا– الذاتية هذا. وقوله: إنَّه ليس يجب أنْ تصير الغاية غير غاية بالجعْل حتى إذا جعل الظفر بالغريم غاية صار الأمر غير بخْتي، وإنْ جعل الوصول إلى الدكان غاية صار الأمر بخْتياً! فإنَّ الجواب عنه إنَّ قوله إنَّ الجعْل لا يغيّر الحال في هذا الباب هو غير مسلّم؛ ألا ترى أنَّ، الجعْل يجعل الأمر في أحدهما أكثرياً وفي الآخر أقلّياً؛ فإنَّ الشاعر بمقام الغريم الخارج إليه به من حيث هو كذلك، فإنَّه في أكثر الأمر يظفر به، وغير الشاعر الخارج إلى الدكان، من

lead for the most part to catching the debtor. So, if different stipulations can bring about a different status with respect to something's being for the most part as well as not being so, then, likewise, it can bring about a different status with respect to the thing's being by chance or not.

(3) One of the ways to expose the error of Democritus's view—who makes the world come to be by chance, while believing that the things subject to generation are such by nature—is for us explain the essence of chance to him—namely, that it is an accidental end for the sake of something that is either natural, volitional, or forced. Now, what is forced ultimately terminates at some nature or volition, and so it should be obvious that what is forced cannot form an infinite series of forced [causes]. So nature and volition are, in themselves, prior to chance, in which case the ultimate cause of the world is either a nature or volition. Now, he assumes that the bodies that he professes are solid, substantially alike, differing [only] in their shape, and are moved essentially in a void, and then suddenly combine and touch. He also assumes that there is no power or form, but only shape; and, indeed, that the combination of [these bodies] and what their shapes require does not permanently fuse one to another, but, rather, [that] they can separate and continue on with their essential motion. [Given these assumptions], then, [those bodies] must be moved essentially so as to become separated without the continuous combination formed from them remaining. If that were the case, however, the Heavens would not continue to exist according to a single configuration during successive astronomical observations covering a long period of time. Now, if he said that among these bodies, there are different strengths in relation to their substances' chance collisions as well as what is compressed between them, and [that] when one of the weaker ones stands between two compressing agents whose power of compression is exactly balanced, then [the weaker one] will remain like that, it might appear as if he said something of consequence—[that is], until we explain that there is nothing to this and that it is not by chance, which we shall do later.[1] What is truly amazing is the chances that one

1. The reference might be to 4.11.10, but see also *Kitāb al-najāt,* ed. Muhammad Danishpazhuh (Tehran: Dānishgāh-yi Tihrān, 1985; henceforth, the *Najāt*), 298–99, where Avicenna explicitly denies that all bodies naturally descend, which certainly has Democritus as its target, and where much of the language—for example, to compress (variations of *Ḍ-Gh-T*)—is identical to the present passage.

حيــث هو كذلك، فإنَّه ليس في أكثر الأمر يظفر بغريمه. فإنَّ كان الجعْل المختلف يختلف لــه حكم الأمر في أكثريته وغير أكثريته، فكذلك يختلف له حكم الأمر في أنَّه اتفاقي أو غير اتفاقي.

(٣) وأمّــا ‹ديموكريتس› الذي يجعــل تكوّن العالم بالاتفاق، ويــرى أنَّ الكائناتِ كائناتٌ بالطبيعة، فممّا يكشــف فساد رأيه هو أنْ نبيّن له ماهيّة الاتفاق وأنَّه غاية عرضية لأمرٍ طبيعي أو إرادي أو ‹قســري› والقَسْــر ينتهي إلى طبيعةٍ أو إرادة. فإنَّه سيظهر أنَّه لا يســتمر قَسْــرٌ على قَسْــرٍ إلى غير النهاية، فتكون الطبيعة والإرادة في ذاتهما أقدم من الاتفاق، فيكون السبب الأول للعالم طبيعة أو إرادة. على أنَّ الأجرام التي يقول بها ويراها صلبــة ويراها متفقة الجواهر مختلفة بالأشــكال، ويراها متحركــة بذاتها في الخلاء إذا اجتمعت وتماســت، ولا قوة عنده ولا صورة إلاّ الشــكل فقط، فإنَّ اجتماعها ومقتضى أشكالها لا يلصق بعضها ببعض، بل يجوز لها الانفصال واستمرار حركتها التي لها بذاتها. فيجب لذاتها أنْ تتحرّك فتنفصل ولا يبقى لها الاتصال. ولو كان كذلك؛ لما وجدت السماء مســتمرة الوجود على هيئةٍ واحدةٍ في أرصادٍ متتابعةٍ بــين طرفي زمان طويل! ولو كان يقــول: إنَّ في هذه الأجرام قوى مختلفة في جواهرهــا، يتفق لها أنْ تتصادم ويضغط ما بينها، ويقف الضعيف منها بين الضاغطين ويتكافأ ميل الضاغطين بحســب القوتين فيبقى كذلك، لكان ربّما أوهم أنَّه يقول شــيئاً؛ إلى أنْ نبيّن أنَّ هذا لا يكون ولا يتفق – وسنشــير إليــه بعد. والعجب أنَّــه يجعل الأمر الدائم، الذي لا يقع فيه خــروجٌ عن نظام واحدٍ ولا

would make something that is eternal, in which there is no deviation from a single order and that does not come to be in time, to be by luck or to involve chance, while making particular things that appear to involve chance be for the sake of some end!

(4) Empedocles and those following him made the particulars occur by chance but have confused chance with necessity and so made the material occur by chance, while its being informed with the form it has is by necessity and not for the sake of some end.[2] For example, they said that incisors are not sharp for the sake of cutting; but, rather, a certain matter that is susceptible to only this form chanced to occur, and so they are necessarily sharp.[3] They were inclined to pretty feeble arguments concerning this topic, saying the following: How can nature act for the sake of something when it cannot deliberate? Also, if nature were to act for the sake of something, then there would not be any deformities, additional appendages, and death in nature at all, since these are unintended states. The fact is, [they maintain,] that the matter chanced to be in a certain state, upon which these states followed. The same would hold for the rest of the natural things if they, in some way, chanced to possess something beneficial, and yet [that benefit] was not associated with chance and the necessity of matter, but, rather, was supposed to proceed only from some agent acting for the sake of some thing. Now, if that were the case, there would only be things that are eternal, perpetual, and invariant. This is like the rain, which, we know with absolute certainty, comes to be on account of the necessity of matter, since when the Sun causes evaporation and then the vapors reach the cooler air, they are cooled and the water becomes heavy and then necessarily falls. As chance would have it, certain benefits result, and so it is supposed that the rain was intended by nature for those benefits, but, they add, no notice is taken of [the rain's] destroying [crops] on the threshing-floor.

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2. Cf. *Physics* 2.8.99a10ff. and *Generation and Corruption* 2.6.333b4ff.

3. Reading *istaḥddat* with **Z**, **T**, and the Latin (*fuerunt acuti*) for **Y**'s *istaḥdatha* (to renew).

أمـــر حادث، كائنٌ ببخْتٍ أو اتفـــاقٍ فيه؛ إتفاقياً. ويجعل الأمـــور الجزئية لغايةٍ وفيها ما يرى الاتفاق.

(٤) وأمّا <أمبيذُكْلِس> ومَنْ جرى مجراه، فإنَّهم جعلوا الجزئيات تكون بالاتفاق، بل خلطوا الاتفاق بالضرورة، فجعلوا حصول المادة بالاتفاق وتصوّرها بصورتها بالضرورة، لا لغاية. مثلاً قالوا: إنَّ الثنايا لم تســـتحد للقطع؛ بل اتفق أنْ حصلت هناك مادة لا تقبل إلاّ هذه الصورة فاســـتحدّت بالضرورة. وقد أخلدوا في هذا الباب إلى حجج واهية قالوا: كيف تكون الطبيعة تفعل لأجل شيءٍ وليس لها رويّة، ولو كانت الطبيعة تفعل لأجل شيءٍ لما كانت التشويهات والزوائد والموت في الطبيعة؛ البتة. فإنَّ هذه الأحوال ليست بقصد، ولكـــن يتفق أنْ تكـــون المادة بحالةٍ تتبعها هذه الأحوال، فكذلك الحكم في ســـائر الأمور الطبيعيـــة التي اتفقت أنْ كانت على وجهٍ يتضمن المصلحة فلم تُنســـب إلى الاتفاق وإلى ضرورة المادة، بل ظُنَّ أنّها إنّما تصدر عن فاعلٍ يفعل لأجل شيءٍ، ولو كان كذلك، لما كان إلاّ أبداً دائماً لا يختلف. وهذا كالمطر الذي يعلم يقيناً أنَّه كائنٌ لضرورة المادة؛ لأنَّ الشّمس إذا بخّـــرت فخلص البخار إلى الجـــو البارد برد فصار ماء ثقيلاً، فنزل ضرورة، فاتفق أنْ يقع في مصالح؛ فظُن أنَّ الأمطار مقصودة في الطبيعة لتلك المصالح، وقالوا - ولم يُلتفت إلى فسادها للبيادر.

(5) They also said something else that was misleading about this topic—namely, that the order found in [both] the generation and passing of natural things follows what the necessity in the materials requires; and this is something about which there should be no mistake. So, if it is conceded that development and generation are ordered, then, indeed, reverting and corruption will be ordered no less than that former order—namely, the order of deteriorating from [the natural thing's] beginning to its end, which is just the reverse of the order of development. In that case, however, it also ought to be supposed that deterioration is for the sake of some thing—namely, death. Moreover, if nature acts for the sake of some thing, then the question remains with respect to that thing itself, namely, "Why did it naturally act the way it did?" and so on *ad infinitum*.[4] Also, they asked: How can nature act for the sake of some thing, while one and the same nature produces different actions on account of material differences, like heat's melting certain things, such as wax, while congealing others, such as egg and salt? Now, what would truly be remarkable is that the heat produces burning for the sake of something. That fact is that that [burning] follows on [the heat] by necessity precisely because the matter is in a certain state, with respect to which it must burn when placed in contact with something hot; and the same holds for the rest of the natural powers.

(6) What we should say and believe about this topic for the nonce is that there is not much dispute about including chance in the generation of natural things—namely, in relation to their individual instances. So neither that *this* clod of dirt occurs at *this* part of the world, nor that *this*

4. For example, one asks, "Why are incisors sharp?" and the response is "For the sake of cutting," to which it is asked, "Why are they for the sake of cutting?" and it might be responded, "For the sake of facilitating digestion." Such "why"-questions might either go on without end—which, in fact, undermines the position that nature acts for some end—or they terminate at some end that chances to be beneficial, which is the position of Empedocles and his followers.

(٥) قالوا ؛ وقد عرض في هذا الباب أمرٌ آخر وهو النظام الموجود في تكوّن الأمور الطبيعية وسلوكها إلى ما توجبه الضرورة التي في المواد ، وليس ذلك ممّا يجب أنْ يُغْتر به . فإنّه – وإنْ سُلّم أنَّ للنشوء والتكّون نظاماً – فإنَّ للرجوع والسلوك إلى الفساد نظاماً ليس دون ذلك النظام ؛ وهو نظام الذبول من أوله إلى آخره ، بعكس من نظام النشوء ، فكان يجب أيضاً أنْ يُظنّ أنَّ الذبول لأجل شيءٍ هو الموت . ثم إنْ كانت الطبيعة تفعل لأجل شيء ؛ فالسؤال ثابتٌ في ذلك الشيء نفسه ؛ وأنَّه لِمَ فِعْلٌ في الطبيعة على ما هو عليه؟ وتستمر المطالبة إلى غير ‹نهاية› . قالوا : وكيف تكون الطبيعة فاعلة لأجل شيء ؛ والطبيعة الواحدة تختلف أفعالها لا ختلاف المواد ، كالحرارة تحل شيئاً كالشمع ، وتعقد شيئاً كالبيض والملح؟ ومن العجائب أنْ تكون الحرارة تفعل الإحراق لأجل شيء ، بل إنَّما يلزمها ذلك بالضرورة ؛ لأنَّ المادة بحال يجب لها فيها عند مماسّة الحار الاحتراق ، وكذلك حكم سائر القوى الطبيعية .

(٦) والذي يجب علينا أنْ نقوله في هذا الباب ونعتقده هو أنَّه لا كثير مناقشة الآن في أنَّ للاتفاق مدخلاً في تكّون الأُمور الطبيعية ، وذلك بالقياس إلى أفرادها . فإنَّه ليس حصول هذه المَدَرة عند هذا الجزء من الأرض ، ولا حصول هذه الحبّة من البُرّ في هذه

grain of wheat occurs in *this* plot of land, nor that *this* semen occurs in *this* womb is something that is always or for the most part; and indeed, let us happily grant [Empedocles this point] and what is analogous.

(7) What we should focus on is the generation of the spike of grain from the wheat through the aid of the Earth's matter and the fetus from the semen through the aid of the womb's matter. Is that considered to be by chance? Now, we shall discover that it is not by chance but is something that nature necessitates and some power elicits. Likewise, let them also cheer on their claim that the matter belonging to incisors is susceptible to only this form; but we know not [only] that *this form* determinately belongs to this matter because it is susceptible to only this form, but [also] that *this matter* determinately belongs to this form because it is susceptible to only this form— [that] is, because in a house the stones are on bottom and the wood on top not only because stone is heavier and wood lighter, but also [because] here there is the work of a craftsman who could not do it if he had not related the materials that [his craft] uses in this way and so, through [his craft], produces this relation. Sound reflection reveals the truth of what we say—namely, that when *either* a grain of wheat *or* a grain of barley falls onto one and the same plot of land, then *either* a spear of wheat *or* a spear of barley respectively grows. It is absurd to say that the earthy and watery particles move by themselves and penetrate the substance of the wheat and cause it to grow, for it will become clear that they do not move from their proper places owing to themselves, where the [downward] motions that do essentially belong to the [earth and water] are well known. So the two must move only through some attractive powers latent within the grains, which bring about the attraction, God willing.

البقعة من الأرض، ولا حصول هذه النُطْفة في هذا الرحم أمراً دائماً ولا أكثرياً، بل لنسامح أنَّه وما جرى مجراه؛ اتفاقي.

(٧) ولنمْعن النظر في مثل تكّون السنبلة عن البُرّة باستمداد المادة من الأرض، والجنين عن النُطفة باستمداد المادة من الرحم؛ هل يُعدّ ذلك بالإتفاق؟ فنجده ليس باتفاقي، بل أمراً توجبه الطبيعة وتستدعيه قوة. وكذلك ليساعدوا أيضاً على قولهم أنَّ المادة التي للثنايا لا تقبل إلاّ هذه الصورة، بل حصلت هذه المادة لهذه الصورة لأنَّها لا تقبل إلا هذه الصورة. فإنَّه ليس البيت إنّما رسب فيه الحجر وطفا الخشب لأنَّ الحجر أثقل والخشب أخف، بل هناك صنعة صانع لم يصلح لها إلاّ أنْ تكون نسب مواد ما بفعله هذه النسبة، فجاء بها على هذه النسبة. والتأمل الصادق يُظهر صدق ما قلناه وهو أنَّ البقعة الواحدة إذا سقطت فيها حبّة بُرّة أنبتت سنْبلة بُرّة، أو حبّة شعير أنبتت سنْبلة شعير. ويستحيل أنْ يقال أنَّ الأجزاء الأرضية والمائية تتحرّك بذاتها وتنفذ في جوهر البُرّة وتربيّه، فإنَّه سيظهر أنَّ تحرّكهما عن مواضعهما ليس لذاتهما. والحركات التي لذاتهما معلومة، فيجب أنْ يكون تحركهما إنّما هو بجذْب قوى مستكنّة في الحبّات جاذبة بإذن اللّه.

(8) Furthermore, with respect to that plot of land, one or the other of the following must be the case: either some parts are suited to generating wheat, while others are suited to generating barley; or whatever is suited to the generation of wheat is suited to the generation of barley. On the one hand, if one and the same parts are suited to both, then the necessity associated with matter falls to the wayside, and the issue comes back to the fact that the form coincidentally belongs to the matter from some agent that provides that form specific to it and moves it toward that form and that it does that always or for the most part. So, clearly, whatever is like that is an action that proceeds from that very thing toward which it is directed, either always (in which case it is not impeded) or for the most part (in which case it is impeded). Now, with respect to natural things, this is what we mean by the *end*. On the other hand, if the parts are different, then it is because of a certain affinity between the power in the wheat and that [particular] matter that there is that which always or for the most part attracts that very matter and moves it to some specific place, in which case there is a cause of [that matter's] acquiring a certain form. So, again, it is the power that is in the wheat that essentially moves this matter to that form of substance, quality, shape, and, where;[5] and that will not be on account of the necessity of the matter, even though the matter with that description will inevitably be borne along to that form. So let us posit that the natural characteristics of the matter are, for instance, either suited to this form or are not susceptible to any other. Is it not inevitable that its being borne along to the place where it acquires this form after not having it is not because of some necessity in it, but, rather, is the result of some other cause that moved [the matter] to [the form], such that either [the matter] comes to have what it is suited to receive or it is not suited to receive anything else? It follows clearly from all this that the nature causes the materials to move toward some definite terminus according to a natural intention belonging to [the nature], and that continues always or for the most part, but that is what we mean by the term *end*.

5. *Al-aynu* refers to the category of *pou* (where) in Aristotle's *Categories*, which, as such, may also be understood as "place."

(٨) ثم لا يخلو إمّا أنْ تكون في تلك البقعة أجزاء تصلح لتكوّن البُرّة وأُخرى تصلح لتكوّن الشعير، أو يكون الصالح لتكوّن البُرّة صالحاً لتكوّن الشعير. فإنْ كان الصالح لهما أجزاء واحدة فقد سقطت الضرورة المنسوبة إلى المادة؛ ورجع الأمر إلى أنَّ الصورة طارئة على المادة من مصوّرٍ يخصّها بتلك الصورة ويحرّكها إلى تلك الصورة؛ وأنَّه دائماً أو في أكثر الأمر يفعل ذلك. وقد بانَ أنَّ ما كان كذلك فهو فعل يصدر عن ذات الأمر متوجهاً إليه، إمّا دائمٌ فلا يُعاق، وإمّا أكثريٌ فيُعاق، وهذا هو مرادنا بالغاية في الأُمور الطبيعية. وإنْ كانت الأجزاء مختلفة فلمناسبة ما بين القوة التي في البُرّة وبين تلك المادة ما يجذب تلك المادة بعينها ويحرّكها إلى حيّزٍ مخصوصٍ في الدوام أو الأكثر؛ فهناك تكسبها صورة مّا فتكون أيضاً القوة التي في البُرّة تحرّك بذاتها هذه المادة إلى تلك الصورة من الجوهر والكيف والشكل والأين، ولا يكون ذلك لضرورة المادة – وإن كان لا بُدّ من أَنّ تكون المادة على تلك الصفة لتنقل إلى تلك الصورة. فلنضع أنَّ طباع المادة صالحة لهذه الصورة أو غير قابلة لغيرها مثلاً. فلا بُدّ من أنْ يكون انتقالها إلى حيث تكتسب هذه الصورة بعد ما لَمْ تكن لها، ليس لضرورةٍ فيها، بل عن سببٍ آخر يحرّكها إليها؛ فيحصل لها ما هي صالحة لقبوله، أو لا تصلح لقبول غيره. فيستبين من هذا كلّه أنَّ تحريكات الطبيعة للمواد هي على سبيل قصدٍ طبيعي منها إلى حدّ محدود، وأنَّ ذلك مستمر على الدَّوْام أو على الأكثر؛ وذلك ما نعنيه بلفظ الغاية.

(9) Furthermore, it is obvious that all ends proceeding from nature, in the case where there is neither opposition nor obstacle, are goods and perfections, and that when [nature] results in some disadvantageous end, that result is not always or for the most part from [nature]. The fact of the matter is that our soul does not immediately grasp some accidental cause about it and so asks, "For what purpose did this seedling wither?" and "For what purpose did this woman miscarry?" As it is, nature is moved for the sake of the good. This goes not only for the development of plants and animals, but also for simple bodies and the actions that proceed from them naturally; for they tend toward certain ends to which they are always directed (as long as there is no obstacle) and are so according to a definite order from which they do not deviate unless there is some opposing cause. The same holds for the instincts to build, weave webs, and store up food that belong to animal souls, for they seem to be quite natural and are ends.

(10) Now, if things happen by chance, then why doesn't wheat produce barley, and why is there no fig-olive progeny, as they think there was goat-stag progeny?[6] Why isn't it that these rare things frequently occur, rather than the species' being continually preserved for the most part? Another proof that natural things are for the sake of some end is that when we see some opposition to or some weakness in the nature, we aid the nature by art—just as the physician does who believes that when the offending opposition is removed or [the patient's] strength restored, the nature will tend toward health and well-being.

(11) It does not follow from the fact that nature lacks deliberation that we must judge that the action proceeding from it is not directed toward some end; for deliberation is not in order to make the action have some end, but in order to designate the action that is chosen from among actions that might be chosen, each one of which has some end proper to it. So deliberation is for the sake of specifying the action, not

6. Cf. Aristotle, *Physics* 2.8.199b9–13.

(٩) ثم مـن الظاهر أنَّ الغايات الصادرة عن الطبيعة–حـال ما تكون الطبيعة غير معارضـة ولا معوِّقة–كلّها خيرات وكمالات. وأنَّـه إذا تأدت إلى غايةٍ ضارّة؛ كان ذلك التـأدّي ليس عنها دائمـاً ولا أكثرياً، بل في حالٍ تتفقد النفس مِنّا فيها سـبباً عارضاً؛ فيقال: ماذا أصاب هذا الفسـيل حتى ذوى؟ وماذا أصاب هذه المرأة حتى أسـقطت؟ وإذا كان كذلـك، فالطبيعة تتحرّك لأجل الخيرية، وليس هذا في نشـوء الحيوان والنبات فقـط، بل وفي حركات الأجرام البسـيطة وأفعالها التي تصدر عنهـا بالطبع، فإنَّها تنحو نحو غاياتٍ تتوجه إليها دائماً – ما لم تُعق – توجهاً على نظامٍ محدودٍ لا تخرج عنه إلاّ بسببٍ معارض. وكذلك الإلهامات التي للأنفس الحيوانية البانية والناسجة والمُدّخرة، فإنها تُشبه الأمور الطبيعية؛ وهي لغاية.

(١٠) وإنْ كانت الأمور تجري اتفاقاً؛ فلِمَ لا تنبت البُرّة شـعيرة، ولا تتولد شـجرة مركّبـة من تين وزيتون، كما يتولّد عندهم بالاتفاق عَنْـز أيّل، ولَم لا تتكرّر هذه النوادر، بـل تبقى الأنـواع محفوظة على الأكثر؟ وممّا يدل على أنَّ الأمـور الطبيعية لغايةٍ؛ أنّا إذا أحسسنا بمعارضٍ أو قصورٍ من الطبيعة أعنّا الطبيعة بالصناعة؛ كما يفعله الطبيب معتقداً أنَّه إذا زال العارض المعارض أو اشتدت القوة، توجهت الطبيعة إلى الصحة والخير.

(١١) وليـس إذا عدمت الطبيعة الرّوية وجب من ذلك أنْ نحكم بأنَّ الفعل الصادر عنها غير متوجهٍ إلى غاية؛ فإنَّ الرّوية ليسـت لتجعل الفعل ذا غاية، بل لتعيّن الفعل الذي يُختار من بين سـائر أفعالٍ جائز اختيارها، لكل واحـد منها غاية تخصّه. فالرّوية لأجل

for the sake of making it an end; and were the soul spared of the various opposing[7] likes and dislikes, an identical and uniform action would proceed from it without deliberation. If you want to become clear on this point, consider closely the case of art, for undoubtedly, it is for the sake of some end. Once it becomes a habit, however, doing it no longer requires deliberation, and it even becomes such that when deliberation is present, it is nigh on impossible to do, and even the one well versed in its performance becomes befuddled in its execution. An example would be a writer or lute player, for when they deliberate about the choice of one letter after another or one note after another and intentionally become preoccupied with their instruments, then they become befuddled and perform haltingly. They continue to do what they do uniformly only by not deliberating about each of the successive things they continue to do, even if that action and its intention initially occurred only through deliberation. As for what provides the initial basis and starting point for that [deliberation], it is not an object of deliberation.[8] The same holds in the case where someone grabs something to catch his balance or uses his hand to scratch an itch, which are done without thought, deliberation, or trying to imagine the form of what one is doing. A case even clearer than this one is when the faculty of the soul self-consciously chooses to move some external limb. Now, it is not the case that it moves the [external limb] itself without an intermediary; rather, it in fact moves only the muscles and tendon, and then they, in their turn, move that limb. Now, the soul is not conscious of moving the muscle, despite the fact that that action is chosen and first.

(12) Concerning what was said about deformities and what is analogous to them, some of them involve a deficiency, malformation, and weakness of the natural course, while others involve some addition. Whatever involves a deficiency or malformation involves a certain privation

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7. Reading *mutafanninah* with **Z** and **T** for **Y**'s (inadvertent) *mutaqannina* (legislated). The Latin's *desideriis* (ardent desire) may be translating some derivation from the root F-T-N, (to be infatuated), but it would be difficult to say exactly what.

8. Avicenna seems to be making the Aristotelian point that one does not deliberate about what is in fact good or even appears to be good to one, but only about the means to acquire that good; cf. Aristotle, *Nicomachean Ethics* 3.3.1112b11ff.

تخصّص الفعل لا لجعله غاية. ولو كانت النفس مسلّمة عن النوازع المختلفة والمعارضات المتفننة، لكان يصدر عنها فعل متشابه على نهْجٍ واحد من غير روية. وإنْ شئت أنْ تستظهر في هذا الباب فتأمل حال الصناعة، فإنّ الصناعة لا يُشك في أنّها لغاية، إذا صارت ملكة لم يحتج في استعمالها إلى الروية، وصارت بحيث إذا أحضرت الروية تعذّرت وتبلّد الماهر فيها عن النفاذ فيما يزاوله، كمَنْ يكتب أو يضرب بالعود؛ فإنّه إذا أخذ يروّي في اختيار حرف حرف أو نغمة نغمة، وأراد أنْ يقف على عدده تبلّد وتعطّل. وإنّما يستمر على نهْجٍ واحدٍ فيما يفعله بلا روية في كل واحد واحد ممّا يستمر فيه–وإنْ كان ابتداء ذلك الفعل وقصده إنّما وقع بالروية. وأمّا المبني على ذلك الأول والابتداء فلا يروّى فيه. وكذلك حال اعتصام الزالق بما يعصمه، ومبادرة اليد على حكّ العضو المستحكّ من غير فكر ولا روية ولا استحضار لصورة ما يفعله في الخيال. وأوضح من هذه القوة النفسانية إذا حرّكت عضواً ظاهراً تختار تحريكه وتشعر بتحريكه، فليس تحريكه بالذات وبلا واسطة، بل إنّما تحرّك بالحقيقة العضل والوتر فيتبعه تحريك ذلك العضو، والنفس لا تشعر بتحريكها للعضلة؛ مع أنَّ ذلك الفعل اختياري وأوّل.

(١٢) وأمّا حديث التشويهات وما يجري مجراها، فإنَّ بعضها هو نقصٌ وقبحٌ وقصورٌ عن المجرى الطبيعي، وبعضها زيادة، وما كان نقصاً وقبحاً فهو عدم فعل لعصيان

produced because of the recalcitrance of matter. Now, we ourselves never promised that the nature could move every matter to the end, nor that there even are ends for the privations of [nature's] actions; rather, we promised that its actions in the materials that are compliant to [the nature] are ends, and this latter [claim] is not at all at odds with the former. Death and deterioration are on account of the weakness of the bodily nature to impose its form onto the matter and to preserve it as such by replacing what is lost. Now, it is simply not the case that the order of deterioration equally leads to some end, for the order of deterioration has a certain cause different from the nature charged with the care of the body. That cause is heat; and as a cause,[9] it is the nature, albeit accidentally. Now, each one of the two has an end. On the one hand, heat's end is to dissolve and transform moisture and so regularly drives matter toward [dissolution], where that is a given end. On the other hand, the end of the nature that is in the body is to preserve the body as long as it can by replenishing it; however, all replenishing will eventually cease, since the replenishing that [the body] receives later on will become less than what it received at first, owing to certain causes (which we shall note in the particular sciences).[10] So that replenishing is an accidental cause for the order of deterioration. Therefore, deterioration, inasmuch as it has an order, is directed toward a certain end, and so it is some action owing to a nature, even if it is not the action of the nature of the body. We again, however, never promised that every state belonging to natural things must be some end of the nature that is in them. All we said, in fact, is that every nature does its action and that it does it only for the sake of its end, whereas the action of some other [second nature] might not be for the sake of [the first nature's] end. Now, death, dissolution, deterioration, and all of that, even if it is not some beneficial end in relation to the body of Zayd, is a necessary end with

9. Reading *sababan* (acc.) with **Z** and **T** for **Y**'s *sababun* (nom.). The Latin suggests a significant variant and reads *et quae causa est calor, sed causa caloris est natura; ergo causa eticae est natura, sed accidentaliter* (that cause is heat, but the cause of heat is a nature; therefore, the cause of deterioration is a nature, but [only] accidentally).

10. Cf., for instance, *Kitāb al-nafs* 5.4, where Avicenna mentions changes of the humoral temperament as one of the causes for the human body's corruption.

المادة. ونحن لم نضمن أنَّ الطبيعة يمكنها أنْ تحرّك كل مادة إلى الغاية، ولا ضمنّا أنَّ لإعدام أفعالها غايات، بل ضمنّا أنَّ أفعالها في المواد الطبْعية التي لها هي غايات، وهذا لا يُزاحم ‹ذاك› . والموت والذبول هو لقصور الطبيعة البدنية عن إلزام المادة صورتها وحفظها إياها عليها بإدخال بدل ما يتحلّل، ونظام الذبول ليس أيضاً غير متأدّ إلى غايةٍ البتة؛ فإنَّ لنظام الذبول سبباً غير الطبيعة الموكلة بالبدن؛ وذلك السبب هو الحرارة، وسبباً هو الطبيعة ولكن بالعرض. ولكلّ واحدٍ منهما غاية، فالحرارة غايتها تحليل الرطوبة وإحالتها فتسوق المادة إليه على النظام وذلك غاية. فالطبيعة التي في البدن غايتها حفظ البدن ما أمكن بإمدادٍ بعد إمدادٍ، لكن كل مددٍ يأتي فإنَّ الاستمداد منه أخيراً يقع أقلَّ من الاستمداد منه بدّياً لعللٍ نذكرها في العلوم الجزئية. فيكون ذلك الإمداد بالعرض سبباً لنظام الذبول، فإذن الذبول–من حيث هو ذو نظام ومتوجّهٍ إلى غاية–فهو فعلٌ لطبيعةٍ وإنْ لم يكن فعل طبيعة البدن. ونحن لم نضمن أنَّ كلّ حالٍ للأمور الطبيعية يجب أنْ تكون غاية للطبيعة التي فيها، بل قلنا إنَّ كلّ طبيعة تفعل فعلها فإنّما تفعله لغايةٍ لها، وأمّا فعل غيرها فقد لا يكون لغايةٍ لها. والموت والتحليل والذبول وكل ذلك–وإنْ لم يكن غاية نافعة بالقياس إلى

respect to the order of the universe. We already alluded to that earlier,[11] and your own knowledge about the state of the soul will draw your attention to the necessary end with respect to death, as well as the necessary ends with respect to frailty.

(13) Additional appendages also come to be for some end. [That] is because when the matter is excessive, the nature moves the excess of it toward the form that it deserves, owing to the preparedness in [the matter], and [the nature] does not forgo giving [the form]; and so the nature's acting on [matter] is for the sake of some end, even if the end toward which it is urged on chances to be a non-natural end.

(14) As for the case of rain and what was said about it, one simply should not concede it. Quite to the contrary, we say that the Sun's proximity and remoteness and the occurrence of warmth and coolness owing to its proximity and remoteness respectively (as you will learn later)[12] are an orderly cause of most of the things in nature that have particular[13] ends; and it is the proximity of the Sun during its motions along the incline that is the very cause that results in the evaporation that brings about the upward motion [of the moisture], where it is cooled and then necessarily falls. The necessity of the matter is not sufficient to account for that [namely, the proximity and remoteness produced by the Sun's motions along the incline]; but, rather, this divine action takes charge of the matter until the necessity of [matter] is reached. In this case, the end is imposed upon it, for either every end or the weighted majority of ends do impose some necessity on a given matter. Yet it is the cause producing motion that seeks out the matter and makes it so as to join the necessity that is in it (if there is) with the intended end. That should be the considered view about all the arts.

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11. See 1.7.4.

12. The reference would appear to be to *Kitāb fī al-samāʾ wa-l-ʿālam* 2, and *Kitāb al-maʿādin wa-l-āthār al-ʿulwīya* 2.

13. Reading *al-juzʾīyah* with **Z** and **T** for **Y**'s and the Latin's *al-khayrīyah* (good).

بدن زيد – فهي غاية واجبة في نظام الكلّ، وقد أومأنا إلى ذلك فيما سلف، وعِلْمك بحال النفس سينبِّهك على غايةٍ في الموت واجبة، وغايات في تناسب الضعف واجبة.

(١٣) وأمّا الزيادات فهي أيضاً كائنة لغايةٍ؛ فإنَّ المادة إذا فضلت حرّكت الطبيعة فضْلها إلى الصورة التي تستحقها بالاستعداد الذي فيها ولا تعطّلها. فيكون فعل الطبيعة فيها لغايةٍ؛ وإنْ كان المستدعي إلى تلك الغاية إتفاق سببٍ غير طبيعي.

(١٤) وأمّا أمر المطر وما قيل فيه؛ فليس ينبغي أنْ نسلّم ما قيل فيه، بل نقول إنَّ قرب الشمس وبُعْدها وحدوث السخونة بقربها والبرودة ببُعْدها – على ما تعلمه بعد – سببٌ ذو نظام لأمور كثيرة من الغايات الجزئيّة في الطبيعة. ووقوع الشمس مقربة في حركاتها المائلة سببٌ يصدر عن ذاته التبخّر المصعّد إلى حيث يبرد فيهبط للضرورة. وليس يكفي في ذلك ضرورة المادة؛ بل هذا الفعل الإلهي المستعمل للمادة، إلى أنْ ينتهي إلى ضرورتها فتلزمها الغاية. فإنَّ كلّ غاية، أو جُلّ الغايات، تلزم ضرورة في مادة، ولكن العلّة المحرّكة ترتاد المادة وتجعلها بحيث تتصل، بالضرورة التي فيها – إنْ كانت – بما هو الغاية المقصودة؛ تأمّل ذلك في الصناعات كلّها.

(15) We also say to them that it is not the case, when motion and action have an end, that every end must have an end and that there will be no end to the question "Why?" for the true end is what is intended for its own sake, and the rest of the things are intended for the sake of it. Now, the why-question that requires the end as its answer is properly asked of whatever is intended for the sake of something else, whereas when what is intended is the thing itself, the question, "Why is it intended?" is not at all appropriate. It is because of this that it is not asked, "Why do you seek health?" and "Why did you seek the good?" or "Why do you want to escape illness?" and "Why do you shun evil?" Now, if motion and transformation were required in order that the end be found or be an end, then every end would necessarily have an end; but as it is, it requires that [only] in the cases of cessation and renewal that proceed from some natural or volitional cause.

(16) You should also not be at all amazed that heat acts for the sake of burning something and that, in fact, heat truly acts in order to burn and to consume what is burnt and to cause its transition into either something like itself or something like the substance in which there is [the heat]. Chance and the accidental end arise in the case of, for example, the burning of a poor man's cloak precisely because [the burning] is not an essential end, for it neither burns it because it is a poor man's cloak nor is the power to burn that is in the fire for the sake of *this* one instance. Quite [to] the contrary, [fire burns] in order to transform whatever it touches into its own substance and in order to melt what is in a certain state and congeal what is in a certain state. In the present case, it chanced to touch *this* cloak, and so there is a certain end on account of the natural activity of fire, even if its bumping into *this* thing that caught on fire is only accidental. Now, the existence of the accidental end does not preclude the existence of the essential; rather, the essential end is prior to the accidental end.

(١٥) ونقــول لهم أيضاً ؛ وليس إذا كان للحركة غايــة وللفعل غاية وجب أنْ يكون لــكل غايةٍ غاية، وأنْ لا تقف ‹المســألة› عن لِمَ. فإنَّ الغايــة في الحقيقة تكون مقصودة لذاتها وسائر الأشياء تقصد لها ، وما يُقصد لأجل شيء آخر فحريٌّ أنْ ‹يُسأل› عنه باللّم المقتضــي للجــواب بالغاية. وأما ما يقصد لذاته فإنَّه لا يليق به الســؤال عن أنَّه لِمَ قُصِدَ ، ولهــذا لا يقال: لِمَ طلبت الصحة، ولمَ طلبت الخيرية، أو لِمَ هربت عن المرض، ولَم نفرت عن الشــر؟ ولو كانت الحركة والإحالة تقتضي الغاية، لأنَّها موجودة أو لأنَّها غاية؛ لكان يجــب أنْ يكون لكل غايــة غاية، لكنها تقتضي ذلك من حيث هناك زوالٌ وتجدّدٌ صادرٌ عن سببٍ طبيعي أو إرادي.

(١٦) وليس يجب أنْ تتعجب من أنَّ الحرارة تفعل لأحراق شيء ، بل حقاً إنَّ الحرارة تفعــل لتحرِق وتُفْنى المُحْرَق وتحيله إلى مشــاكلتها أو مشــاكلة الجوهر الذي هي فيه. إنَّما يكون الاتفاق والغاية العرضية في مثل أنْ تحرِق ثوب فقير ؛ وذلك ليس له بغايةٍ ذاتيةٍ ؛ فإنّها ليســت تحرقه لأجل أنّه ثوب فقير ، ولا في النار هذه القوة المحرقة لأجل هذا الشــأن ، بل لكي تحيل ما تماسّه إلى جوهرها ، ولكي تحلّ ما يكون بحال وتعقد ما يكون بحال، وقد اتفق الآن أنْ ماسّها هذا الثوب. فلفعل النار في الطبيعة غاية، وإنْ لم تكن مصادفتها هذا المشــتعل إلاّ بالعرض، ووجود الغاية بالعرض لا يمنع وجود الغاية بالذات، بل الغاية بالذات متقدمة على الغاية بالعرض.

(17) From all this, it is clear that matter is for the sake of the form and that its purpose is to exist determinately and so have the form exist determinately in it, whereas the form is not for the sake of the matter, even if there inevitably is matter in order for the form to exist in it. Also, whoever closely considers the usefulness of the animal's limbs and the parts of plants will have no doubt that natural things are for the sake of some end, and you will get a whiff of that at the end of our discussion about natural things.[14] Now, despite all this, we do not deny that among natural things there are necessary things, some of which are needed for the sake of the end and some of which impose the end.

14. The reference is probably to the whole of *Kitāb al-ḥayawān*.

(١٧) فبيّنٌ من هذا كله؛ أنَّ المادة لأجل الصورة، وأنَّها تتوخى لتحصل فتحصل فيها الصورة، وليست الصورة لأجل المادة، وإنْ كان لا بُدّ من المادة حتى توجد فيها الصورة. ومَنْ تأمّل منافع أعضاء الحيوان وأجزاء النبات؛ لم يبق له شكٌ في أنَّ الأمور الطبيعية لغايةٍ، وشتشمّ من ذلك شيئاً في آخر كلامنا في الطبيعيات، ومع هذا كلّه فلا ننكر أنْ يكون في الأمور الطبيعية أمورٌ ضروريةٌ؛ بعضها يُحتاج إليها للغاية، وبعضها تلزم الغاية.

Chapter Fifteen

How causes enter into investigating and seeking the why-question and the answer to it

(1) Since we have explained the number of causes and their states for you, we should add that the natural philosopher must be interested in comprehending all of them, and especially the form, so that he completely comprehends the effect.

(2) Now, no principle of motion is included among the objects of mathematics, since they cannot move; and for the same reason, motion's end and matter are not at all included in them, and in fact, the only things considered about them are formal causes.

(3) Concerning material things, however, know that the question "Why?" might involve any one of the causes. So if it involves the agent (as, for example, asking, "Why did so-and-so fight so-and-so?") the answer might be the end (such as saying, "In order to avenge himself"). The answer might also be either the advisor[1] or someone who did something to him earlier (namely, the one inciting him to act)—as, for example, to say, "Because so-and-so advised him to" or "Because [so-and-so] robbed him of his property"—where this one is an agent on account of the form of choice that originates from him that provokes the ultimate action.

(4) Whether to provide the form or the matter as an answer is an open question. In the case of form, it will be the form of the action—that is, fighting. When the question concerns precisely the cause of [the form's] existence from the agent,[2] however, it is incorrect to provide [the form]

1. The Arabic *mushīr* is also Avicenna's preferred term for the "guiding principle"; see 1.10.4

2. Here and below the cause in question is what is the cause of the efficient cause's acting.

<الفصل الخامس عشر>

في دخول العلل في المباحث وطلب اللِم والجواب عنه

(١) وإذْ قد بانَ لنا عدّة الأسباب وأحوالها فنقول: أنَّه يجب أنْ يكون الطبيعي معْنيّاً بالإحاطة بكلّيتها، وخصوصاً بالصورة، حتى تتمّ إحاطته بالمعلول.

(٢) وأمّا الأمور التعليمية فلا يدخل فيها مبدأ حركة؛ إذ لاحركة لها، وكذلك لا تدخل فيها غاية حركة ولا مادة البتة، بل تتأمل فيها العلل الصورية فقط.

(٣) واعلم أنَّ السؤال عن الأمور المادية باللّم ربما تضمّن علّة من العلل. فإنْ تضمّن الفاعل؛ كقولهم؛ لِمَ قاتل فلانٌ فلاناً؟ فيجوز أنْ يكون جوابه الغاية، كقولهم لكي ينتقم منه، ويجوز أنْ يكون جوابه المشير، <أ> والفاعل المتقدم للفاعل؛ وهو الداعي إلى الفعل؛ مثل أنْ يقال لأنَّ فلاناً أشار عليه، أو أنَّه غصبه حقّه، وهذا هو الفاعل لصورة الاختيار الذي ينبعث منه الفعل الأخير.

(٤) وأمّا أنَّه هل يجيب بالصورة أو هل يجيب بالمادة، ففيه نظر. أمّا الصورة فإنَّها صورة الفعل وهو القتال، وليس السؤال إلاّ عن علّة وجودها عن الفاعل فلا يصلح أنْ

as an answer, for it is not the cause of its very own existence from the agent, except in the case where that form is the ultimate end—such as the good, for example. In that case, it is what moves the agent to be an agent without itself being caused, as we alluded to when making clear the relation between the agent and the end.[3] Additionally, [the cause in question] is not the proximate cause of the [form's] existing in that matter as a result of the agent; but, rather, it is the cause of the agent's existing as an agent. And so it is not the cause of the agent as something existing in matter, but as an essence or account. So when the question is about [the form's] coming to be an existing thing, then it is incorrect to provide [the form] *qua* something existing as an answer, but only *qua* an account or essence. The form in question might itself be a certain account that is included within [that form] or [an account] that is broader in scope than [the form], being an idea that embraces the idea of [the form]. In that case, that account would be a correct answer, just as it is said, "Why did so-and-so act justly?" and it is said, "Because acting justly is admirable." Here, *being admirable* is included in *acting justly* and is an answer analogous to the form, and [yet] the answer is not the form in question, but another form. [That] is because *being admirable* is either a part of its definition or broader in scope than it, since *being admirable* is more general than *acting justly,* whether necessarily broader in scope or a constitutive part of its definition. When it is correct to provide the form as the answer, then it is so inasmuch as it is included within the whole set [of factors] inciting the mover to choose. The very same thing can be judged about the matter. So, when it is said, "Why did so-and-so turn "*this* wood into a bed?" saying, "Because it was the wood he had" is not enough unless one adds, "It was the good solid wood that he had suitable for being turned into a bed, and he did not need it for anything else."

3. See 1.11.1–2, where he discusses how the final cause is the cause of the causality of the efficient cause.

يجاب بها ، فإنَّها ليست علّة لوجود نفسها عن الفاعل ؛ إلاَّ أنْ تكون تلك الصورة هي غاية الغايات كالخير مثلاً ، فتكون لذاتها لا لسببٍ مّا هي محرّكة للفاعل إلى أنْ يكون فاعلاً ؛ على النحو الذي أومأنا إليه في بيان نسبة ما بين الفاعل والغاية . ومع ذلك فلا تكون علّة قريبة لوجودها في تلك المادة عن الفاعل ، بل علّة لوجود الفاعل فاعلاً ، فلا تكون – من حيث هي موجودة في المادة علّة للفاعل – بل من حيث هي ماهيّة ومعنى . فإذا كان السؤال عن كونها موجودة ، لم يصلح الجواب بها من حيث هي موجودة ؛ بل من حيث هي معنى وماهيّة . وربّما كانت الصورة المَسْئُول عنها ذات معنى داخل فيها أو عارض لها ، ذاهب مذهبها . فيكون يصلح أنْ يكون ذلك المعنى جواباً ؛ كما يقال : لِمَ عدل فلانٌ؟ فيقال لأنَّ العدل حَسَنٌ ، فيكون الحسن معنى في العدل وجارياً مجرى الصورة ، ولا تكون الصورة المَسْئُول عنها جواباً ، بل صورة غيرها . فإنَّ الحسن هو جزء حدّ أو عارضٍ لها ، فإنَّ الحسن معنى أعمّ من العدل ؛ إمّا عارض لازم ، وإمّا جزء حدّ له مقوّم . وإذا صلحت الصورة أنْ يجاب بها ها هنا فقد دخلت من حيث هي كذلك في جملة الداعي المحرّك للاختيار . وحكم المادة هذا الحكم بعينه ، فإنَّه إذا قيل لِمَ نجرَ فلانٌ هذا الخشب سريراً؟ فقيل لأنَّه كان عنده خشب ، لَمْ يكن مقنعاً ؛ إلاّ أنْ يُزاد فيقال : كان عنده خشب صلب صالح لأنْ يُنجز منه سريرٌ ، وكان لا يحتاج إليه في أمرٍ آخر .

(5) Concerning issues involving volition, however, it is difficult to produce the cause completely, for the will is incited to act [only] after a number of factors are fulfilled, the enumeration of which is not easy. Also, one might not even be conscious of many of them so as to include them in the account.

(6) Concerning issues involving nature, the preparedness of the matter and its encountering the active power is enough, and so the determinate occurrence of matter's relation with respect to [the active power] is by itself an answer, once the presence of the agent is mentioned in the question. When the question involves the end, such as saying, "Why did so-and-so recover?" it is correct to provide the efficient principle as an answer and so say, "Because he drank the medicine." Also, it is correct to provide the material principle as an answer in addition to the agent and so say, "His body's humoral temperament is naturally strong"; but it is not enough to mention the matter alone. Also, mentioning the form alone, as in saying, "Because his humoral temperament is well balanced," rarely will be enough to put an end to the questioning; and, in fact, it will require some other question that will lead to a certain matter and agent. When the question concerns the matter and its preparedness—as, for example, in saying, "Why is the human body mortal?"—one might give the final cause as an answer and so say, "It was made such in order that the soul, once perfected, could free itself from the body." The material cause might also be given as an answer, in which case it is said, "Because it is a composite of contraries." It is not permitted to give the agent as an answer in the case of preparedness that is unlike the form, because it is impossible that the agent provide the matter with the preparedness such that, if it does not provide it, then [the matter] would not be prepared—that is, unless by *preparedness* we mean *to have the disposition completed*. In that case, the agent might provide [the preparedness], just as it is said of the mirror when it is asked, "Why does it receive the image?" and it is said, "Because someone polished it," whereas the original preparedness belongs necessarily to the matter. Also, one might give the form as an answer when it is what completes the preparedness—and so, for example, it is said about the mirror, "Because it is smooth and polished."

(٥) لكن الأمور الإرادية يصعب أنْ تؤدي العلّة بتمامها فيها ، فإنَّ الإرادة تنبعث بعد توافي أمور لا يسهل إحصاؤها ، وربّما لم نشعر بكثير منها فيخبر عنه.

(٦) وأمّآ الأمور الطبيعية فيكفي فيها من المادة الاستعداد والملاقاة الفاعلة، فيكون حصول نسبة المادة فيها جواباً وحده؛ إذا ذكر في السؤال حضور الفاعل. وأمّا إذا تضمن السؤال الغاية كما يقال: لِمَ صحَّ فلانٌ؟ فيصلح أنْ يجاب بالمبدأ الفاعلي؛ فيقال لأنَّه شرب الدواء. ويصلح أنْ يجاب بالمبدأ المادي مضافاً إلى الفاعل، فيقال: لأنَّ مزاج بدنه قوي الطبيعة، ولا يكفي ذكر المادة وحدها. وأمّا الصورة فقلّما تُقْنع ويقطع السؤال ذكرها وحدها ، بأنْ يقال لأنَّ مزاجه اعتدل، بل تحوج إلى سؤال آخر يؤدي إلى مادة أو فاعل. وأمّا إذا كان السؤال عن المادة واستعدادها ؛ بأنْ يقال مثلاً: لِمَ بدن الإنسان قابل للموت؟ فقد يجوز أنْ يُجاب بالعلّة الغائية؛ فيقال جُعل كذلك لتتخلّص النفس – عند الاستكمال – عن البدن. وقد يجوز أنْ يجاب بالعلّة المادية فيقال لأنَّه مركبٌ من الأضداد ، ولا يجوز أنْ يُجاب بالفاعل في الاستعداد الذي ليس كالصورة؛ لأنَّ الفاعل لا يجوز أنْ يعطي المادة الاستعداد ، كأنّه إنْ لم يعطِ لم تكن مستعدة، اللّهم إلاّ أنْ نعني بالا ستعداد التهيؤ التام، فقد يعطيه الفاعل، كما يقال للمرآة إذا سُئل أنَّها لِمَ تقبل الشبح؟ فيقال لأنَّ الصاقل صقلها ، وأما الاستعداد الأصلي فلازم للمادة. ويجوز أنْ يجاب بالصورة إذ كانت هي المتمّمة للاستعداد ؛ فيقال في المرآة مثلاً لأنّها مَلْساء صقيلة.

(7) In summary, the question is not directed at the matter unless it is considered along with the form, in which case the question is about the cause of the form's existing in the matter. When the question involves the form, then providing the matter alone as an answer is not enough, and instead, a certain preparedness, which is related to the agent, must be added to it. Both the end and the agent do provide answers. Now, if you want to separate out what is said metaphorically and mention the true state of affairs, then the true answer is to mention all the causes, [even if] they were not included in the question; and when they are mentioned and sealed with the true end, then the question comes to a stop.

◆

(٧) وبالجملة؛ السـؤال لا يتوجه إلى المادة إلاّ وقد أُخذت مع صورة، فيسـأل عن علّـة وجود الصورة في المادة. وأمّا إذا تضمن السـؤال الصورة، فالمادة وحدها لا تكفي أنْ يجاب بها، بل يجب أن يضاف إليها إستعدادٌ ويُنسب إلى الفاعل، والغاية يجاب بها، والفاعل يجاب به. وإذا شئت أنْ ترفض ما يقال على سبيل المجاز وتذكر الأمر الحقيقي، فإنَّ الجواب الحقيقي أنْ تذكر جميع العلل التي لم تتضمنها ‹المسألة›، فإذا ذكرت وختمت بالغاية الحقيقية؛ وقف السؤال.

SECOND BOOK: ON MOTION AND THAT WHICH FOLLOWS IT

Chapter One

On Motion

(1) Having completed the discussion of the general principles of natural things, we appropriately turn to their general accidents. Now, there are none more general than motion and rest, where rest, as we shall explain when treating it, is a privation of motion. So we should start by discussing motion.

(2) We say that some things exist as actual in every respect, while others are actual in one respect but potential in another. It is impossible, however, that there be something that is potential in every respect, itself having no actuality whatsoever. Let this [for now] be accepted and set down as an axiom, although an inquiry into it will be taken up soon.[1]

1. See *Ilāhīyāt* 4.2.

المقالة الثانية

في الحركة وما يجري مجراها

<الفصل الأول>

في الحركة

(١) لقد ختمنا الكلام في المباديء العامة للأمور الطبيعية؛ فحريٌّ بنا أنْ ننتقل إلى الكلام في العوارض العامة <التي> لها، ولا أعمّ لها من الحركة والسكون. والسكون، كما سنبيّن من حاله، عدم الحركة، فحريٌّ بنا أنْ نقدّم الكلام على الحركة؛

(٢) فنقول: إنَّ الموجودات بعضها بالفعل من كل وجه، وبعضها من جهةٍ بالفعل ومن جهةٍ بالقوة، ويستحيل أنْ يكون شيءٌ من الأشياء بالقوة من كل جهةٍ لا ذات له بالفعل البتة. ليُسلّم هذا، وليُوضع وضْعاً، مع قرب تناول الوقوف عليه. ثم من شأن كلّ ذي قوة

Next, everything possessing potency characteristically passes from it into its corresponding actuality; and whenever it is actually impossible to pass to [some actuality]; there is no [corresponding] potentiality. Now, the passage from potency to actuality is sometimes all at once and sometimes not, whereas [*passage* itself] is more general than either of the two. As most general, it belongs to every category, for there is no category in which there is not some passage from a certain potency belonging to it to a certain actuality belonging to it. With respect to substance, it is like a human's passage into actuality after being in potentiality; with respect to quantity, it is like the growing thing's passage from potency to actuality; and with respect to quality, it is like the passage of blackness from potency into actuality. Concerning what is in [the category] of relation, it is like the father's passage into actuality from potency. In [the category of] where,[2] it is like actually going upward that results from the potency; and in [the category of] when,[3] it is like evening's passing from potency to actuality. As for position, it is like the passing from potency to actuality of the one who stands. The same holds with respect to [the categories of] possession, action, and passion. The technical sense among the Ancients concerning the use of *motion,* however, is not common to all of these kinds of passages from potency to actuality; rather, it is what does not pass all at once, but only [does so] gradually. Now, this happens only in a few categories—as, for instance, quality, for what has a potential quality may advance little by little toward actuality until it reaches it, and likewise what has a potential quantity. Later we shall explain in which of the categories this [type of] passage from potency into actuality may and may not occur.[4]

2. The Arabic *aina* corresponds with Aristotle's category of *pou,* which is also frequently identified with the category of place.

3. The Arabic *matá* corresponds with Aristotle's category of *pote,* which is also frequently identified with the category of time.

4. See *Physics* 2.3.

أنْ يخــرج منها إلى الفعل المقابل لهــا ، وما امتنع الخروج إليه بالفعل فلا قوة عليه . والخروج إلــى الفعل عن القوة قد يكون دفعْة ، وقد يكون لا دفعْــة ؛ وهو أعمّ من الأمرين جميعاً ؛ وهــوّ – بما هو أعمّ – أمر يعرض لجميع المقولات ، فأنَّه لا مقولة إلاّ وفيها خروجٌ عن قوةٍ لها إلى فعلٍ لها . أما في الجوهر ؛ فكخروج الإنســان إلى الفعل بعد كونه بالقوة ، وفي الكمّ فكخروج النامي إلى الفعل عن القوة ، وفي الكيف فكخروج الســواد إلى الفعل عن القوة ، وفــي المضاف فكخروج الأب إلــى الفعل عن القوة ، وفي الأين فكالحصول فوق بالفعل عن القوة ، وفي متى فكخروج العشي إلى الفعل عن القوة ، وفي الوضع فكخروج المنتصب إلى الفعــل عن القوة ، وكذلك في الجدة ، وكذلك في الفعل وفي الانفعال . لكن المعنى المتصالح عليــه عند القدماء في اســتعمال لفظ الحركة ليس ما يشــترك فيــه جميع أصناف هذه الخروجات عن القوة إلى الفعل ، بل ما كان خروجاً لا دفعْة بل متدرجاً . وهذا لا يتأتى إلاّ في مقولات معدودة مثلاً كالكيف ؛ فإنَّ ذا الكيف بالقوة يجوز أنْ يتوجه إلى الفعل يسيراً يســيراً إلى أنْ ينتهي إليه ، وكذلك ذو الكمّ والقوة . ونحن ســنبيّن من بعد أنَّ أي المقولات يجوز أنْ يقع فيه هذا الخروج من القوة إلى الفعل ، وأيّها لا يجوز أنْ يقع فيه ذلك .

(3) Now, were it not the case that, in defining *time,* we must take motion in its definition, and that time frequently is taken in the definition of the *continuous* and *gradual,* and likewise in the definition of *all at once*—for *instant*[5] is taken in its definition (for it is said to be what is in an instant) and *time* is taken in the definition of the *instant,* since it is [time's] limit[6]—and [instead] time were taken in *motion*'s definition, then it would be easy for us to say that motion is a passage from potency to actuality either with respect to time, or continuously, or not all at once. As it stands, however, all of these are descriptions that include a hidden circular explanation. Thus, the one [namely, Aristotle] who provided us with this discipline was forced to take another course concerning that. He considered the state of what is being moved when it is being moved in itself and the manner of existence proper to motion in itself.[7] He found that motion in itself is a perfection and actuality—that is, actually being—as long as there is a potency corresponding with [the motion], since something might be moved either potentially or actually and perfectly, where its actuality and perfection are motion. In this way, on the one hand, motion is common to the rest of the perfections, while, on the other, it is different from them in that, when the rest of the perfections are determinate, something actually comes to be therein, and afterwards there is nothing potential in [the thing] associated with that actuality. So [for example] when black actually becomes black, no part of the blackness that it can be remains potentially black and when the square[8] actually becomes a square, no part of the squareness that it can be remains potentially a square. [In contrast], when something movable is actually being moved, it is thought that some part of the continuous motion by which it is moved is still something potentially movable.

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5. *Al-āna,* which here is translated as "instant," can also be translated "now" and so, in this respect, is much like the Greek *to nun.*

6. Correcting **Y**'s *ṭarfah* (twinkling), which is clearly a typographical error, to *ṭarafahu* with **Z**, **T**, and the Latin.

7. Cf. Aristotle, *Physics* 3.1.

8. Reading *murabba*^{c} with **Z**, **T**, and the Latin (*Liber primus naturalium tractatus secundus: De motu et de consimilibus,* ed. S. Van Riet, J. Janssens, and A. Allard Avicenna Latinus [Leuven: Peeters, 2006]) for **Y**'s *mutaḥarrik* (mobile).

(٣) ولولا أنَّ الزمان ممّا نضطر في تحديده إلى أنْ تؤْخذ الحركة في حدّه، وأنَّ الاتصال والتدريج قد يؤْخذ الزمان في حدّهما والدفْعة أيضاً فإنَّها قد يؤْخذ الآن في حدّها؛ فيقال: هو ما يكون في آن. والآن يؤْخذ الزمان في حدّه لأنَّه طرفه، والحركة يؤخذ الزمان في حدّها ليسهل علينا أنْ نقول: إنَّ الحركة خروجٌ عن القوة إلى الفعل في زمانٍ أو على الاتصال أو لا دفْعة؛ لكن جميع هذه الرسوم تتضمن بياناً دورياً خفياً. فاضطر مفيدنا هذه الصناعة أنْ سلك في ذلك نهْجاً آخر؛ فنظر إلى حال المتحرّك عندما يكون متحرّكاً في نفسه، ونظر في النحو من الوجود الذي يخصَّ الحركة في نفسها فوجد الحركة في نفسها كمالاً وفعلاً، أي كوناً بالفعل، إذ كان بإزائها قوة. إذ الشيء قد يكون متحركاً بالقوة، وقد يكون متحركاً بالفعل وبالكمال، وفعله وكماله هو الحركة. فالحركة تشارك سائر الكمالات من هذه الجهة، وتفارق سائر الكمالات من جهة أنَّ سائر الكمالات، إذا حصلت، صار الشيء بها بالفعل ولم يكن بعد فيه، ممّا يتعلق بذلك الفعل، شيء بالقوة. فإنَّ الأسود إذا صار بالفعل أسود، لم يبقَ بالقوة أسود من جملة الأسود الذي له، والمربّع إذا صار بالفعل مربّعاً لم يبقَ بالقوة مربّعاً من جملة المربّع الذي له، والمتحرّك إذا صار بالفعل متحرّكاً؛ فيظن أنَّه يكون بعد بالقوة متحرّكاً من جملة الحركة المتّصلة التي هو بها متحرّك. ويوجد

Additionally, [the moved thing] potentially exists as something else different from what is moved. [That is] because, as long as the moved thing itself is not the potential thing toward which it is being moved[9] (but which it will reach through the motion), then its current state and relation during the motion to that which it can be potentially is not like what it was before the motion, since, in the state of rest before the motion, it is that potential thing absolutely. In fact, [what is moved] possesses two potentialities one of which is for the thing [it will potentially become] and the other [of which] is for being directed toward it. In that case, it has two perfections at that time for which it also has two potencies. At that time [namely, during the motion], it will have realized the perfection of one of the two potentialities and yet still have remained in potency to that thing that is the intended object of the two potentialities. In fact, with respect to both of them, even if one of the two perfections actually occurred (namely, the first of them), [what is moved] is still not free of what is in potency with respect to both things together, one of which is that toward which it is directed through the motion and the other [of which] is with respect to the motion, since obviously it has not undergone motion to such a degree that no potentiality whatsoever for [motion] remains. So motion is the first perfection belonging to what is in potency, though not in every respect. [That is because] some other perfection can belong to whatever is in potency—like the perfection of humanity or equinity—where that is not associated with its being in potency insofar as it is in potency. How could it be so associated, when it does not preclude the potency as long as it exists nor the perfection when it occurs? So motion is the first perfection belonging to what is in potency from the perspective of what is in potency.[10]

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9. Hasnawi suggests emending the text's *mā lam yakun* to *mā lam yaskun* <*yakūnu ba'du*>, in which case the sense would be "for as long as the moved thing itself is not at rest, <it is still> potentially something toward which it moves." See Ahmad Hasnawi, "La définition du mouvement dans la *Physique* du *Shifā'* d'Avicenne," *Arabic Sciences and Philosophy* 11 (2001): 219–55, esp. 242.

10. Cf. Aristotle, *Physics* 3.7.201a10–11 and 201b4–5.

أيضاً بالقوة شيئاً آخر غير أنَّه متحرّك. فإنَّ ذات المتحرّك ما لم تكن بالقوة شيئاً مّا يتحرك إليه وأنَّه بالحركة يصل إليه، فإنَّه لا يكون حاله وقياسه عند الحركة إلى ذلك الذي هو له بالقوة كما كان قبل الحركة، فإنّه – في حال السكون قبل الحركةّ – يكون هو ذلك الشيء بالقوة المطلقة، بل يكون ذا قوتين إحداهما على الأمر والأخرى على التوجّه إليه، فيكون له في ذلك الوقت كمالان وله عليهما قوتان. ثم يحصل له كمال إحدى القوتين، ويكون قد بقي بعد بالقوة في ذلك الشيء الذي هو المقصود بالقوتين بل في كليهما، وإنْ كان أحدهما حصل بالفعل الذي هو أحد الكمالين وأولهما. فهو بعد لم يتبرأ عمّا هو بالقوة في الأمرين جميعاً: أحدهما المتوجّه إليه بالحركة، والآخر في الحركة. فإنَّ الحركةّ – في ظاهر الأمرّ – لا تحصل له بحيث لا تبقى قوتها البتة، فتكون الحركة هي الكمال الأول لما بالقوة لا من كل جهة، فإنّه يمكن أنْ يكون لما بالقوة كمالٌ آخر؛ ككمال إنسانية أو فرسية، لا يتعلق ذلك بكونه بالقوة بما هو بالقوة، وكيف يتعلق وهو لا ينافي القوة ما دامت موجودة ولا الكمال إذا حصل؟ فالحركةُ كمالٌ أولٌ لما بالقوة من جهة ما هو بالقوة.

(4) [Motion] has been defined in various obscure ways owing to its obscure nature, since it is a nature whose states do not exist as actually enduring and [since] its existence involves seeing that something [that existed] before [the motion] has ceased, while something new comes to exist. So some of [the Ancients] defined it in term of *otherness,* since it requires that the state become otherwise and is evidence that something is other than what it was.[11] [They] were unaware that what necessarily evidences otherness does not in itself have to be otherness, for not everything that provides evidence of something is [that thing]. Also, if otherness were motion, then everything that is other would be moved, which is not the case. One group said that [motion] is an indefinite nature, and this is appropriate if it is some attribute belonging to it other than a property unique to the species, since there are things such as that other than motion, such as the infinite and time. It is also said that [motion] is a passage from sameness, as if a thing's being the same is for a single attribute to persist with respect to each instant that elapses, whereas the relation of motion's parts and states to something at various times is not the same. So [for example] what is moved has a different place at each instant, and what undergoes alteration has a different quality at each instant. Only exigency and short-sightedness prompted these descriptions; and there is no need for us to go to great lengths refuting and contradicting them, since what we have said is enough for the sound mind to declare them false. It is also said about the definition of motion that it is a process from one state to another or a procession from potency to act.[12] That is mistaken, because the relation of procession and traversal to motion is not like the relation of a genus or what is similar to a genus, but like the relation of synonymous terms, since both of these terms, as well as the term *motion,* apply primarily to change of place and then are extended to states.

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11. The Arabic *ghayrīyah* is clearly translating the Greek *heterotētes,* which Aristotle mentions at *Physics* 3.2.201b20.

12. See, for instance, Themistius, *In Aristotelis physica paraphrasis,* ed. H. Schenkl, vol. 5 (Berlin: George Reimer, 1900), 70.5–13, who made motion a kind of *poreia*—a passage, procession, or traversal.

(٤) وقد حُدّت بحدود مختلفة مشتبهة، وذلك لاشتباه الأمر في طبيعتها؛ إذْ كانت طبيعة لا توجد أحوالها ثابتة بالفعل، ووجودها فيما يرى أنْ يكون قبلها شـــيء قد بطل وشيء مســـتأنف الوجود. فبعضهم حدّها بالغيْرية؛ إذ كانت توجب تغيّراً للحال وإفادة لغير ما كان، ولم يعلم أنَّه ليس يجب أنْ يكون ما يوجب إفادة الغيْرية؛ فهو في نفسه غيْرية، فإنّه ليس كلّ ما يفيد شيئاً يكون هو. ولو كانت الغيْرية حركة لكان كل غَيْرٍ متحرّكاً، ولكن ليس كذلك. وقال قومٌ إنَّها طبيعة غير محدودة، والأحرى أنْ يكون هذاً – إنْ كان صفة لهـــاً – صفة غير خاصّـــة، فغير الحركة ما هو كذلك كاللانهاية والزمان. وقيل إنَّها خروج عن المساواة، كأنَّ الثبات على صفةٍ واحدةٍ مساواة لأمرٍ بالقياس إلى كلّ وقت يمرّ عليه؛ وأنَّ الحركة لا تتساوى نسبة أجزائها وأحوالها إلى الشيء في أزمنة مختلفة، فإنَّ المتحرّك في كلّ آنٍ له أيْنٌ آخر، والمســـتحيل له في كلّ آنٍ كيفٌ آخر. وهذه رســـومٌ إنّما دعا إليها الاضطـــرار وضيق المجال، ولا حاجة بنا إلى التطويل في إبطالها ومناقضتها، فإنَّ الذّهن السليم يكفيه في تزييفها ما قلناه. وأمّا ما قيل في حدّ الحركة أنَّها زوالٌ من حالٍ إلى حال، أو ســـلوكٌ من قوة إلى فعل فذلك غلطٌ؛ لأنَّ نسبة الزوال والسلوك إلى الحركة ليس كنسبة الجنس أو ما يشـــبه الجنس، بل كنســـبة الألفاظ المرادفة إياها، إذ هاتان اللفظتان ولفظة الحركة وضعت أولاً لاستبدال المكان ثم نقلت إلى الأحوال.

(5) At this point, one should know that when one fully understands motion as it should be, then it is seen to be a [single] term having two senses, one of which cannot actually subsist in concrete particulars, whereas the other one can. So, if by *motion* one means the continuous thing intellectually understood to belong to that which undergoes motion, [stretching] from start to end, then what is being moved simply does not have that while it is between the starting and end points. Quite to the contrary, supposedly it has occurred in some way only when what is moved is at the end point; but this continuous intelligible thing has ceased to exist there, and so how can it have some real determinate existence? The fact is that this thing is not really something that itself subsists in concrete particulars. It leaves an impression on the imagery faculty only because its form subsists in the mind by reason of the moved thing's relation to two places: the place from which it departs, and the place at which it arrives. Alternatively, it might leave an impression on the imagery faculty because the form of what is moved, which occurs at a certain place and has a certain proximity and remoteness to bodies, has been imprinted upon it; and thereafter, by [the moving thing's] occurring at a different place and having a different proximity and remoteness, it is sensibly perceived that another form has followed [the first]; and so one becomes aware of two forms together as a single form belonging to motion. [Motion so understood], however, does not determinately subsist in reality as it does in the mind, since it does not determinately exist at the two limits together, and the state that is between the two has no subsistent existence.

(٥) وممّا يجب أنْ يُعلم في هذا الموضع؛ أنَّ الحركة إذا حصل من أمرها ما يجب أنْ يُفهم؛ كان مفهومها إسماً لمعنيين: أحدهما لا يجوز أنْ يحصل بالفعل قائماً في الأعيان، والآخر يجوز أنْ يحصل في الأعيان. فإنَّ الحركة إنْ عُني بها الأمر المتصل المعقول للمتحرّك من المبدأ والمنتهى؛ فذلك لا يحصل البتة للمتحرّك - وهو بين المبدأ والمنتهىّ - بل إنّما يظنّ أنّه قد حصل نحواً من الحصول إذا كان المتحرّك عند المنتهى، وهناك يكون هذا المتّصل المعقول قد بطل من حيث الوجود، فكيف يكون له حصولٌ حقيقيٌ في الوجود؟ بل، وهذا الأمر بالحقيقية ممّا لا ذات له قائمة في الأعيان؛ وإنّما ترتسم في الخيال، لأنَّ صورته قائمة في الذّهن بسبب نسبة المتحرّك إلى مكانين: مكان تركه، ومكان أدْركه، أو يرتسم في الخيال لأنَّ صورة المتحرّك - وله حصولٌ في مكانٍ وقربٍ وبُعْدٍ من الأجسامّ - تكون قد انطبعت فيه. ثم تلحقها من جهة الحسّ صورة أخرى بحصولٍ له آخر في مكانٍ آخر، وقربٍ وبُعْدٍ آخرين، فيشعر بالصورتين معاً على أنّها صورة واحدة لحركة، ولا يكون لها في الوجود حصولٌ قائمٌ كما في الذّهن، إذ الطرفان لا يحصل فيهما المتحرّك في الوجود معاً، ولا الحالة التي بينهما لها وجود قائم.

(6) The thing that exists in actuality and to which the name is appropriately applied—namely, the motion that exists in the mobile—is the intermediate state of [the mobile], when neither is it at the first limit of the traversed distance, nor has it reached the end. Instead, it is at an intermediate limiting point in such a way that at no instant that occurs during the period [that] it passes into actuality is it found occurring at that limiting point such that its occurrence would be as something traversing a certain distance (that is, some interval in the traversal), whatever the period of time you stipulate. 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 at which it is posited, it did not previously exist there nor will it exist there afterwards, unlike [its state at] the points of the two extreme limits. So this intermediacy is the form of motion and is a single description that necessarily entails that the thing is being moved and simply does not change as long as there is something being moved, [although] certainly the points of intermediacy may, by supposition, change. Now, what is being moved is not something intermediate because it is at one limiting point to the exclusion of another; rather, it is something intermediate because it has the aforementioned description, namely that, inasmuch as at any limiting point that you care to choose, neither was it there before [that point], nor will it be there after [that point]. Its having this description is a single state that always follows upon it at any limiting point whatsoever, not being so described at one limiting point to the exclusion of another. This, in fact, is the first perfection, whereas the second perfection happens once it has made the traversal. This form is found in what is being moved and at an instant, because it is correctly said of it at any instant one cares to choose that [the thing being moved] is at some intermediary limiting point before which it was not there and after which it is not there.

(٦) وأمّـا المعنى الموجود بالفعل، الذي بالحري أن يكون الاسـم واقعاً عليه، وأنْ يكون الحركة التي توجد في المتحرّك؛ فهي حالته المتوسـطة حين يكون ليس في الطرف الأول من المسافة ولم يحصل عند الغاية، بل هو في حدّ متوسط بحيث ليس يوجد ولا في آنٍ من الآنات التي تقع في مدة خروجه إلى الفعل حاصلاً في ذلك الحدّ، فيكون حصوله في أي وقت فرضته قاطعاً لمسافةٍ مّا وهو بعد في القطع، وهذا هو صورة الحركة الموجودة في المتحرّك؛ وهو توسّط بين المبدأ المفروض والنهاية، بحيث أيّ حدّ يفرض فيه لا يوجد قبله ولا بعده فيه؛ لا كحدّي الطرفين، فهذا التوسّط هو صورة الحركة، وهو صفة واحدة تلزم المتحرّك ولا تتغيّر الْبتَّة ما دام متحركاً. نعم قد تتغيّر حدود التوسط بالفرض، وليس المتحرّك متوسّـطاً لأنَّه في حدّ دون حدّ، بل هو متوسطٌ لأنّه بالصفة المذكورة؛ وهي أنَّه بحيث أيّ حدّ تفرضه لا يكون قبله ولا بعده فيه، وكونه بهذه الصفة؛ أمرٌ واحدٌ يلزمه دائماً في أي حدّ كان، ليس يوصف بذلك في حدٍ دون حدّ. وهذا بالحقيقة هو الكمال الأول، وأمّآ إذا قُطع فذلك الحصول هو الكمال الثاني، وهذه الصورة توجد في المتحرّك وهو في آنٍ لأنَّه يصح أنْ يقال له في كل آنٍ يفرض أنَّه في حدٍ وسطٍ لم يكن قبله فيه ولا بعده يكون فيه.

(7) The claim that every motion is in time [may be taken in either one of two ways].[13] On the one hand, by *motion* one may mean the state that belongs to something between a given starting point and end point that it reached and at which it then either stops or does not, where this extended state is in time. The existence of this state is in one way like the existence of things in the past, while in another way it is distinct from them. [That] is because, on the one hand, things existing in the past had an existence at some past instant that was present, while, on the other hand, it is not like this, for one understands by this motion *traversal*. On the other hand, one might mean by *motion* the first perfection that we previously mentioned. In this case, its being in time does not mean that it must map onto a period of time—the fact is that it won't lack the occurrence of some traversal (where that traversal will map onto a period of time), and so it won't lack some time's coming to pass—nor [does it imply] that it continuously remains the same during any instant of that time.[14]

(8) One might say that *being in place* and not having been there before or afterwards is a universal intelligible and does not actually exist (and the same holds for the relation to it—namely, the thing that they designate an *instant*). The fact is [the objector might continue] that what actually exists is only being in *this* place, not having been there before or afterward (and, likewise, for the relation to *this* [instance of] being [in place]), whereas the universal (as the practitioners of the discipline have agreed) is determined only by its individual instances and is

13. Avicenna's treatment here may be taken as a response to a possible objection to his view that there can be motion at an instant, for it seems that every motion requires a period of time, and yet an instant is not a period of time. Thus, there apparently cannot be motion at an instant. See Aristotle, *Physics* 6.3.234a24–234b9.

14. Avicenna's point here is that although his conception of motion allows for motion at an instant, it also entails that there will be a traversal (for, according to him, the mobile cannot remain in the same state for more than an instant, and so the motion necessarily involves the transition from one state to another), in which case there will be a period of time that corresponds to this traversal.

(٧) والذي يقال من أنَّ كل حركةٍ ففي زمانٍ؛ فإمّا أنْ يعني بالحركة الحالة التي للشيء بين مبدأ ومنتهى وصل إليه فيقف عنده أو لا يقف؛ فتلك الحالة الممتدة هي في زمان، وهذه الحال فوجودها على سبيل وجود الأمور في الماضي وتباينها بوجهٍ آخر؛ لأن الأمور الموجودة في الماضي قد كان لها وجودٌ في آنٍ من الماضي كان حاضراً ولا كذلك هذا، فتكون هذه الحركة يعني بها القطع. وإمّا يعني بالحركة الكمال الأول الذي ذكرناه، فيكون كونه في زمانٍ لا على معنى أنَّه يلزمه مطابقة الزمان، بل على أنّه لا يخلو من حصول قطع؛ ذلك القطع مطابقٌ للزمان، فلا يخلو من حدوث زمانٍ لا أنَّه كان ثابتاً في كل آنٍ من ذلك الزمان مستمراً فيه.

(٨) فإنْ قال قائل: إنَّ الكون في المكان لم يكن قبله ولا بعده فيه وكذلك الإضافة إليه، والأمر الذي يجعلونه آناً هو أمرٌ كلّي معقول وليس بموجودٍ بالفعل، بل إنّما الموجود بالفعل الكون في هذا المكان ولم يكن قبله ولا بعده فيه، وكذلك الإضافة إلى هذا الكون، والأمر الكلّي إنّما يثبت بأشخاصه ولا يكون شيئاً واحداً موجوداً بعينه، كما اتفق عليه

not one and the same existing thing.[15] We say: Insofar as *being in place* is predicated of many placed things, the issue is undoubtedly as has been described. Insofar as it is predicated of a single placed thing, but not simultaneously, the matter, however, is problematic. [That] is because it is not improbable that a certain generic account is predicated of a single subject at two moments while not remaining one and the same—as, for example, when a black body becomes white. In that case, when the body was black, there was blackness in it, and blackness is a color, and color is, for instance, like a part of blackness, and there is blackness through a specification of what is joined to [color].[16] When it is white, however, we cannot say that the very same thing to which the specification had been accidentally joined remains. Now there is a different specification joined to it. [The situation would], for instance, be like a board existing in a house according to one specification—namely, that it is part of a wall—and then the very same [piece] becoming part of the roof and having a different relation and different specification as a part of the roof. The present case is not like that; rather, an example of it would be, for instance, if the wall and the board in it ceased to be, and then there came to be in the house a new wall and, in it, another board like the previous one. That is because blackness's difference does not cease, while its share in the nature of the genus to which it is joined remains the same. Otherwise, it would not be a species-making difference but instead would be some accident that does not make a species. This has been explained elsewhere.[17]

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15. The objection seems to be this: loosely, the form of motion, according to Avicenna, is a mobile's being at some place for only an instant, where this form will hold of the mobile at every particular instant and at every particular place it happens to be during its motion. The objection, then, is that, for the Aristotelian, such as Avicenna, the form that exists in the world is always of a particular, whereas the single form that is predicated of many exists only in the intellect. Consequently, since Avicenna's form of motion is a single form applying to the mobile at many particular places and many particular instants, it cannot exist in the world but must exist only in the mind; and yet Avicenna claimed that it is this form that, in fact, is found in concrete particulars out in the world.

16. Although not noted in **Y**'s edition, **Z**'s apparatus notes that **T** transposes the text's *qārinuhu mā* so as to read *mā qārinuhu,* which is followed here.

17. Cf. *Kitāb al-madkhal* 1.13 and *Kitāb al-maqūlāt* 1.4.

أهل الصناعة. فنقول: أمّا الكون في المكانّ – من حيث يقال على متمكناتٍ كثيرينّ – فلا شك أنَّ الحال فيه على ما قد وصف، وأمّا من حيث يقال على متمكنٍ واحدٍ ولكن لا مَعاً فالأمر فيه مُشْكل؛ فإنَّه لا يبعد أنْ يكون معنى جنسي يقال على موضوعٍ واحدٍ في وقتين ويكون لم يثبت واحداً بعينه؛ مثل الجسم الأسود إذا ابيضّ، فإنَّ الجسم إذا كان أسود فقد كان فيه سواد، وكان السواد لوناً، وكان اللون كالجزء من السواد مثلاً، وبتخصيصٍ ما قارنه كان سواداً. فلّما ابيضّ فلا يمكننا أنْ نقول إنَّ ذات الشيء الذي كان عرض له مقارنة التخْصيص باقية وقارنه تخصيص آخر كخشبةٍ مثلاً موجودة في بيت على تخصيص أنَّها جزء حائط، ثم صارت هي بعينها جزء سقف ولها إضافة أخرى وتخصيص آخر أنَّه جزء سقفٍ، فإنَّ ذلك ليس كذلك، بل مثله مثل أنْ يُعدم الحائط والخشبة التي فيه، ثم يُحدَث في البيت حائط وفيه خشبة أخرى مثل تلك الخشبة، وذلك لأنَّ السواد لا يبطل فصْله وتبقى حصته من طبيعة الجنس التي كانت مقارنة له بعينها؛ وإلاّ فليس بفصْلٍ منوّع، بل هو عارضٌ لا ينوّع، قد علم هذا من مواضع أخرى.

(9) When the situation is like this, we need to consider [which of the following descriptions best describes it]. On the one hand, it might be that the status of *being in the existing place* with respect to the placed thing is sometimes joined to a specification that it is in *this* existing place and at other times joined to another specification, like color's status. On the other hand, it might not be like that, and instead its status would be like heat that sometimes acts on this and at other times acts on that, or wetness that is sometimes acted upon by this and at other times acted upon by that, while being one and the same; or some other accident that remains one and the same while one specification after another follows upon it.

(10) First, we say that this specification of *this* and *that* in the case of place is not something actually existing in itself, as will become obvious to you later.[18] [That is so] because what is continuous does not have actual parts but is accidentally divided into parts, owing to certain causes that divide the [one] spatial magnitude and so make it [many] spatial magnitudes, according to one of the types of division. Now, what is between the limiting points of that division are also spatial magnitudes, which neither an instant nor a motion encompasses. [At any rate, the motion would not occur] in the manner that we said there is [motion] at an instant; rather, the motion would be like the traversal that maps onto a period of time. Nor would the thing that we call an *instant* actually be many in it. Because of that, it is not actually many except when the spatial magnitude actually is made many. When [the instant] is not actually many and the motion is along the single subject (I mean the spatial magnitude that truly exists and is not numerically many), then [the motion] must be numerically one. It would not be like the state, with respect to color, that exists in the subject during the state when [the subject] is black and the state when it is white, where the state of

18. The reference appears to be 3.2.8–10, where the true nature of continua is given and divisions of the continua are associated with products of the estimative faculty.

(٩) فـإذا كان الأمر علـى هذا ، فلننظر هل حكم الكون فـي المكان الموجود في المتمكن ، تارة مقارناً لتخصيص آنّه في هذا المكان الموجود ، وتارة مقارناً لتخصيص آخر ؛ حكمـه حكم اللون أو ليس كذلك ، بـل حكمه حكم حرارة تارة تفعل في هذا وتارة في هـذا ، أو رطوبـة تارة تنفعل عن هذا وتارة تنفعل عن ذلك وهي واحدة بعينها ، أو عرض آخر من الأعراض يبقى واحداً بعينه ، ويلحقه تخصيص بعد تخصيص؟

(١٠) فنقول : أولاً إنَّ هذا التخصيص بهذا وبذاك في أمر المكان ليس أمراً موجوداً بالفعـل نفسـه ، كما يظهر لك بعد . إذ المتصل لا أجزاء لـه بالفعل ، بل يعرض أنْ يتجزأ لأ سـباب تقسم المسافة فتجعلها بالفعل مسـافات على أحد أنواع القسمة . وما بين حدود تلك القسمة أيضاً مسافات لا يشتمل عليها آنٌ وحركةٌ – على النحو الذي قلنا إنَّها تكون في آنّ – بل الحركة التي على نحو القطْع يكون الزمان مطابقاً لها ، ولا يكون المعنى الذي سـميناه آناً هو متكّثر فيهـا بالفعل ، لأنَّ ذلك لا يتكّثر بالفعل إلاّ بتكّثر المسـافة بالفعل . وإذا لم يكن متكّثراً بالفعل ، وكانت الحركة على الموضوع الواحدّ – أعني المسـافة حقاً موجـودةّ – ولم تكن كثيرة بالعدد ؛ كانت بالضرورة واحدة بالعدد ، ولم تكن على النمط الذي يكون عليه الحال في اللون ووجوده في الموضوع في حال سواده وفي حال بياضه ،

the relation, which specifies both of them, is actually [related] to the subject. [That] is because the motion does not actually require a discontinuity; rather, the continuity persists in such a way that this state accompanying it need not change relative to the subject until some enduring feature individually disappears from it. Indeed, it is the actual relation to an actually differing thing that is different, whereas what is actually one becomes many on account of the relation only when the relation is actually many; but when the spatial magnitude is one by continuity, no difference occurring in it, then a given relation to it does not become different. Because of that, then, the number of something that is one does not differ. When, thereafter, the spatial magnitude accidentally has a certain division and difference—which neither depends upon the motion nor does the motion depend upon it, neither one necessitating nor being necessitated by the other—then the duality that occurs is not essentially but only accidentally many and is by means of the one's relation to the many, where the relation is external, not internal, to the thing itself.

(11) In summary, this state is not the state of color that, in fact, differs not in relation to some external thing, [but] by being joined to the difference of blackness and whiteness. Also, what is undergoing motion is not in a certain place absolutely, becoming many by being many with respect to *this* place and *that* place. [That] is because there is no actual discontinuity with respect to the spatial magnitude of the motion, one place being designated to the exclusion of some other, such that *there* it is possible to be in place absolutely, whether generically or specifically, producing either a species or an individual because of its relation to actually many places.

وحال النسبة التي تخصص كلاً إلى الموضوع بالفعل، لأنَّ الحركة لا توجب بالفعل إنفصالاً بل يستمر الاتصال استمراراً لا يجب معه تغيّر هذه الحال بالقياس إلى الموضوع حتى يعدم منه أمرٌ ثابت بالشخص. فإنَّه إنّما تختلف النسبة بالفعل إلى مختلفٍ بالفعل، وإنّما يكثر الواحد بالفعل تكثّراً من قبل النسبة إذا كانت النسبة متكثّرة بالفعل. وإذا كانت المسافة واحدة بالاتصال لا اختلاف فيها لم تختلف إليها نسبة فلم يختلف بسبب ذلك عدد شيء واحد. ثم بعد ذلك إذا عرض للمسافة قسمة ما واختلاف، ولم يكن ذلك ممّا يتعلق بالحركة ولا الحركة تتعلق به، ولا أحدهما موجب الآخر ولا موجبه، كانت الإثنينية التي تعرض غير متكثّرة بالذات بل بالعرض، ومن طريق نسبة الواحد إلى كثير، وتكون النسبة خارجية غير داخلة في ذات الشيء.

(١١) وبالجملة لا تكون هذه الحال حال اللون الذي هو بالحقيقةّ – لا بالقياس إلى أمرٍ خارجّ – يختلف بمقارنة فصْل السواد والبياض، ولا كون المتحرّك في مكانٍ مطلقاً؛ يصير كثيراً بكونه كثيراً في هذا المكان وذلك المكان، لأنَّه ليس في مسافة الحركة إنفصالٌ بالفعل ومكانٌ معيّن دون مكان، حتى يجوز أنْ يكون هناك كونٌ في المكان مطلقاً؛ جنسياً أو نوعياً يتنوّع أو يتشخص بسبب نسبته إلى أمكنةٍ كثيرة بالفعل.

(12) Know that motion frequently depends upon six things. These are (1) the mobile, (2) the mover, (3) that with respect to which,[19] (4) a *terminus a quo,* (5) a *terminus ad quem,* and (6) time. Its dependence upon the mobile is obvious. Its dependence upon the mover is because either the mobile has motion of itself insofar as it a natural body, or it proceeds from a cause. Now, were the [mobile] to move owing to itself and to no other cause at all, the motion would never cease as long as there existed the selfsame natural body by which it is a mobile; but there are many cases of bodies where the motion ceases but [those bodies] themselves still exist. Also, were the mobile itself the cause of the motion such that it is [both] mover and mobile, the motion would be necessary of itself; but it is not necessary of itself, since the very same natural body exists while it is not undergoing motion. So, if there is found a natural body that is always undergoing motion, it is because it has some attribute additional to its natural corporeality, whether within it (if the motion is internal) or outside of it[20] (if [the motion] is external). In short, the thing itself cannot be a cause of its motion. [That] is because one [and the same] thing is not [both] mover and what is moved, unless it is a mover through its form and is moved through its subject, or [unless] it is a mover when taken together with something and what is moved when taken together with something else. What will make it plain to you that nothing moves itself is that, when the mover produces motion, it does so inasmuch as it [itself] either is being moved or is not. Now, if the mover produces motion when it [itself] is not being moved, then it is absurd that the mover be what is being moved—it is, in fact, different from it. If it produces motion inasmuch as it is being moved and it produces motion through the motion that is actually in it—where the sense of *to produce motion* is to make an actual motion in something that is potentially

19. While the locution *mā fīhi* (literally, "that in which") might seem to refer to the medium through which the mobile passes, Avicenna more regularly uses this locution to refer to the category *in which* there is motion; see par. 24 below.

20. **Y** apparently omits the phrase *in kānat al-ḥarakah laysat min khārij wa-immā khārijan ʿanhu* (if the motion is internal, or outside of it) by homeoteleuton; it appears in **Z**, **T**, and the Latin.

(١٢) واعلم أنَّ الحركة قد تتعلق بأمور ستة وهي: المتحرّك، والمحرّك، وما فيه، وما منه، وما إليه، والزمان. أمّا تعلّقها بالمتحرّك فأمرٌ لا شبهة فيه، وأمّا تعلّقها بالمحرّك فلأن الحركة إمّا أنْ تكون للمتحرّك عن ذاته من حيث هو جسمٌ طبيعي، أو تكون صادرة عن سبب. ولو كانت الحركة له لذاته لا لسببٍ أصلاً؛ لكانت الحركة لا تعدم البتة ما دام ذات الجسم الطبيعي المتحرّك بها موجود، لكن الحركة تعدم عن كثير من الأجسام وذاته موجودة. ولو كانت ذات المتحرّك سبباً للحركة حتى يكون محرّكاً ومتحرّكاً، لكانت الحركة تجب عن ذاتهّ - لكن لا تجب عن ذاتهّ - إذ توجد ذات الجسم الطبيعي وهو غير متحرّك. فإنْ وجد جسمٌ طبيعيٌ يتحرك دائماً فهو لصفةٍ له زائدة على جسميته الطبيعية؛ إمّا فيهّ - إن كانت الحركة ليست من خارج، وإمّا خارجا عنه إنْ كانت عن خارج. وبالجملة لا يجوز أنْ تكون ذات الشيء سبباً لحركته، فإنَّه لا يكون شيءٌ واحدٌ محرّكاً ومتحرّكاً إلاّ أنْ يكون محرّكاً بصورته ومتحرّكاً بموضوعه، أو محرّكاً وهو مأخوذ مع شيء، ومتحرّكاً وهو مأخوذ مع شيء آخر. وممّا بيّن لك، أنَّ الشيء لا يحرّك ذاته؛ أنَّ المحرّك إذا حرّك لم يخلُ إمّا أنْ يكون يحرّك لا بأنْ يتحرّك، وإمّا بأنْ يكون يحرّك بأنْ يتحرّك، فإنْ كان المحرّك يحرِّك لا بأنْ يتحرّك، فمحالٌ أنْ يكون المحرّك هو المتحرّك، بل يكون غيره. وإنْ كان تحرّك بأنْ يتحرّك، وبالحركة التي فيه بالفعل يُحرّك - ومعنى يُحرّك أنّه يُوجِد في شيءٍ متحرّك بالقوة حركة بالفعلّ - فيكون حينئذ إنّما يُخرِج شيئاً من

moved—then, in that case, it would make something pass from potency into actuality through something actually in it—namely, the motion. Now, it is absurd that that thing be actually in it while the very same thing is potentially in it. For example, if it is hot, then how can it itself be becoming hot through its heat? In other words, if it is actually hot, then how can it be potentially hot so as acquire from itself a prior heat, so as to be simultaneously in actuality and potentiality?

(13) In general, the nature of corporeality is a certain nature of a substance having length, breadth, and depth, where this standing is something common that does not require that there be motion. Otherwise, the [motion] itself would be common. Now, if, in addition to this status, there is some other account such that motion follows upon the body—and to the extent that there is a substance possessing length, breadth, and depth and together with which there is some other property on account of which it is moved—then there is a certain principle of motion in it in addition to the condition by which, when it exists, there is a body. That is all the more obvious when [the principle] is external.

(14) In establishing that every mobile has a mover, a dialectical account has been given of which the best explanation is ours: namely, that every mobile is divisible (as will become clear later)[21] and has parts whose corporeal nature does not prevent the estimative faculty from imagining them at rest, and, in fact, if it is prevented, it is so because of something in addition to [the nature of corporeality]. Now, everything that the estimative faculty imagines, [provided that the thing's] nature does not prevent it, is possible in relation to the act of the estimative faculty *qua* that nature. Now, it is not impossible (save conditionally) for the estimative faculty to imagine a part of the mobile *qua* body at rest,

21. See 3.6.7–9.

القوة إلى الفعل بشـــيءٍ فيه بالفعل؛ وهو الحركة. ومحالٌ أن يكون ذلك الشيء فيه بالفعل وهو بعينه فيه بالقوة، فيحتاج أنْ يكْتســبه مثلاً – إنْ كان حاراً – فكيف يسخّن نفسه بحرارته؛ أي إنْ كان حارّاً بالفعل فكيف يكون حارّاً بالقوة حتى يكتســب من ذي قبل حرارة عن نفسه، فيكون بالفعل وبالقوة معاً؟!

(١٣) وبالجملة طبيعة الجســمية طبيعة جوهرٍ له طولٌ وعرضٌ وعمقٌ، وهذا القدر مشترك فيه لا يوجب حركة، وإلاّ لاشترك فيها بعينها، فإنْ زيد على هذا القدر معنى آخر حتى يلزم الجســم حركة وحتى يكون جوهراً ذا طول وعرض وعمق وخاصيّة أُخرى مع المذكور؛ يتحرّك بسبب ذلك فيكون فيه مبدأ حركة زائد على الشرط الذي إذا وجد كان به جسماً، وإنْ كان من خارج؛ فذلك فيه أظهر.

(١٤) وقد قيل في إثبات أنَّ لكل متحرّك محرّكاً؛ قولٌ جدلي. وأحسن العبارة عنه مــا نقــول: إنَّ كلّ متحرّكٍ – كما يتبيّن من بعدّ – منقســمٌ وله أجزاء لا يمنع عن توهمها ساكنة طبيعة الجسمية التي لها، بل إنْ مُنِعَ مُنِعَ لأمرٍ زائد عليها. وكل توهّم شيء لا تمنعه طبيعته؛ فهو من التوهّم الممكن من حيث تلك الطبيعة. فتوهّم جزء المتحرّك ساكناً – من حيث هو جسمٌ – توهّمٌ لا يستحيل إلاّ بشرط، وذلك الجزء ليس هو ذلك الكل. وكل ما

where that part is not that whole, whereas to posit that whatever undergoes motion essentially is at rest is to posit what is not the case. The fact is that it would not rest, especially when [something's undergoing motion essentially] is neither impossible in itself, nor is its resting required with respect to the estimative faculty. So, to posit that each body is in a state of rest makes it necessary that the whole be resting in the way that the cause makes the effect necessary, because, as should be equally clear to you, the state of rest that belongs to the whole is the collection of the states of rest of the parts, when the posited parts or the like occur. Therefore, then, nothing of the bodies undergoes motion essentially.

(15) One might say: [First,] your claim that what is moved essentially does not rest when something else is posited as resting is true only when it is possible to posit that other thing's coming to rest, not [when it is] impossible. That, then, indicates that a certain state of rest necessarily entails that there be something that can rest with it [and] is not impossible. When it is impossible that it rest, it might necessarily follow from positing that it rests that what essentially undergoes motion is resting, despite the fact that it is an absurdity, just as many absurdities follow upon absurdities. So, the truth be told, it is absurd that what essentially undergoes motion should be at rest; however, when some other absurdity is posited, then the absurdity of its resting might necessarily follow. So it is impossible only for it to rest in reality, [not in the estimative faculty]. [Second,] the impossibility of its necessarily being at rest when an absurdity is posited does not, in fact, contradict the truth that its essentially undergoing motion is eliminated as a result of that [absurdity] when it is posited. [That] is because the one is a categorical statement, while the other is a conditional statement. It is as if we were

هو متحرّك لذاته، ففرض ما ليس هو بل هو غير ساكناً، وخصوصاً إذا كان غير محالٍ في نفسه، لا يوجب في الوهم سكونه. وكل جسم فإنَّ فرض سكون الجزء منه يوجب سكون الكلّ، إيجاب العلّة للمعلول؛ لأنَّ السكون الذي للكل هو، كما تبيّن لك، مجموع سكونات الأجزاء إذا حصلت أجزاء تفرض، أو غير ذلك؛ فاذن ولا شيء من الأجسام ‹متحرّكٌ› لذاته.

(١٥) فإنَّ قال قائل: إنَّ قولكم إنَّ المتحرّك لذاته لا يسكن إذا فرض غيره ساكناً؛ إنّما يصح إذا كان فرض سكون ذلك الغير ممكناً غير مستحيل، فيدل ذلك على أنَّ سكون ما يلزم أنْ يسكن معه جائز غير مستحيل. وأمّا إذا كان سكونه مستحيلاً، فيجوز أن يكون فرضه ساكناً يلزم عنه سكون المتحرّك لذاته مع أنَّه محال، كما أنَّ كثيراً من المحالات يلزمها محالات، فحّقٌ أنَّ سكون المتحرّك لذاته محال، لكنه إذا فُرض محالٌ آخر جاز أنْ يلزمه سكونه المحال، فإنَّه إنّما يستحيل سكونه في الوجود، وأمّا لزوم القول بسكونه عند فرض محالٍ لا يمكن، بل عند فرض ما يسقط عنه كونه متحرّكاً لذاته فأمرٌ غير مناقض لذلك

to assume that a hundred is part of ten, in which case wouldn't ten be a hundred and something, even though that is not the case? Because of that, however, it does not necessarily follow that we are wrong to say that ten is not more than a hundred. In the same way, even if the estimative faculty can imagine a state of rest of a part of what is self-moved *qua* body, it might not be the case *qua* part of what essentially undergoes motion and according to its nature. In other words, even if that is possible for it *qua* the nature of its genus, it is not possible for it *qua* its specific nature, and, in fact, it is impossible to assume it—just as it is not impossible that human *qua* animal should fly, whereas it is impossible *qua* human. So, when the former [assumption] is impossible, then one absurd assumption has necessarily followed from another.

(16) We took for granted only that whatever is self-moved would not come to rest through another's coming to rest either when that other's resting exists in reality or [when] the estimative faculty takes the imagining [of the rest] as one of its proper objects[22]—namely, something possible. Concerning the other reason, we too say that when a certain rest that is [itself] absurd is assumed in another, then that which is self-moved might come to rest. To that, we then say that it is not impossible for part of the body *qua* body to rest, and so the impossibility of resting would be on account of something appearing in it other than the corporeality, in which case the cause of motion in any body is something additional to the corporeality; and this we conceded.

22. Literally, "the imagining of the estimative faculty is imagined by the estimative faculty to be an object of the estimative faculty."

الحقّ، لأنَّ ذلك حمليٌّ وهذا شـــرطي. كما لو فرضنا المئة جزء للعشـــرة، أليست العشرة تكون حينئذ مئة وشـــيئاً؟ وذلك ما لا يكون، وليس يلزم لذلك أنْ يكون قولنا إنَّ العشرة ليست أكثر من مئة باطلاً. وكذلك؛ فعسى أن المتحرّك بذاتهّ – وإنْ أمكن توهّم سكون جزئه من حيث هو جسمّ – فليس يمكن من حيث هو جزء المتحرّك لذاته وعلى طبيعته؛ أي وإنْ كان يمكن ذلك له من حيث طبيعة جنسه، فليس يمكن ذلك له من حيث طبيعته الخاصّة، بل يستحيل فرضه. كما أنَّ الإنسان من حيث هو حيوان لا يمنع أنْ يكون طائراً؛ ويمتنع من حيث هو إنســـان، فإذا كان ذلك ممتنعاً فقـــد لزم فرض المحال من فرض المحال.

(١٦) ونحن إنّما نسلّم أنَّ ما هو متحرّك ‹بذاته› فلا يسكن بسكون غيره إذا حصل ســـكون غيره في الوجود؛ أو تُوهّم بوهم المتوهّم؛ أي الممكن. وأمّا على وجهٍ آخر فإنّا نقول: إنَّه قد يلزم أنْ يســـكن المتحرّك بذاته إذا فُرض ســـكون محالٍ في غيره؛ فنقول في جواب ذلك إنَّ جزء الجسمّ – من حيث هو جسمّ – لا يمتنع عليه السكون، فإنَّ امتنع السكون يكون لمعنى عارض عليه غير الجسمية، فإذا كان كذلك، فيكون علّة الحركة في كل جسم أمراً زائداً على الجسمية وهذا نسلّمه.

(17) Still, one might rightly ask us: What forced you to focus on the *part* (given that this is the key premise of the argument) and not just stipulate that it is not impossible for the estimative faculty to imagine the whole *qua* body at rest, in which case it happens to have some account in addition to the corporeality by which the self-moved necessarily moves such that it is impossible to posit the [state of] rest? If the former argument works for you, this one should all the more so. If the intention of the argument is different from this one, [the objector continues] (as if the original speaker in no way believes or means it—its being merely grandiloquence on your part for the sake of his argument) and he himself neither believes nor considers this assumption possible concerning it *qua* body[23] and, rather, says that anything that must be at rest should the estimative faculty imagine something else's being at rest is not moved essentially, and so this is not granted, but, rather, the case is as we explained when initially setting out the problem, then [given all that] something might very well undergo motion on account of itself. Moreover [the objector continues] the estimative faculty imagines a certain absurdity and then, from the imagining of the estimative faculty, it accidentally becomes something that is not self-moved. That absurdity, however, does not entail that the status of [what essentially undergoes motion] changes as a result of a certain absurdity that necessarily follows upon the former absurdity. In fact, what is moved essentially might not be such that, should the estimative faculty imagine a part of it at rest, it comes to rest, but, rather, in that case, it would necessarily cease to be. If it is said, 'This is absurd!' it is responded, 'Yes, but it is an absurdity that necessarily follows upon a prior absurdity.'

23. Reading *min haythu huwa jism* with **Z**, **T**, and the Latin for **Y**'s (inadvertent) *min haythu haur jism* ("*qua* destruction of a body"?).

(١٧) لكن بالحري أنْ يقول لنا قائل: فما اضْطرّكم إلى أنْ اشـــتغلتم بالجزء، إنْ كان مأخذ الاحتجاج هو هذا، ولم تنصّوا في أول الأمر على الكلّ أنّه إذا تُوهم ساكناً – من حيث هو جســـمٌ – لم يســـتحل، فقد عرض له معنى أريد من الجسمية به صار متحرّك الذات واجب الحركة فيســـتحيل فرض السكون؟ وإنْ كان ذلك الاحتجاج يكفيكم؛ فهذا أكفـــى. وإنْ كان الغرض في الاحتجاج غير هذا الغرض، وكأنْ لم يذهب إليه القائل الأول ولا أراده بوجهٍ، وإنّما هو تحســـينٌ منكم لكلامه، وهو نفســـه لـــم يذهب إلى إمكان هذا الفرض فيهّ – من حيث هو جســـمٌ – ولا اعتبر الإمكان، بل قال: إنَّ كل ما كان يُوهم غيره ســـاكناً يوجب كونه ساكناً، فليس متحرّكاً لذاته. فليس هذا مسلّماً، بل الأمر على ما أوضحناه في التقرير الأول للشّك. فإنَّه يجوز أنْ يكون الشيء متحرّكاً لذاته، ثم يُتوهم محـــالٌ فيعرض مـــن توهمه أنْ يصير هو غير متحرّك بذاته، ولا يلـــزم ذلك المحال أنْ يتغيّر حكمـــه بمحال يلزم ذلك المحال، بـــل يجوز أنْ لا يكون المتحرّك لذاتـــه، بحيث إذا تُوهم جزؤه ســـاكناً سكنَ لكنه حينئذ يجب عدمه. فإنْ قيل إنَّ هذا محال، قيل نعم؛ وقد لزم ‹محال› محالاً فُرض قبله.

(18) This is a position for which I have no convincing response, although perhaps someone else might. I suspect that the key premise of the argument is not wholly forced into this, and that is because, if this premise is conceded, then bringing about rest is either absurd or not, and then the argument [follows]. The premise that I mean is "anything whose motion is impossible on account of positing a rest in something else is not something moved essentially," which is different from "Anything whose motion is impossible on account of positing a rest in something else is either absurd or not." Even if we were to say, "Anything whose motion is impossible on account of positing an absurdity in something else is not something essentially undergoing motion" (in which case there would be agreement about that), our argument and inference would [still] be valid. Still, the issue concerns the truth of this premise. So, let someone else who is particularly impressed by this argument try to show that this premise is true, and perhaps he will have better luck with this difficulty than we did.

(19) Another doubt [can be raised] against this argument—namely, that even if what is continuous can be supposed to have parts, the estimative faculty cannot imagine those parts as either resting or undergoing motion except by supposition because, as long as they are parts of what is continuous, they neither possess a *where* nor a position except by supposition, which is something that will be explained later.[24] So, if the estimative faculty's act of imagining a state of rest in the part turns out true only when there is an actual discontinuity, then either this argument does not have a relevant key premise or it requires that the estimative faculty imagine a division and then simultaneously a rest. If your estimative faculty were to imagine a rest at some supposed point, while there

24. See 3.2.8–10.

(١٨) فهذا القول ممّا ليس يحضرني له جواب أقنع به. ولا يبعد أنْ يكون عند غيري له جوابٌ، وأظنّ أنَّ مأخذ الاحتجاج لا يلجيء إلى هذا كل الإلجاء، وذلك إنْ كانت هذه المقدمة مسلّمة كان التسكين محالاً أو غير محال. ثمَّ الاحتجاج. أعني بالمقدمة قولنا كلّ ما تمتنع حركته لفرض سكونٍ في غيره فليس متحرّكاً لذاته، وهذا غير قولنا كل ما تمتنع حركته لفرض سكونٍ في غيره محال أو غير محال، حتى لو قلنا كل ما يمتنع أنْ يتحرّك لفرض محالٍ في غيره لم يكن متحرّكاً لذاته؛ فسلّم ذلك، لصحّ لنا القول والقياس، ولكن الشأن في صحة هذه المقدمة؛ فليجتهد غيرنا من المتعصبين لهذا الاحتجاج في تصحيح هذه المقدمة، فربما تيسرت له هذه المتعسرّة علينا!

(١٩) وعلى هذا الاحتجاج شكٌ آخر؛ وهو أنَّ المتصلّ – وإنْ كان يمكن أنْ تُفرض له أجزاءٌ – فلا يمكن أنْ تتوهم تلك الأجزاء ساكنة أو متحرّكة إلاّ بالفرض لأنَّها غير ذات أيْنٍ ما دامت أجزاء المتصل إلاّ بالفرض، ولا ذات وضْع؛ وهذا شيء سيبين بعد. فإذا كان توهّم السكون في الجزء ممّا لا يتحقّق توهّماً إلاّ وينفصل بالفعل، لم يكن لهذا الاحتجاج مأخذ سديد، أو يدّعي توهّم فصلٍ ثم إسكانٍ معاً. ولو أنّك توهّمتَ في الجزء المفروض

is a continuous [motion], it would have been taking *rest* as an equivocal term, whereas *rest* in its [proper] definition cannot be imagined in that part by the estimative faculty any more than absurd things can altogether be imagined in the intellect and the imagery faculty. So, let someone else who is interested in confirming this key premise puzzle over it and take over the responsibility from us.

(20) Motion's dependence upon the termini *a quo* and *ad quem* is derived from its definition because [motion] is a first perfection occurring in something that has a second perfection by which it terminates at [that second perfection], as well as having a state of potentiality that precedes the two perfections—namely, the state that the first perfection leaves behind when it is directed toward the second perfection. Sometimes the termini *a quo* and *ad quem* are two contraries. Sometimes they are between two contraries, but one is nearer to one contrary and the other is nearer to the other contrary. Sometimes they are neither contraries nor between contraries, but belong to a class of things that have a relation to contraries or opposites in a certain way such that they do not simultaneously occur together, such as the states that belong to the celestial sphere. [That] is because the point from which the motion begins is not contrary to where it ends, but neither do they simultaneously occur together. Sometimes, that which is at the termini *a quo* and *ad quem* remains there for a time so that there is a state of rest at the two limits. Sometimes ([such as] when [the terminus] is actually by supposition, like a limiting point), it occurs at it only for an instant—as in the case of the celestial sphere, for its motion leaves behind a certain starting point while being directed toward a certain end, and yet it stops at neither one.

سكوناً وهو متصل، فقد توهمتَ معنى مشاركاً للسكون في الإسم، وأمّا السكون بحدّه فــلا يمكــن أنْ يتوهم في ذلك الجزء، كما لا يمكن أن تتوهم الأمور المحالة في العقل والخيال جميعاً. فليكن هذا المأخذ ممّا يسأل ‹عنه› غيرنا ممّن يقف على تحقيقه، أنْ ينوب عنّا فيه.

(٢٠) وأمّا تعلّق الحركة بما منه وبما إليه فيســتنبط من حدّها لأنَّها أول كمالٍ يحصل لشيءٍ له كمال ثانٍ ينتهي به إليه وله حالة القوة التي قبل الكمالين؛ وهي الحالة التي الكمال الأول تركهــا وتوجّه إلى الكمال الثاني. وربّمــا كان ما منه وما إليه ضدّين؛ وربّما كانا بين الضدّيــن، لكن الواحد أقرب من ضدّ والآخر أقرب من ضدّ آخر. وربّما لم يكونا ضدّين ولا بين ضدّين؛ ولكن كانا من جملة أمورٍ لها نســبة إلى الأضداد وأمور متقابلة بوجهٍ مّا فلا تجتمع معاً كالأحوال التي للفلك؛ فإنّه لا يتضادّ مبدأ حركة منه لمنتهاها، لكنها لا تجتمع معــاً. وربّما كان ما منه وما إليــه ممّا يثبت الحصولان فيهما زماناً حتى يكون عند الطرفين ســكونٌ، وربّما لم يكن الحصول فيه إذا فُرض كأنَّه حدٌّ بالفعل إلاّ آناً كما للفلك؛ فإنَّ في حركته ترك مبدأ وتوجهاً إلى غاية، لكن لا وقوف له عند أحدهما.

(21) Here, someone might say that, according to your school of thought,[25] the limiting points in a continuum do not actually exist but only potentially exist, becoming actual only either by a certain dividing (whether like touching or being parallel) or by some accident or supposition, as we shall explain.[26] So, then, as long as one of these [delimiting] causes is not actual, there is no given starting or ending point; and as long as there is no determinate start or end from which the motion begins and at which [it ends], then neither is there motion. So, as long as the celestial sphere does not have a certain cause of being delimited, it does not undergo motion, which is absurd.

(22) We say in response that motion has the end and starting points through a certain sort of actuality and potentiality, where potentiality is taken in two respects: proximate in actuality and remote in actuality.[27] For example, the mobile, at any given moment that it is being moved, has a certain limiting point in proximate potency (which is up to you to posit) and at which it has arrived at some instant (which you posit). So [what is undergoing the motion] has that [limiting point], [even] while in itself it is truly in potentiality. It becomes an actual limiting point by the occurrence of some actual positing and actual dividing, but with the former it does not stop but continues on. Now, a future limiting point (inasmuch as it is a limiting point of motion) cannot be designated as actually such either by some positing or by some actual delimiting cause; rather, in order to have this description, it requires that the distance up to it be completely covered. I mean that here there is that which you can posit as a starting point or as an ending point and, in general, some limiting point that you posit with respect to the motion. So, any of the celestial sphere's motions to which you can point at some determinate time or come to know has that [starting or ending point] by supposition.

25. Cf. Aristotle, *Physics* 8.8.263a23–b9.

26. See 3.2.8–10.

27. For a discussion of Avicenna's analysis of circular motion as presented in this passage, see Jon McGinnis, "Positioning Heaven: The Infidelity of a Faithful Aristotelian," *Phronesis* 51 (2006): 140–161, esp. §4.

(٢١) ثم لقائل أنْ يقول ؛ إنَّ الحدود في المتصل على مذهبكم ليست موجودة بالفعل بـل بالقوة ، وإنّما تصير بالفعل إمّا بقطعٍ وإمّا كمماسّـة أو مـوازاة أو بعرضٍ أو بفرضٍ كما سنذكره . فيكون إذنّ – ما لَمْ يكن أحد هذه الأسباب بالفعلّ – لا يكون مبدأ ولا منتهى . ومـا لَمْ يكن مبـدأ ولا نهاية معينيّن عنه تبتديء الحركة أو تنتهـي إليه ؛ لا تكون حركة ، فالفلك ، ما لَمْ يكن له سببٌ محدود ، لا يكون متحرّكاً ، وهذا محال .

(٢٢) فالـذي نقوله في جوابه : إنَّ النهاية والمبدأ تكون للحركة بضرب فعلٍ وبضرب قـوةٍ ، والقوة تكون على وجهين : وجهٌ قريبٌ من الفعل ووجهٌ بعيدٌ من الفعل ، مثال ذلك ؛ إنَّ المتحرّك في حال ما يتحرّك له بالقوة القريبة حدٌّ ، ولك أنْ تفرضه ، وقد وصل إليه في آنٍ تفرضه . فيكون ذلك له وفي نفسـه بالحقيقة بالقـوة ، وإنّما يصير بالفعل حدّاً بحصول الفرض بالفعل والقطع بالفعل ؛ ومع ذلك لا يقف بل يسـتمر . وحدّ مستقبلٍ لا يمكنّ – من حيث هو حدّ حركةٍ – أنْ يُجعل بالفعل حدّ حركة بفرضٍ أو بسـببٍ محدّدٍ بالفعل ، بل يحتاج أنْ يستوفي المسافة إليه حتى يصير بهذه الصفة ، أعني أنْ يكون هناك ما يمكنك أنْ تفرضـه مبدأ أو يمكنك أنْ تفرضه منتهى ، وبالجملة حدّاً تفرضه من الحركة . فكل حركةٍ من حركات الفلك تشـير إليها في وقتٍ معيّنٍ وتحصّلها فإنَّها يفترض لها ذلك ، فتارة يفرض

So, sometimes the starting and ending points are distinct. In other words, they are two different points, both being limiting points of that which is posited of the motion during that time that you determine.[28] At other times, one and the same point is a starting and ending point—a starting point because the motion is from it and an ending point because the motion is toward it—but that [designation] belongs to it at two [different] times.[29] So, motion's dependence upon a starting or ending point (whether [the motion] is in [the category of] place or position) is that, when you designate a given motion or distance, an independent starting and ending point become designated along with that. The dependence upon the starting and ending point of what undergoes local motion is that it has that either in actuality or in potentiality proximate to actuality, according to whichever of the two works, since we have not stipulated that a particular one of them be assigned to it. In short, [motion] depends upon the starting and ending point according to this form and the aforementioned condition, not inasmuch as both are actual.

(23) Next, it is commonly accepted that motion, moving [something], and being moved are a single thing. When it is taken with respect to itself, it is counted as *motion;* if it is taken in relation to that with respect to which [there is motion], it is called *being moved;* and if it is taken in relation to that from which it results, it is called *moving* [*something*]. We should, however, investigate and consider this position with more precision than is commonly done. Now, we say that there is something apart from this form, and that is because being moved is a state that what is moved has, whereas motion is something related to what is moved inasmuch as motion has a certain state in it that what is moved does not have. [That] is because motion's relation to matter means

28. For example, one might designate the Sun's rising in the east and then setting in the west as beginning and ending points, in which case the Sun's motion would have two distinct termini, but only by supposition.

29. For example, one might designate the Sun's being immediately overhead as a single point by which to mark off solar motion; and, in fact, a sidereal day corresponds to the amount of time between the Sun's being immediately overhead and its subsequent return to that position.

المبدأ والمنتهى متباينيّ – أي نقطتين هما حدّا ذلك المفروض من الحركة في ذلك الوقت الذي تعيّنه، وتارة يكون نقطة واحدة هي بعينها مبدأ ومنتهى. أمّا مبدأ فلأنَّ الحركة عنها، وأمّا منتهى فلأنَّ الحركة إليها؛ ويكون ذلك لها في زمانين. فالحركة المكانية والوضعية تعلّقها بالمبدأ أو المنتهى هو أنّك إذا عيّنت حركة ومسافة تعيّن – ومع ذلك – مبدأ ومنتهى قائم بنفسه. والمتحرّك المكاني تعلّقه بالمبدأ والمنتهى هو أنْ يكون ذلك له بالفعل أو بالقوة القريبة من الفعل؛ ذلك على أي وجهٍ كان منهما جازَ، فإنّا لم نشترط الوجه المعيّن فيه منهما. وبالجملة فإنَّها تتعلّق بالمبدأ والمنتهى على هذه الصورة والشرط المذكور، لا من حيث هما بالفعل.

(٢٣) ثم من المشهور أنَّ الحركة والتحريك والتحرّك ذات واحدة، فإذا أُخذت باعتبار نفسها فحسب كانت حركة، وإنْ أُخذت بالقياس إلى ما فيه سُمّيت تحرّكاً، وإنْ أُخذت بالقياس إلى ما عنه، سُمّيت تحريكاً. ويجب أنْ نتحقّق هذا الموضع ونتأمله تأمّلاً أدقّ من هذا المشهور فنقول: إنَّ الأمر بخلاف هذه الصورة؛ وذلك لأنَّ التحرّك حال للمتحرّك، وكون الحركة منسوبة إلى المتحرّك بأنَّها فيه حالٌ للحركة لا للمتحرّك. فإنَّ نسبة الحركة إلى المادة في المعنى، غير نسبة المادة إلى الحركة وإنْ تلازما في الوجود. وكذلك التحريك حالٌ للمحرّك لا للحركة، ونسبة الحركة إلى المحرّك حال للحرك لا للمحرّك. فإذا كان كذلك؛ كان التحرّك نسبة المادة إلى الحركة لا الحركة منسوبة إلى المادة، ولم يكن

something different from the matter's relation to motion, even if in reality the two mutually entail one another. Likewise, moving [something] is a state that the mover has that motion does not have, and the relation of motion to the mover is a state that motion has that the mover does not. Consequently, being moved is matter's relation to motion, not the motion as something related to matter. Also, being moved and moving [something] are not motion in the subject. There is no question that motion's being related to matter as well as to a mover are intelligible concepts, yet these names do not indicate these concepts.

(24) Motion's dependence upon the categories *with respect to which* there is motion does not refer to the subject of [the motion], but to the thing that is the goal that gives rise to the motion. [That] is because the mobile, while it is being moved, is described as situated in between two things, one that was left behind and another that is the goal (whether a *where,* a quality, or the like), provided that the motion does not change the thing all at once. Therefore, [the mobile] is something in between two limiting points, both belonging to a certain category (whether *where,* quality, or the like) and so motion is said to be with respect to that category. This will become clearer for you after you learn motion's relation to the categories.[30]

30. See 2.3.

التحرّك هو الحركة بالموضوع، وكذلك لم يكن التحريك هو الحركة في الموضوع. ولا يناقش في أنْ يكون كون الحركة منسوبة إلى المادة معنى معقولاً، وكذلك إلى المحرّك، لكن هذين المعنيين لا يدل عليهما بهذين الإسمين.

(٢٤) وأمّا تعلّق الحركة بما فيه الحركة من المقولات فليس يعني به الموضوع لها، بل الأمر الذي هو المقصود حصوله في الحركة؛ فإنَّ المتحرّك عندما يتحرّك موصوف بالتوسّط بين أمرين: أمرٌ متروك وأمرٌ مقصود؛ إمّا أيْنٌ أو كيفٌ أو غير ذلك، إذ كانت الحركة تغيّر الشيء لا دفعة، فاذن يكون متوسطاً بين حدّين ولهما مقولة؛ إمّا أيْنٌ وإمّا كيفٌ وإمّا غير ذلك، فيقال إنَّ الحركة في تلك المقولة، وقد تزداد لهذا بياناً بعد أنْ تعرف نسبة الحركة إلى المقولات.

Chapter Two

The relation of motion to the categories

(1) There has been a disagreement about motion's relation to the categories. Some said that motion is the category of passion, while others said that the term *motion* applies purely equivocally to the kinds under which it falls.[1] Still others said that *motion* is an analogical term similar to the term *existence,* which includes many things neither purely univocally nor equivocally, but analogically;[2] however, [they continued,] the kinds primarily included under the terms *existence* and *accident* are the categories [themselves], whereas the kinds included under the term *motion* are certain species or kinds from the categories. So there is a stable *where* and a flowing *where* (namely, motion with respect to place); there is a stable quality and a flowing quality (namely, motion with respect to quality—that is, alteration); there is also a stable quantity and a flowing quantity (namely, motion with respect to quantity—that is, augmentation and diminution). Some of them might even take this position to such an extreme as to say that there is also a stable substance and a flowing substance (namely, motion with respect to substance—that is, generation and corruption). They said that flowing quantity is one of the species of

1. Both Philoponus (*In Phys.* 349.5–6) and Simplicius (*In Aristotelis Physicorum,* ed. H. Diels (Berlin: G. Reimer, 1882), 403.13–23 (henceforth Simplicius, *In Phys.*) mention that Alexander of Aphrodisias argued that *motion* is an equivocal term. While Alexander's commentary on the *Physics* is no longer extant, it was translated into Arabic and may very well have been one of the sources for Avicenna's present discussion. Another likely sources is Plotinus *Enneads* 6.1.15ff. and 3.20ff.

2. The Arabic *tashkīk* literally means "ambiguous"; however, Avicenna consistently contrasts this term with "equivocal" and "univocal" in a way reminiscent of Aristotle's *pros hen* equivocation and anticipating Aquinas's theory of analogy (see part 6 below). As for the specific group under discussion, I have not been able to identify any source where *motion* is described using the language of *tashkīk,* or even as a "flow" (*sayyāl*), a term that this group also apparently used to describe motion.

<الفصل الثاني>

في نسبة الحركة إلى المقولات

(١) إنَّه قد اُختلف في نسبة الحركة إلى المقولات، فقال بعضهم إنَّ الحركة هي مقولة أنْ ينفعل، وقال بعضهم إنَّ لفظة الحركة تقع على الأصناف التي تحتها بالاشتراك البحْت، وقال بعضهم بل لفظة الحركة لفظة مشكّكة مثل لفظة الوجود تتناول أشياء كثيرة لا بتواطؤ ولا باشتراك بحْت، بل بالتشكيك. لكن الأصناف الداخلة تحت لفظة الوجود والعرض دخولاً أولياً هي المقولات، وأمّا الأصناف الداخلة تحت لفظة الحركة فهي أنواعٌ أو أصنافٌ من المقولات. فالأين منه قارّ ومنه سيّال هو الحركة في المكان، والكيف منه قار ومنه سيّال هو الحركة في الكيف أي الاستحالة، والكمّ منه قارّ ومنه سيّال هو الحركة في الكمّ، أي النمو والذبول، وربّما تمادى بعضهم في مذهبه حتى قال: والجوهر منه قارّ ومنه سيّال وهو الحركة في الجوهر أي الكون والفساد. وقالو إنَّ الكمّ السيّال نوعٌ من أنواع الكمّ

continuous quantity because it is possible to find a common limiting point in it, but [flowing quantity] is distinct from the other in that it has no position, whereas continuous [quantity] has a position and stability. Also, they said that blackening and blackness are a single genus, except that blackness is stable, while blackening is not. In short, motion is the flow in each genus. Some of them said: When [motion], however, is related to the cause in which it is, then it is the category of passion, or, [when related] to the cause from which it results, it is the category of action, whereas one group applied this consideration specifically to flowing quality, deriving from it the categories of action and passion.

(2) The proponents of this school of thought—I mean, the doctrine of the flow—disagreed. Some of them made the distinction between blackness and blackening one involving a species-making difference, while others distinguished it by something other than a species difference, since, [this second group argued,] it is like something that is added to a given line, so that the line becomes larger without thereby departing from its species. The first group, [in contrast,] argued: Blackening *qua* blackening is a flowing blackness, and it does not have this [flowing] as something outside of its essence *qua* blackening; and so, then, it must be distinguished from the blackness that remains the same by a species difference. We can show the falsity of both of these arguments: the first is undermined by number, and the second by whiteness and the fact that it is not something outside of the essence of whiteness *qua* whiteness without there being a species difference.

المتصل لا مكان وجود الحدّ المشـــترك فيه، إلاّ أنّـــه يفارقه بأنّه لا وضْع له وللمتصل وضْعٌ واســـتقرار. قالا ‹وا› والتسوّد والسواد من جنس واحد إلاّ أنَّ السواد قارّ والتسوّد غير قارّ، وبالجملة فإنَّ الســـيّال في كلّ جنْس هو الحركة. وقال بعض هؤلاء لكنها إذا نســـبت إلـــى العلّة التي هي فيها كانت مقولـــة أَنْ ينْفعل، أو إلى العلّة التي هي عنها صارت مقولة أنْ يفعل. وقومٌ خصّوا هذا الاعتبار بالكيْف السيّال وأخرجوا منها مقولتي يفعل وينفعل.

(٢) واختلف أصحاب هذا المذهب، أعني القول بالسيّال، فمنهم مَنْ جعل الافتراق الذي بين السواد والتسوّد افتراقاً فصْلياً منوّعاً ومنهم مَنْ جعله افتراقاً بمعنى غير فصْلي، إذ هو كزيادةٍ تعرض على خطٍ فيصير خطّاً أكبر ولا يخرج به ‹عن› نوعه. وقال الأولون، بل التســـوّد بما هو تســـوّدٌ هو سوادٌ ســـيّال، وليس هذا له أمراً خارجاً عن هوّيته بما هو تســـوّدٌ، فهو إذن يمايز الســـواد الثابت بفْصل. ويمكن أنْ نبيّن بطلان الحجتين جميعاً: أمّا الأولى فتنتقـــض بالعدد، وأمّا الثانية فبالبياض وكونه أمراً غير خارجٍ عن هوّية الأبيض بما هو أبيض من غير أنْ يكون فصلاً.

(3) There is also a third school of thought[3]—namely, of those who say that the kinds under which the term *motion* falls (even if it is an analogical [term], as was said) are not species of categories in the aforementioned way. So, blackness is not a species of quality, and locomotion is not a species of *where.* Indeed, motion does not occur in the [category of] quality in such a way that quantity is its genus or, likewise, its subjects; for all motions are only in the substance *qua* subject, and there is neither difference nor distinction among them in this sense. Still, when [the subject's] substantiality is replaced, then that replacement is called a motion with respect to substance as long as it is in process; and if it is with respect to *where,* then it is called a motion with respect to *where.* In general, if the termini *a quo* and *ad quem* are a quality, the motion is with respect to quality, and if [they are] a quantity, the motion is with respect to quantity. Accordingly, *motion* is not said univocally, for *perfection,* taken as a genus in the description of [motion *qua* first perfection of the potential as such], belongs to the class of terms similar to *existence* and *unity.* Now, you know that quantity, quality, and *where* are not included under a single genus; and when these categories are neither included under a single genus nor does the first perfection's relation to them contain them in the manner of a genus, we have no way to make motion a generic concept. Instead, this description includes a certain concept, something like which only an analogical term will indicate.

(4) Concerning this topic of inquiry, these are the three positions that need to be considered. I do not like the middle position and, in fact, detest its claim that blackening is a quantity and augmentation a quality. It is not right that blackening is a blackness that is undergoing intensification; rather, it is an intensification of its subject with respect to its blackness. That is because, when you assume that some blackness has

3. The position mentioned here has some affinities with that of Abū Bishr Mattá; see the Arabic *Physics,* 179.

(٣) وهـا هنا مذهبٌ ثالـثٌ؛ وهو مذهب مَنْ يقول إنَّ لفظـة الحركة، وإنْ كانت مشـكّكة كما قيل، فإنَّ الأصناف الواقعة تحتها ليسـت أنواعاً من المقولات على السبيل المذكورة، فلا التسوّد نوعٌ من الكيف ولا النقلة نوعٌ من الأين، فإنَّ وقوع الحركة في الكيف ليـس علـى أنَّ الكيف جنسٌ لها ولا أيضاً موضوعٌ لها، فـإنَّ جميع الحركات إنّما هي في الجوهر من حيث هي في موضوع لا غير ولا تمايز بينها في هذا المعنى. ولكن إذا تبدّلتْ جوهريته سـمي ذلك التبدّل - ما دام في السـلوكّ - حركة في الجوهر، وإنْ كان في الأين سـميّ حركة في الأين. وبالجملة إنْ كان ما عنه وما إليه كيفاً فالحركة في الكيف، وإنْ كان كمّـاً فالحركة في الكمّ. وتقال الحركة على هذه لا بالتواطؤ، فإنَّ الكمال المأخوذ في رسـمها أخذ الجنْس هو من الألفاظ المجانسـة للوجود والوحدة، وأنت تعلم أنَّ الكمّ والكيف والأين ليست داخلة تحت جنس واحد. وإذا لم تكن هذه المقولات داخلة تحت جنسٍ واحد ولا نسـبة الكمال الأول إليها أيضاً أمراً حاصراً إيّاها حصر الجنس؛ لم يكن لنا سبيل إلى أنْ نجعل الحركة معنى جنسياً؛ بل هذا الرسم يتناول معنىً إنّما يدلّ على مثله لفظٌ مشكّكٌ لا غير.

(٤) والمذاهـب الملتفت إليها في هـذا المطلوب هي هذه <الثلاثة>، وليس يعجبني المذهب الأوسط، بل أستكره ما يقال به من أنَّ التسوّد كيفية وأنَّ النمو كميّة. وبالحري أنْ لا يكون التسوّد سواداً يشتدّ، بل اشتداد سوادٍ، بل اشتداد الموضوع في سواده؛ وذلك لأنَّه لا يخلو إذا فرضنا سـواداً اشـتدّ إمّا أنْ يكون ذلك السـواد بعينه موجوداً - وقد

undergone intensification, then either the very same blackness exists and with the intensification there happened to be a certain increase, or [the blackness] does not exist. On the one hand, if it does not exist, then it is absurd to say that what does not exist but has passed away is this thing right now undergoing intensification, for its having an existing description requires that it be something existing that remains the same. Now, if the blackness remains the same, then there is no flow (that is, a flowing quality), as they maintained. Instead, it is something always remaining the same to which there accidentally belongs a certain increase whose amount does not remain the same—and, in fact, at each instant there is some other amount—in which case this continuous increase is the motion, not the blackness. So motion is either the intensification of the blackness and its flow, or the intensification of the subject with respect to blackness and its flow with respect to it; it is not the intensifying blackness. It is obvious from this that the intensification of blackness brings about [the blackness's] departure from its original species, since it is impossible to point to whatever of [the blackness] that exists, which while conjoined to it increases it. The fact is that any limiting point that it reaches is a simple quality; however, people name all the limiting points *black* that resemble a given one and anything resembling white (that is, what is close to it) *white*. Absolute blackness is one [species] (which is an obscure limit), and the same holds for [absolute] whiteness and the rest, such as what is a mix [of the two]. Now, what is a mix [of the two] is not one of the two extreme limits—it shares nothing in common in reality but the name. Only different species arise between the two extremes, but, owing to the proximity to one of the two limits, it is accidentally associated with [one of the extreme limits]. Indeed, sometimes sensation does not distinguish between the two, and so we suppose that they are single species, when that is not the case. This will be confirmed in the universal sciences.[4]

4. While there seems to be little question that "universal sciences" here refers to the *Ilāhīyāt*, it is not clear what the exact reference is. For now, see 3.7, where Avicenna does return to the issue of what is involved in the change of a specific color.

عرضتْ له عند الاشتداد زيادةٌ – أو لا يكون موجوداً . فإنْ لم يكن موجوداً فمحالٌ أنْ يقال إنَّ ما قد عدم وبطل هو ذا يشـــتدّ فإنَّ الموصوف بصفةٍ موجودة يجب أنْ يكون أمراً موجوداً ثابت الذات . وإنْ كان السواد ثابت الذات فليس بسيّالٍ كما زعموا من أنَّه كيفية ســـيّالة بـــل هو ثابت على الدّوم ، تعرض عليه زيادة لا يثبـــت مَبْلغُها ، بل يكون في كل آنٍ مبلغ آخر ؛ فتكون هذه الزيادة المتصلة هي الحركة لا السواد . فاشتداد السواد وسيلانه أو اشـــتداد الموضوع في السواد وسيلانه فيه ، هو الحركة لا السواد المشتدّ . ويظهر من هذا أنَّ اشـــتداد السواد يخرجه عن نوعه الأول ، إذ يستحيل أنْ يشير إلى موجودٍ منه وزيادة عليه مضافة إليه ، بل كل ما يبلغه من الحدود فكيفية بســـيطة . لكن الناس يســـمون جميع الحدود المشابهة لحدّ واحدٍ سواداً ، وجميع المشابهة للبياضّ – أي المقاربة لهّ – بياضاً . والســـواد المطلق هو واحد وهو طرف خفي ، والبياض كذلك ، وما سوى ذلك كالممتزج ؛ والممتزج ليس هو أحد الطرفين ولا يشاركه في حقيقة المعنى ، بل في الإسم . وإنّما تتكون الأنواع المختلفة في الوسط ، لكنه يعرض لمّا يقرب من أحد الطرفين أنْ ينسب إليه . فالحسّ ربّما لم يميّز بينهما فظنّهما نوعاً واحداً وليس كذلك ، وتحقيق هذا في العلوم الكلّية .

(5) The last position [that we mentioned] shows better judgment than this one and does not follow it except for a common feature that both positions entail. Underlying [that common feature] is the fact that those who assign this number to the number of the categories [i.e., ten] are forced into either one of two situations: either they allow that motion is one of the ultimate genera [i.e., one of Aristotle's ten categories], or they must increase the number of categories, since the kinds of motion are not subsumed under one of their genera—not even the category of passion—whereas [*motion*] is a universal concept generically predicated of many. So, if they are going to be obstinate about the categories' being ten, then they should be indulgent and concede that the category of passion is motion, even if [it means that], with respect to this category, they give up on and do not even try to preserve the pure univocity with which I see them being so particularly impressed. In fact, they were so indulgent in the case of [the category of] possession that it [ought] to convince them all the more so in the case of motion.

(6) Be that as it may, it is quite likely that, even if the expressions *perfection* and *action* apply to substance and the remaining nine [categories] analogically, their application to the kinds of motion is not purely analogical. That is because analogy expresses a single concept, but the things that that concept includes differ with respect to it in priority and posteriority—such as *existence,* since [existence] belongs to substance primarily and to the accidents secondarily. As for the concept of motion—that is, the first perfection belonging to what is in potency insofar as it is in potency—it has nothing to do with [the situation] where one thing called *motion* is derived from another. So locomotion's having this description [namely, being a motion] is not a cause of alteration's having this description. The existence of locomotion might, in fact, be a

(٥) وأمّا المذهب الأخير فهو أحصف من هذا المذهب، ولا يلزمه إلاّ أمرٌ مشترَكٌ يلزم المذهبين، ومبناه على أنَّ الواضعين لعدد المقولات هذا العدد يلزمهم أحد أمرين: إمّا أنْ يجوّزوا أنْ تكون الحركة جنساً من الأجناس العالية، وإمّا أنْ يزيدوا في عدد المقولات زيادة ضرورية، إذ كانت أصناف الحركة لا تدخل في جنس منها - ولا في مقولة ينفعلّ - وهي معانٍ كلّية مقولة على كثيرين قول الأجناس. فإنْ تشدّدوا في عشْرية المقولات، فواجبٌ أنْ يسامحوا ويجعلوا مقولة أنْ ينفعل هي الحركة، وأنْ لا يطلبوا في مقولة أنْ ينفعل من صريح التواطؤ ما أراهم يتعصبون فيه ولا يحفظونه. فإنَّهم قد فعلوا في أمر مقولة الجدة من المسامحة ما يحملهم على أكثر من ذلك في الحركة.

(٦) على أنَّه لا يبعد أنْ تكون لفظة الكمال والفعلّ - وإنْ كان وقوعهما على الجوهر والتسعة الباقية وقوعاً بالتشكيك - فإنَّ وقوعهما على أصناف الحركة لا يكون بالتشكيك الصريح. وذلك لأنَّ التشكيك هو أنْ يكون اللفظ واحد المفهوم؛ ولكن الأمور التي يتناولها ذلك المفهوم تختلف بالتقدّم والتأخّر فيه كالوجود؛ فإنّه للجوهر أولاً وللأعراض ثانياً. وأمّا مفهوم الحركةّ - وهو الكمال الأول لما بالقوة من حيث هو بالقوةّ - فليس ممّا يستفيده بعض ما يسمّى باسم الحركة من بعض. فليس كون النقلة بهذه الصفة علّة لكون الاستحالة بهذه

cause for the existence of alteration, in which case the priority and posteriority would concern the concept expressed by *existence*, but not the concept expressed by *motion*. It is just as the couplet precedes the triplet with respect to the concept of existence, while not preceding it with respect to the concept of being a number, for both have a number simultaneously. The triplet does not have a number because the couplet has a number in the way that the triplet's existence is dependent upon the existence of the couplet: the concept of existence is different from the concept of number, the sense of which you have learned elsewhere.[5] So it is quite likely that, even if *perfection* is analogical in relation to other things, it is univocal in relation to these [that is, the kinds of motion], just as it quite likely that it is equivocal in relation to certain things while univocal in relation to what falls under some of them.

(7) Returning to where we were, we ask of both groups what they will say about the category of passion: Is it motion itself, or is it, as they say, one of motion's [various] relations to the subject? If it is motion itself, then is it motion itself absolutely or a certain motion? If it is motion itself absolutely, then motion is one of the [ultimate] genera. If it is a certain motion—as, for example, locomotion or alteration—then the number of the categories must be increased. [That] is because, if locomotion is a genus, then alteration and motion with respect to quantity are equally genera, since each one of these is just as deserving as any other. If locomotion is not a genus but an analogical term, something that is a genus [namely, the category of passion] will exist under it, even though [locomotion] is more specific than [the category of passion] taken as a whole. Now, if the category of passion is not motion absolutely, but motion's relation to matter, then [this relation] must belong either

5. See, for instance, *Physics* 1.8.3.

الصفة، بل يجوز أنْ يكون وجود النقلة سبباً لوجود الاستحالة، فيكون التقدّم والتأخّر في المفهوم من لفظة الوجود لا في المفهوم من لفظة الحركة كما أنَّ الإثنينية قبل الثلاثية في مفهوم الوجود وليس قبله في مفهوم العددية، فإنَّ العددية لهما معاً، ليست العددية للثلاثية من جهة العددية للثنائية، كما أنَّ الوجود للثلاثية يتعلق بالوجود في الثنائية، ومفهوم الوجود غير المفهوم من العدد، وأنت قد عرفتَ هذا المعنى في مواضع أُخرى. فلا يبعد أنْ يكون الكمالّ – وإنْ كان مشكّكاً بالقياس إلى أشياء أُخرىّ – هو متواطيء بالقياس إلى هذه، كما لا يبعد أنْ يكون مشتركاً بالقياس إلى أشياء ومتواطئاً بالقياس إلى ما تحت بعضها.

(٧) ونرجع إلى ما كنا فيه فنقول للطائفتين جميعاً: ما قولكم في مقولة أنْ ينفعل؛ أهي نفس الحركة أمْ نسبة للحركة إلى الموضوع كما يقولون؟ فإنْ كانت نفس الحركة، أفهي نفس الحركة المطلقة أمْ نفس حركةٍ مّا؟. فإنْ كانت نفس الحركة المطلقة، فالحركة أحد الأجناس، وإنْ كانت نفس حركةٍ مّا مثلاً نفس النقلة أو نفس الاستحالة، فيجب أنْ يزاد في عدد المقولات، فإنَّه إنْ كانت النقلة جنساً فالاستحالة أيضاً جنس، والحركة في الكمّ جنس، فإنَّ كلّ واحدٍ من هذه يستحق ما يستحقه الآخر. وإنْ كانت النقلة ليست جنْساً بل إسماً مشكّكاً فيوجد تحته معنى هو جنس، وإنْ كان أخصّ من عمومه. وإنْ لم تكن مقولة أنْ ينفعل هي الحركة مطلقة؛ بل كانت نسبة الحركة إلى المادة؛ فلا يخلو إمّا أنْ تكون

[(1)] to absolute motion or [(2)] to a certain motion. If, on the one hand, [the relation] belongs to absolute motion, then absolute motion must be predicated either [(1a)] univocally or [(1b)] analogically of its kinds. If [(1a)] it is predicated univocally, then motion considered in itself is a genus, and so the genera become greater than ten! (The fact is that it is better suited to be a genus through itself than through its relation to its subject, and even if not better suited, at least no less suited). If, on the other hand, [(1b)] [absolute motion] is predicated analogically [of its kinds]—and likewise for the category of passion, which [on the present supposition] is the relation of this thing that is analogical in name to its subject—then there is no genus. If [(2)] the category [of passion] is the relation of a certain kind of motion [to matter], then all the other kinds [of motions] are equally entitled to be the same as it [that is, a genus]. Moreover, [each kind of motion] would be one genus in itself and another in relation to the subject, increasing the genera greatly. Likewise, they [namely, the proponents of either (1) or (2)] must ask themselves why they made quality itself a genus while not making its relation to the subject a genus, whereas here they make the relation of either absolute motion or a certain motion a genus while not making motion itself a genus. If what they are considering is the natures of things considered in themselves as abstract essences without their accidents of relations and the like, then they should make the category of passion the very state of passivity, not its relation to something. The whole of this discussion will be confirmed once you understand what we said earlier about action and being acted upon by motion and being moved.[6] So it is most fitting that they make the category of passion and motion belong to a single class.

6. Avicenna discusses the association of the categories of action and passion to motion at *Kitāb al-maqūlāt* 6.6, although the reference may also be to *Physics* 2.1.23–24.

للحركة المطلقة أو لحركةٍ مّا . فإنْ كانت للحركة المطلقة فلا يخلو إمّا أنْ تكون الحركة المطلقة مقولة على أصنافها بالتواطؤ أو بالتشـــكيك، فإنْ كانـــت مقولة بالتواطؤ فالحركة باعتبار ذاتها جنس؛ فصارت الأجناس أكثر من عشـــرة! . ولأنْ تكون بذاتها جنْساً أولى من أنْ تكون بنسبتها إلى موضوعها جنساً ، وإنْ لم تكن أولى فليس دونه في الاستحقاق؛ وإنْ كانت مقولة بالتشـــكيك . وكذلك مقولة أنْ ينفعل التي هي نســـبة هذا المشكّك إسمه إلى موضوعه مقولة بالتشكيك فليس بجنْس . وإنْ كانت المقولة هي النسبة لصنْفٍ من الحركة فيســـتحق مثله سائر الأصناف، ومع ذلك فيكون بنفسه جنســـاً وبالقياس إلى الموضوع جنساً آخر، وتتزيّد الأجناس تزيّداً كثيراً . وكذلك يلزم أنْ يطالبوا بالسبب الذي جعلوا له نفس الكيفية جنســـاً ولم يجعلوا نسبتها إلى الموضوع جنساً ، وهناك أخذوا نسبة الحركة المطلقة، أو حركة مّا فجعلوها جنساً ولم يجعلوا الحركة نفسها جنساً . وإنْ كان مأخوذهم طبائع الأمورّ – وذواتها مجردة الماهيات لامع عوارض لها من نسبٍ وغير ذلكّ – فيجب أنْ يجعلوا مقولة أنْ ينفعل هي نفس حالة الانفعال لا ما هو نســـبة لها إلى شـــيء . وهذا الـــكلام إنّما يتحقّق كلّه بعد أنْ تعـــرف ما قلناه قديماً من حال الفعـــل والانفعال بالتحريك والتحرّك، فالأولى بهم أنْ يجعلوا مقولة أنْ ينفعل والحركة من بابةٍ واحدة .

(8) We ourselves are not that obstinate about preserving the received canon—namely, that the genera are ten and that each one of them is truly generic and that there is nothing outside of them. You can also give this same explanation to whoever makes *motion* an absolutely equivocal term. So, when the positions for which we have given evidence but [have] not accepted are repudiated, the truth alone remains: namely, the first position. Since we have explained the manner of motion's relation to the categories and made clear the sense of our saying that motion is in the category, what is there, then, but to let us now explain in how many categories motion occurs?

(٨) وأمّا نحن فإنّا لا نتشدّد كلّ التشدّد في حفظ القانون المشهور من أنَّ الأجناس عشــرة، وأنّ كلّ واحدٍ منها حقيقي الجنسية ولا شيء خارج منها، ويمكنك أنْ تبيّن هذا البيان بعينه لمن جعل الحركة إســماً مشــتركاً على الإطلاق. فإذا انفسخت المذاهب التي أثبتناهــا ولم نقبلها بقي الحق واحداً وهو المذهب الأول. فإذ قد بيّنا وجه نســبة الحركة إلــى المقولات، وأوضحنا معنى قولنا إنَّ الحركة فــي المقولة ما هو؛ فلنبيّن الآن أنَّ الحركة في كم مقولةٍ تقع.

Chapter Three

Concerning the list of those categories alone in which motion occurs

(1) Let us lay a foundation, even if might include a repetition of some of what was said. So, we say that the statement "Motion is in such-and-such a category" might possibly be understood in four ways, the first of which is that the category is a certain real subject of [motion] subsisting in itself. The second is that, even if the category is not [motion's] substantial subject, it is by means of [the category] that [the motion] really does belong to the substance, since it exists in it primarily, just as smoothness belongs to the substance only by means of the surface. The third is that the category is [motion's] genus, and [motion] is a species of it. The fourth is that the substance is moved from a certain species of that category to another and from one kind to another. Now, the sense that we adopt is this last one.

(2) 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, which, in turn, is because if it

<الفصل الثالث>

في بيان المقولات التي تقع الحركة فيها وحدها لا غيره

(١) إنّا لنضع أصلاً، وإنْ كان ربّما اشتمل على تكرار بعض ما قيل، فنقول: إنَّ قولنا إنَّ مقولة كذا فيها حركة؛ قد يمكن أنْ يُفهم منه أربعة معانٍ؛ أحدها أنَّ المقولة موضوع حقيقي لها قائم بذاته، والثاني أنَّ المقولة، وإنْ لم يكن الموضوع الجوهري لها، فبتوسطها تحصل للجوهر، إذ هي موجودة فيه أولاً، كما أنَّ الملاسة إنّما هي للجوهر بتوسط السطح. والثالث أنَّ المقولة جنس لها وهي نوعٌ لها. والرابع أنَّ الجوهر يتحرّك من نوعٍ لتلك المقولة إلى نوعٍ آخر، ومن صِنْفٍ إلى صِنْفٍ، والمعنى الذي نذهب إليه هو هذا الأخير؛

(٢) فنقول: أمَّا الجوهر؛ فإنَّ قولنا إنَّ فيه حركة هو قولٌ مجازيٌّ؛ فإنَّ هذه المقولة لا تعرض فيها الحركة، وذلك لأنَّ الطبيعة الجوهرية إذا فسدت تفسد دفعة، وإذا حدثت تحدث دفعة، فلا يوجد بين قوتها الصرفة وفعلها الصرف كمال متوسط، وذلك لأنَّ الصورة الجوهرية لا تقبل الاشتداد والتنقّص، وذلك لأنَّها إذا قبلت الاشتداد والتنقّص لم يخل إمّا

is so susceptible, then, when it is in the middle of increasing and decreasing, its species must either remain or not. Now, on the one hand, if its species remains, then the substantial form has not changed at all, but only some accident belonging to the form has changed, in which case that which is decreasing or increasing has ceased to exist while the substance has not; and so this is a case of alteration or the like, not generation. On the other hand, if the [same] substance does not remain with the increase, then the increase would have brought about another substance. Likewise, at every moment assumed during the increase, another substance would come to be once the first has passed away, and it would be possible for there to be a potential infinity of substantial species (as in the case of qualities); but it is a known fact that this is not the case. Therefore, the substantial form passes away and comes to be all at once, and whatever has this description does not have an intermediary between its potentiality and actuality, which is motion.

(3) We also say that the subject of the substantial forms does not actually subsist except by receiving the form (as you have learned),[1] like the material that does not, in itself, exist except as something potential. Now, it is impossible that something that does not actually exist should be moved from one thing to another. So, if there is substantial motion, it involves some existing moving thing, where that moving thing will have a form by which it is actual and is an actually subsisting substance. So, if it is the substance that was before and so it is found to exist up to the moment that the second substance exists, then it has neither corrupted nor changed with respect to its substantiality, but [merely] with respect to its states. Now, if it is some substance other than the species from which and to which [there is purportedly motion], then the substance has first

1. See 1.2.5.

أنْ يكونّ – وهو في وسط الاشتداد والتنقصّ – يبقى نوعه أوْ لا يبقى، فإنْ كان يبقى نوعه فما تغيّرت الصورة الجوهرية البتة، بل تغيّر عارض للصورة فقط؛ فيكون الذي كان ناقصاً واشتدّ قد عدم، والجوهر لم يعدم، فيكون هذا إستحالة أو غيرها، لا كوناً. وإنْ كان الجوهر لا يبقى مع الاشتداد، فيكون الاشتداد قد جلب جوهراً آخر، وكذلك في كل آنٍ يُفرض للاشتداد يحدث جوهراً آخر، ويكون الأول قد بطل، ويكون بين جوهرٍ وجوهرٍ إمكان أنواع جوهرية غير متناهية بالقوة، كما في الكيفيات. وقد علم أنَّ الأمر بخلاف هذا. فالصورة الجوهرية إذن تبطل وتحدث دفعة، وما كان هذا وصفه فلا يكون بين قوته وفعله واسطة هي الحركة.

(٣) ونقول أيضاً إنَّ موضوع الصور الجوهرية لا يقوم بالفعل إلاّ بقبول الصورة كما علمتّ – كالهيولىّ – وهي في نفسها لا توجد إلاّ شيئاً بالقوة، والذات ‹غير› المحصّلة بالفعل يستحيل أنْ تتحرّك من شيءٍ إلى شيء. فإنْ كانت الحركة الجوهرية موجودة فلها متحرّكٍ موجود، وذلك المتحرّك تكون له صورة هو بها بالفعل، ويكون جوهراً قائماً بالفعل. فإنْ كان هو الجوهر الذي كان قبل؛ فهو حاصل موجود إلى وقت حصول الجوهر الثاني لم يفسد ولم يتغير في جوهريته، بل في أحواله. وإنْ كان جوهراً، غير الجوهر الذي عنه والذي إليه، فيكون قد فسد الجوهر أولاً إلى الجوهر الوسط، وتميّز إذن جوهران

corrupted into the intermediary substance, and thus two substances are actually distinguished. The discussion about [this intermediary substance] is just like the discussion about the substance from which the motion was assumed [to begin]. [That] is because either it possesses the nature into which it first changed during that entire period of time, and then all at once changes into the second, or it preserves its original species during part of that time, while at another part it becomes that other species without some intermediate state, which comes down to our earlier claim about transitioning from one species to another all at once. That period of time, then, corresponds with some motion other than ones that would produce [a new] species of substance, since transitions with respect to substantiality do not [occur] over a period of time. Now, it cannot be said that this argument equally holds with respect to the motion of alteration. That is because the material, in our view, requires the existence of certain actual forms for its subsistence, whereas when the form exists, a certain species actually exists; and so the substance that is between two substances must exist in actuality, not merely by supposition. That is not the case with respect to accidents that the estimative faculty imagines between, for instance, two qualities. So [accidents] are dispensable with respect to the actual subsistence of the subject.

(4) Sometimes they establish that there is no motion with respect to substance because [substance's] nature has no contrary.[2] Now, when its nature has no contrary, it cannot increasingly and decreasingly go[3] from one nature to another such that the state in which it is when there is motion is in between two extreme limits that are not together and between which there is the maximum degree of separation—namely,

2. Compare Aristotle, *Physics* 5.2.225b10–11.

3. Reading *yantaqilu* with **Z**, **T**, and the Latin (*permutetor*) for **Y**'s *yanfaṣilu* (to separate oneself).

بالفعــل. والكلام فيه كالكلام فــي الجوهر الذي فرضت الحركة منه؛ فإنّه إمّا أنْ يكون في تلــك المدة كلّها على طبيعة الجوهر المتغيّر إليه أولاً فيكون التغيّر إلى الثاني دفعة، وإمّا أنْ يكــون في بعض تلك المدة حافظاً لنوعــه الأول، وفي بعضها الآخر واقعاً في النوع الآخر بلا توســط. فيلزم منه ما قيل من الانتقال من نــوعٍ دفعةً، فتكون تلك المدة مطابقة لحركةٍ غيــر حركات نوعية الجوهــر؛ إذ كانت الانتقالات في الجوهرية لا فــي مدةٍ وزمان، ولا يمكن أنْ يقال إنَّ هذا القول يلزم أيضاً على حركة الاســتحالة، وذلك لأنَّ الهيولىّ – فيما نحن فيــهّ – محتاجة في قوامها إلى وجود صور بالفعــل، والصورة إذا وجدت بالفعل حصلــت نوعاً بالفعل. فوجَبَ أن يكون الجوهر الذي بــين الجوهرين أمراً محصّلاً بالفعل ليس بالفرض، ولا كذلك في الأعراض التي تتوهم بين كيفيتين مثلاً فإنّها مُستغنى عنها في قوام الموضوع بالفعل.

(٤) وقد يثبتون أنَّ الجوهر لا حركة فيه لأنَّ طبيعته لا ضدّ لها، وإذا لم يكن لطبيعته ضدٌّ اســتحال أنْ ينتقل عن طبيعةٍ إلى طبيعةٍ أخرى على سبيل التنقّص والاشتداد حتى تكون الحالة التي هو فيها عند الحركة حالة متوسطة بين طرفين لا يجتمعان، وبينهما غاية

two contraries. We should consider this proposition in some detail. We say that, in the definition of contrariety, either the matter or the subject must be taken. Now, if by *subject* one means the real subject actually subsisting as a species that receives those accidents that belong to that species, then substantial forms are not contraries, because they are in a material, not a subject. If by that subject one means any substrate whatsoever, then it seems that the form of fire is contrary to the form of water—and not merely their quality (for there is no doubt about [the contrariety of their qualities]), but, rather, the forms from which their qualities proceed. That is because the two forms share a substrate upon which they successively follow, and there is a maximal degree of difference between them. On account of this, there has been a tendency[4] to try to show that the celestial sphere is not generated because its form has no contrary, as if it were taken as an axiom that the form of whatever is generated has a contrary toward which it goes. In that case [namely, on the assumption that whatever is generated has a contrary toward which it goes], fire, air, water, and earth would represent contraries of form. So why was the substantial forms' having a contrary denied absolutely? It seems that between the contrary that we mentioned here and some other thing there is a maximal degree of difference, where there is *a maximal degree of difference* between it and that one only when some third thing together with it has less than a [maximal degree of] difference (namely, what is intermediary), such that its being borne toward it involves an extension like the extension, in an interval between two things. Now, the substantial forms with respect to which there is primary alteration are not intermediaries having this description, just as there is no intermediary between fire and air. The idea seems to be that the

4. Following **Z** and **T**, which reads *min al-sha'n* for **Y** *fī al-shubbān* (among the young men). The Latin *et hoc etiam amplius* also strongly suggests that that translator read *sha'n*, which can also mean *importance* (≈*amplius*).

البُعْـد ؛ وهما الضدّان. ويجب أنْ نتأمل نحن هذه القضية فنقول: إنَّه لا بدّ من أخذ المادة أو الموضوع في حدّ التضادّ، فإنْ عنى بالموضوع الموضوع الحقيقي القائم بالفعل نوعاً القابل للأعـراض الذي لذلـك النوع؛ فلا تكون الصور الجوهرية متضـادّة لأنَّها في هيولى لا في موضوع. وإنْ عنى بذلك الموضوع أي محلٍ كان، فيشبه أنْ تكون الصورة النارية مضادّة للصورة المائية لا كيفيتاهما فقط. فذلك لا شكّ فيه، بل الصور التي عنها تصدر الكيفيات التي لهما، وذلك لأنَّ الصورتين مشتركتان في محلٍ وتتعاقبان عليه وبينهما غاية الخلاف. ولهذا من الشـأن ما اشتغل من بين أنَّ الفلك لا يتكون لأنَّه لا ضدّ لصورته، كأنَّه وضع أنَّ كلّ متكونٍ فلصورته ضدٌّ وإليه يكون انتقاله، فيجعل النار والهواء والماء والأرض متضادّة الصورة، فلِمَ أنكر أن يكون للصور الجوهرية ضدّ البتة؟ فيشبه أنْ يكون الضدّ الذي نذكره هاهنـا هو الذي بينه وبين شـيء آخر غاية الخلافّ – وإنّما يكـون بينه وبين ذلك غاية الخلافّ – إذا كان لشيءٍ ثالث معه خلاف دونه وهو الواسطة، بحيث يحتمل استمراراً فيه كالاستمرار في بُعْدٍ بين شيئين. وليس بين الصور الجوهرية التي فيها الاستحالة الأولية واسـطة بهذه الصفة، كما ليس بين النار والهواء واسـطة. ويشبه أنْ يكون يرى التعاقب

succession taken in the definition of *contrary* is a succession between two things between which there is a maximal degree of difference. As we said, however, this can happen without an intermediary, and so this contrary can be eliminated and another succeed it without some other successor intervening between the two; but again, if, as is frequently the case, the intermediary (if there is an intermediary) successively follows, then the transition is something extending continuously between the two extreme limits.

(5) Moreover, one does not see the substrate's receiving the form of fire successively upon the [form] of water without its first receiving the intermediary form of air (never mind a continuous extension!); rather, it must inevitably come to rest possessing the form of air. So the form of water is not contrary to the form of fire,[5] since the transition does not extend from one to the other, but from fire to air; whereas the form of fire is not contrary to the form of air, since there is not a maximal degree of difference between the two. If this is the intention, then the interpretation of it comes down to the first explanation we tried out—namely, that the nature of substantiality is not cast off gradually, since it does not undergo an increase or weakening such that its increasing and weakening have two extreme limits, which, in this inquiry, are specified by the name *contraries*. In First Philosophy, we will also provide you with a more detailed explanation that the substantial form does not undergo increase and weakening.[6]

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5. With **Z** and the Latin, secluding the subsequent phrase, *nor is the form of fire the contrary of the form of air,* which appears in MSS **S** and **M** but appears to be either a transposition or a duplication of the phrase in the next line. While the phrase appears in **T**, someone has gone back and marked through it. Also see *Kitāb fī al-samāʾ wa-l-ʿālam* 6, where Avicenna argues specifically against the suggestion that substances can undergo intensification and weakening with respect to their substance.

6. The reference may be to *Ilāhīyāt* 2.3, where the vocabulary of "increasing" and "weakening" is used in speaking about the species form belonging to matter; or it may be to *Ilāhīyāt* 2.4, where much of the argumentation—though not the vocabulary—of the present discussion is repeated.

المأخوذ في حدّ الضدّ هو تعاقبٌ بين شـيئين بينهما غاية الخلاف. وهذا، على ما قلنا، يصـحّ أنْ يكون بلا واسـطة، فيصحّ أنْ يرتفع هذا الضـدّ ويعقبه الآخر من غير أنّ يتخلّل بينهمـا عاقبٌ آخر، وإنْ كان قد يصحّ أيضاً أنْ يكون يتعقّب المتوسـطّ – إنْ كان هناك متوسطّ – فيكون الانتقال مستمراً من الطرفين على الاتصال.

(٥) ثـم لا يرى أنَّ المحل يقبـل الصورة النارية عقيب المائية، مـن غير أنْ يقبل أولاً صورة الهواء المتوسط لا على استمرارٍ متصل، بل وَجَبَ أنْ يسكن لا محالة على الصورة الهوائية. فلا تكون الصورة المائية مضادّة للصورة النارية، إذ لا يستمر الانتقال من إحداهما إلى الأخرى إلاّ من النارية إلى الهوائية، إذ ليس بينهما غاية الخلاف. فإنْ كان القصد هذا القصد، كان التعبير عنه يرده إلى البيان الأول الذي حاولناه نحن؛ وهو أنَّ طبيعة الجوهرية لا تنسـلخ يسيراً يسيراً؛ إذ لا يقبل الشدّة والضعف قبولاً يكون لاشتداده ولضعفه طرفان يخصّان في هذا النظر باسـم الضدّية. وسـنبيّن لك أيضاً في الفلسـفة الأولى أنَّ الصورة الجوهرية لا تقبل الاشتداد والضعف، ببيانٍ أشرح.

(6) Still, on the basis of observing semen gradually developing into an animal and the seed gradually into a plant, it is imagined that there is a motion here [namely, with respect to substance]. What should be known is that, up to the point that the semen develops into an animal, it happens to undergo a number of other developments between which there are continuous qualitative and quantitative alterations; and so, all the while, the semen is gradually undergoing alteration. In other words, it is still semen until it reaches the point where it is divested of its seminal form and becomes an embryo. Its condition [remains] like that until it is altered [into] a fetus, after which there are bones, a nervous system, veins, and other things that we do not perceive, [remaining] like that until it receives the form of life. Then, in like fashion, it alters and changes until it is viable and there is parturition. Someone superficially observing the transformation imagines that this is a single process from one substantial form to another and therefore supposes that there is a motion with respect to the substance, when that is not the case and, instead, there are numerous motions and rests.[7]

(7) That there is motion with respect to quality is obvious. Still, among the people[8] there are those who do not believe that there is motion in all the species of quality, but [only] in the kind related to the senses. They say that state and habit are the sort that depends upon the soul and that their subject is not the natural body. As for power and impotence, hardness and softness, and their like, they follow upon certain accidents that the subject just happens to have; and the subject, together with some of those accidents, becomes their subject. In that case, then, the subject for power is the same subject for lack of power, and the same holds in the case of hardness and softness. Shapes and what are like them come to exist all at once in the matter that received them only because they are not susceptible to strengthening and weakening. I do not know what they

7. For a brief discussion of this objection and Avicenna's response, especially with reference to his biological works, see Jon McGinnis, "On the Moment of Substantial Change: A Vexed Question in the History of Ideas," in *Interpreting Avicenna; Science and Philosophy in Medieval Islam,* ed. J. McGinnis (Leiden: E. J. Brill, 2004), 42–61, esp. §3.

8. It is not clear who the author of this and the subsequent views is. In neither Aristotle nor the Graeco-Arabic commentary tradition treating the topic of those categories in which motion occurs have I been able to find a discussion paralleling Avicenna's discussion here. The closest discussion I have been able to find is at *Enneads* 6.110–12, where Plotinus distinguishes between sensible qualities and qualities of the soul.

(٦) لكنه لمّا رأى أنَّ المنيّ يتكون حيواناً يسيراً يسيراً ، والبذر نباتاً يسيراً يسيراً ؛ توهّم من ذلك أنَّ هناك حركة ، والذي يجب أنْ يعلم هو أنَّ المنيّ إلى أنْ يتكون حيواناً تعرض له تكونات أخرى تصل ما بينهما استحالات في الكيف والكم ، فيكون المنيّ لا يزال يستحيل يسيراً يسيراً – وهو بعْد منيّ – إلى أنْ يبلغ حدّاً تنْخلع عنه صورة المنويّة وتصير عَلَقة ، وكذلك حالها إلى أنْ تستحيل مُضْغة ، وبعدها عظاماً وعصباً وعروقاً ، أو أموراً أُخر لا ندركها ، وكذلك إلى أنْ يقبل صورة ‹الحياة› . ثم كذلك يستحيل ويتغيّر إلى أنْ يشتدّ فينفصل . لكن ظاهر الحال يُوهم أنَّ هذا سلوكٌ واحدٌ من صورةٍ جوهريةٍ إلى صورة جوهرية أخرى ، ويُظنّ لذلك أنَّ في الجوهر حركة وليس كذلك ، بل هناك حركات وسكونات كثيرة .

(٧) وأمّا كون الحركة في الكيف فذلك ظاهر ، لكن في الناس مَنْ لم يرَ الحركة في أنواع الكيف كلّها ؛ إلاّ في الصنف المنسوب إلى الحواس ؛ فقال : أمّا نوع الحال والملكة فهو يتعلق بالنفس وليس موضوعه الجسم الطبيعي . وأمّا القوة واللاقوة والصلابة واللين وما أشبه ذلك ؛ فإنَّها تتبع أعراضاً تعرض للموضوع ويصير الموضوع مع بعض تلك الأعراض موضوعاً لها ، فلا يكون حينئذ الموضوع للقوة هو بعينه الموضوع لعدم القوة ، وكذلك الحال في الصلابة واللين . وأمّا الأشكال وما يشبهها فإنَّها إنّما توجد في المادة التي تقبلها دفعة ، إذ لا تقبل التشدّد والتضعّف . ولا أدري ماذا يقولون في الانحناء والاستقامة وغير ذلك؟

would say about being curved or rectilinear and the like. My opinion is that the situation is not as they say. The fact is that, in the subject of the state and habit—whether it is a soul, a body, or the two together in a common state—there exists a certain potential perfection *qua* potential belonging to a given substance. Those who said that the subject for hardness and softness and for power and weakness is not one and the same are undone by augmentation and diminution, which, according to their position, could not be motions. The fact is, however, that with respect to these things, we mean by *subject* only the nature of the species that bears the accidents; and, so as long as that nature remains, the species does not change and the substantial form does not corrupt. The subject is something that endures regardless of whether we consider it [as the subject] of some accident it happens to have; or [consider it] as something additional that is added to it, becoming a proximate subject for the state in which there is motion; or [consider it] in itself. We concede that the status of shapes does not appear to be like that of other qualities with respect to their alteration, since [shapes] occur all at once.

(8) There is also motion with respect to quantity, and that in two ways, one of which is through either a certain increase being superadded, owing to which the subject is augmented, or a certain decrease that takes a part away through separation, owing to which the subject is decreased. In both cases, however, its form remains. This is called *augmentation* and *diminution*. [The second] is not by either a certain increase being added to it or a certain decrease decreasing it, but in that the subject itself receives a certain greater or lesser magnitude, whether by rarefying or condensing, without a separation [or addition] occurring in its parts. Now, when this entails an alteration of some underlying thing (namely, with respect to quality), then that is different from its increasing or decreasing in quantity;[9] but because this state is a gradual process from potency to act, it is a perfection of what is in potency and so is a motion.

9. The difference between the two ways that there might be motion in the category of quantity might be understood better if we anachronistically consider *quantity* here as mass. In the first case, the mass of some object has been either increased or decreased (and, presumably, the volume it occupies as well). In the second case, the mass is neither increased nor decreased, but the volume that is occupied is either increased or decreased. Avicenna, like al-Fārābī before him, would appeal to this second kind of quantitative change to explain away certain phenomena frequently explained by appealing to a void; see al-Fārābī, *Fârâbî's Article on Vacuum,* ed. and trans. N. Lugal and A. Sayili (Ankara: Türk Tarih Kurumu Basımevi, 1951); and Avicenna, *Physics* 2.9.17 and 20–21.

وعنـــدي إنَّ الأمر ليس على ما يقولون، وأنَّ موضوع الحال والملكةّ – كان نفســاً أو بدناً أو هما معاً – بحال الشــركة فإنّه يوجد فيه كمالٌ مّا بالقوة من جهة ما هو بالقوة لجوهر ما. <والذين> قالوا إنَّ الموضوع ليس واحداً للصلابة واللين، أو القوة والضعف، فينتقض عليهم في النمو والذبول. وكان يجبّ – على قولهمّ – أنْ لا تكونا حركتين، بل إنّما نعني بالموضوع في هذه الأشياء طبيعة النوع الحاملة للأعراض. فما دامت تلك الطبيعة باقية لم يتغيّر النوع ولم تفســد الصورة الجوهرية؛ فإنَّ الموضوع ثابت من غير أنْ نبالي أنّه لعارضٍ يعــرض له أو زيادة تنضاف إليه، يصير موضوعاً قريبــاً للحالة التي فيها الحركة أو لذاته. نعم، الأشكال يشبه أنْ لا يكون حكمها حكم سائر الكيفيات في وقوع الاستحالة فيها؛ لأنَّها تكون دفعة.

(٨) والكــمّ ففيه أيضاً حركة، وذلك على وجهين: أحدهما بزيادةٍ مضافة فينمو لها الموضوع، أو نقصانٍ يقتطع بالتحلّل فينقص لها الموضوع، وصورته في الأمرين باقية، وهذا يسمّى ذبولاً ونمواً. وقد يكون لا بزيادةٍ تزاد عليه أو نقطانٍ ينقص منه، بل بأنْ يقبل الموضوع نفسه مقداراً أكبر أو أصغر بتخلّخلٍ أو تكاثف؛ من غير انفصالٍ في أجزائه. وهذاّ – وإنْ كان تلزمه اســتحالة قوام وهي من الكيفّ – فتلك غير إزدياده في الكمّ أو نقصانه فيه، ولأنَّ هذه الحالة سلوك من قوة إلى فعلٍ يسيراً يسيراً، فهو كمالٌ مّا بالقوة فهو حركة.

(9) One, however, may have doubts and say that small and big are not contraries, whereas all motions are between contraries. We say, first, that we ourselves are not all that strict in requiring that every motion be only between contraries; rather, we say that something is undergoing motion when there are certain opposing things that are not simultaneously together and the thing gradually proceeds from one of them to the other, even if there is no contrariety there. Additionally, the big and the small between which the augmented and diminishing things are moved are not some absolute, relative to big and small; rather, it is as if nature has assigned to the animal and plant species certain limiting points with respect to big and small that they cannot exceed but between which they are moved. So, here there is an absolute huge with respect to the species that does not become small relative to some other huge thing, and the same holds for an absolute small. Consequently, it is not at all unlikely that they are, in a way, like contraries and, in fact, there is a certain contrariety.

(10) One might also object that augmentation is a certain motion with respect to place [rather than quantity] because the place changes during [the augmentation]. The answer is that when we say that augmentation is a certain motion with respect to quality, it is not that there cannot thereby be a motion with respect to place accompanying it. Nothing prevents two changes—a change of quantity and a change of *where*—being in the subject of augmentation. In that case, there would be two motions in it simultaneously.

(٩) لكنه قد يتشـــكك فيقال إنَّ الصغير والكبير ليسا بمتضادّين؛ والحركات كلّها بين المتضادّات؛ فنقول: أمّا أولاً، فلسنا نحن ممّن يتشدّد كل التشدّد في إيجاب كون الحركات كلّها بين المتضادّات لا غير، بل إذا كانت أشـــياء متقابلة لا تجتمع معاً، وسلك الشيء من أحدهما إلى الآخر يســـيراً يسيراً ســـمينا الشيء متحرّكاً، وإنْ كان لا تضادّ هناك. على أنَّ الصغير والكبير اللّذين يتحرك فيما بينهما النامي والذابل ليسا الصغير والكبير الإضافي المطلـــق، بل كأنَّ الطبيعة جعلـــت للأنواع الحيوانية والنباتية حـــدوداً في الصغر وحدوداً فـــي الكبر لا تتعداهما وتتحرّك فيمـــا بينهما، فيكون العظيم هناك عظيماً على الإطلاق، ولا يصيـــر صغيراً بالقياس إلى عظيم آخر في ذلك النـــوع، وكذلك الصغير يكون صغيراً بالإطلاقّ – وإذا كان كذلكّ – لم يبعد أنْ تتشاكل المتضادات؛ بل تكون متضادّة.

(١٠) فـــإنْ قال قائل إنَّ النمو حركة في المـــكان لأنَّ المكان يتبدل فيه، فالجواب أنَّه ليس إذا قلنا إنَّ النمو حركة في الكم فإنَّ ذلك نمنع به أنْ يكون معه حركة في المكان، فإنَّه لا يمتنع أنْ يكون في موضوع النمو تبدلان؛ تبدّل كمّ وتبدّل أينٍ، فتكون فيه حركتان معاً.

(11) As for the category of relation, it seems that the lion's share of transitions in it are from one state to another, [occurring] only all at once. Even if there is variation[10] in some cases, the real and primary change is in another category to which the relation just happens to belong, since the relation is characteristically concomitant with other categories and does not, in itself, really exist. So, when the category is something susceptible to increase and weakening, then the relation happens to be like that as well, for, since *heat* is susceptible to increase and weakening, so is *hotter.* So it is the subject of the relation that is primarily susceptible and upon which that necessarily follows, in which case the motion essentially and primarily is in the thing that accidentally has the relation, while belonging to the relation accidentally and secondarily.

(12) That motion exists in the category of *where* is perfectly clear, whereas for the category of *when,* it would seem that the transition from one *when* to another occurs all at once, like the transition from one year to the next or one month to the next. Alternatively, the situation concerning *when* might be like that of relation, in that there is no transition from one thing to another with respect to the *when* itself; but, rather, the primary transition is with respect to quality and quantity, where time necessarily follows on account of that change, and so, because of it, there is accidentally change with respect to [*when*]. As for what is unchanging, you will learn[11] that it is not in time. So how can it have a motion in it?

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10. Reading *ikhtalafa* (m.) with **Z** and **T** (*ikhtalafat* [f.]) and the Latin (*diversificantur*) for **Y**'s *akhlafa* ("to not hold true" or, literally, "to break a promise").

11. See 2.13.6.

(١١) وأمّا مقولة المضاف، فيشبه أنْ يكون جُلّ الانتقال فيها إنّما هو من حال إلى حالٍ دفعةً، وإنْ اختلف في بعض المواضع فيكون التغيّر بالحقيقة، وأولاّ، في مقولةٍ أخرى عرضت لها الإضافة، إذ الإضافة من شأنها أنْ تلحق مقولات أخرى، ولا تتحقق بذاتها. فإذا كانت المقولة ممّا تقبل الأشدّ والأضعف، عرض للإضافة مثل ذلك. فإنَّه لمّا كانت السخونة تقبل الأشدّ والأضعف، كان الأسخن يقبل الأشدّ والأضعف، فيكون موضوع الإضافة يقبل، ويلزم ذلك قبولاً أولياً، فتكون الحركة في الأمر العارض له الإضافة بالذات وأولاً، وللإضافة بالعرض وثانياً.

(١٢) وأمّا مقولة الأين فإنَّ وجود الحركة فيها بيّنٌ واضح. وأمّا مقولة متى فيشبه أنْ يكون الانتقال من متى إلى متى أمراً واقعاً دفعةً، كالانتقال من سنةٍ إلى سنةٍ أو من شهر إلى شهر. أو يشبه أنْ يكون حال متى كحال الإضافة، في أنَّ نفس متى لا تنتقل فيه عن شيءٍ إلى شيءٍ، بل يكون الانتقال الأول في كيفٍ أو كمّ، ويكون الزمان لازماً لذلك التغيّر؛ فيعرض بسببه فيه التبدّل. وأمّا ما لا تغيّر فيه؛ فستعلم أنَّه ليس في الزمان، فكيف تكون له حركة فيه؟

(13) Now, it has been said that there is no motion whatsoever in the category of position, since there is no contrariety with respect to position.[12] Also, [it has been said] that when someone goes from standing to sitting, he is still judged to be standing until, all at once, he is seated. The truth requires that there be motion with respect to position, whereas there is no great need for real contrariness at motion's two extreme limits, which should be obvious to you by considering the motion of the celestial sphere. Additionally, it is not out of the question that there is a contrariety with respect to [position] to the extent that lying face up is contrary to lying face down. As for the claim that the transition toward sitting occurs all at once, if one means by it that the sitting, which is the extreme limit, is attained all at once, then it is true; but the blackness and *where* that are extreme limits are likewise attained all at once. If one means by it that that transition, which involves every position from which the sitting results, [occurs] all at once, then it is false, because one gradually goes from standing to sitting until one comes to the end, which is sitting, exactly like the case during the transition from down to up.

(14) The way that motion exists with respect to position is for the whole of something to change its position without leaving its place at all, and, instead, the relation of its part to either its place's parts or sides undergoes change. Inevitably, then, it is something moved with respect to position because it has not changed its place, but only its position in its place has changed, where the place itself is the initial one. Now, when there is change with respect to position and, moreover, it proceeds gradually by degrees, that change is motion with respect to position, since every motion is a change of state having this description and vice versa, being related to the state that is changing, not to something else that has not changed. By this I do not mean that everything undergoing

12. The reference may be to Philoponus, who says that, though it might seem that there is motion in the category of position, the motion is in fact in the category of place (Arabic *Physics,* 512–13), although nothing like the reason Avicenna mentions here is put forth there. For an extended discussion of Avicenna's account of motion with respect to the category of position, see Jon McGinnis, "Positioning Heaven" §4.

(١٣) وأمّآ مقولة الوضْع؛ فقد قيل إنّها لا حركة فيها البتة، إذ لا تضادّ في الوضْع، وأنــه إذا انتقل شــيءٌ من قيامٍ إلى قعودٍ فإنّه لا يزال في حكــم القائم إلى أنْ يصير قاعداً دفعةً، وكذلك إذا انتقل من قعودٍ إلى قيامٍ فإنّه لا يزال في حكم القاعد إلى أنْ يصير قائماً دفعةً. والحقّ يوجب أنْ يكون في الوضْع حركة، وأنّه لا كثير حاجةٍ إلى التضادّ الحقيقي فــي طرفي الحركة، يتبيّن ذلــك لك؛ بتأمل حركة الفلك. على أنَّ الوضْع لا يبعد أنْ يكون فيه تضادّ؛ حتى يكون المســتلقي مضادّاً للمنبطح. والذي قيل من أنَّ الانتقال إلى القعود يكــون دفعةً، إنْ عنى بــه أنَّ القعود الذي هو الطرف يحصل دفعةً؛ فهو صادق. وكذلك السواد الذي هو الطرف يحصل دفعةً، وكذلك الأين الذي هو الطرف الذي يحصل دفعةً. وإنْ عنــى به أنَّ كل وضْعٍ ينتقل عنه إلــى القعود يكون ذلك الانتقال دفعةً فهو كذب؛ لأنَّ الانتقال عن القيام إلى القعود يكون قليلاً قليلاً حتى يوافي النهاية التي هي القعود؛ كالحال في الانتقال من السفل إلى العلو بعينه.

(١٤) أمّــا كيفية وجود الحركة في الوضع؛ فهو أنَّ كل مســتبدل وضْعٍ من غير أنْ يفــارق بكلّيته المكان، بل بأنْ تتبدل نســبة أجزائه إلى أجــزاء مكانه أو إلى جهاته؛ فهو متحــرّك في الوضْع لا محالة؛ لأنَّ مكانه لم يتبدل بل تبدّل وضعه في مكانه، والمكان هو الأول بعينه. وإذا كان التبدّل في الوضْع، وكان مع ذلك ‹متدرجاً› يســيراً يســيراً، كان ذلــك التبدّل حركة في الوضّع، إذ كانت كلّ حركة هي تبدّل حالٍ بهذه الصفة وبالعكس، وتكون منســوبة إلى الحالة التي تبدلت لا إلى شيءٍ آخر لم يتبدّل. ولست أعني بهذا أنَّ

motion with respect to position remains in its place. So it is not necessary from my account—namely, that everything remaining in its place that gradually changes its position is something moved with respect to position—that everything moved with respect to position is like that [namely, not changing its place at all]. The fact is that nothing prevents something from changing its position only after having changed its place, just as nothing prevents something from changing its quantity only after having changed its place.[13] Instead, the intention is to show that motion exists in the [category of] position by showing that there is something that is moved with respect to position. As for whether something can change its position alone without changing its place, let its possibility be recognized from the motion of the celestial sphere; for, on the one hand, it might be like the outermost celestial sphere, which is not in a place in the sense of the containing limit that exactly encompasses [what it contains], which is what we mean by *place*.[14] On the other hand, it might be in a place, but it would absolutely not leave its place; and, instead, what changes is only the relation of its parts to the parts of its place with which it is in contact. When there is only this [type of] change—where there is no change of the place—and *this change* is change of position and there is nothing but this change, then there is only this motion, which is with respect to position.

(15) That the outermost celestial sphere does not move from [its] location they[15] take to be patently obvious. Moreover, it does not undergo motion with respect to quality, quantity, substance, or some category other than position. So, when you go through each one of the categories, you do not find this motion fitting well with [any] of them, except position or *where;* but it is not *where*, so position remains. Someone might say that every part of the celestial sphere undergoes motion with respect to place, and [for] everything of which every[16] part undergoes motion with

13. Cf. the objection considered in par. 10.

14. Cf. Aristotle, *Physics* 4.4.212a2–6 and Avicenna, *Physics* 2.9.1.

15. The "they" here is probably a reference to certain Aristotelians who denied motion with respect to position, mentioned at the beginning of par. 13.

16. Reading *kull* with MSS **A** and **M**, **T**, and the Latin (*omnis*) for **Y** and **Z**'s *kāna*, which if retained, could be translated, "whatever a part of which is undergoing motion with respect to place."

كل متحرّكٍ في وضْعٍ فهو ثابت في مكانه؛ فليس يجب من قولي: إنَّ كل ثابت في مكانه يستبدل وضعه بالتدريج فهو متحرّك في الوضع؛ أنّ كل متحرّك في الوضْع كذلك – بل لا أمنع أنْ يكون الشيء لا يتغيّر وضعه إلاّ وقد تغيّر مكانه، كما لا أمنع أنْ يكون شيءٌ لا يتغيّر كمّه إلاّ وقد تغيّر مكانه، بل الغرض هو أنْ يثبت وجود المتحرّك في الوضْع بإثبات متحرّكٍ مّا في الوضْع. وأمّا أنَّه هل يمكن أنْ يكون الشيء يتبدل وضعه وحدّه ولا يتبدل مكانه؛ فليعلم إمكانه من حركة الفلك. فإنَّه أنْ يكون كالفلك الأعلى الذي ليس في مكان؛ بمعنى نهاية الحاوي الشامل المساوي الذي إياه نعني بالمكان، وإمّا أنْ يكون في مكانه لكنه لا يفارق كلّية مكانه، بل إنّما تتغيّر عليه نسبة أجزائه إلى أجزاء مكانه التي يلقاها. وإذا لم يكن هناك إلاّ هذا التغيّر والمكان ثابت، وهذا التغيّر تغيّر الوضْع، وليس هناك غير هذا التغيّر، فليس هناك غير هذه الحركة التي في الوضْع.

(١٥) وأمّا كون حركة الفلك الأعلى غير مكانية؛ فواضحٌ عندهم بيّنٌ. ثم ليس تحرّكه في كيفيةٍ ولا كميّةٍ ولا جوهريةٍ ولا في مقولةٍ غير الوضْع. فإنك إذا تعقّبت مقولة مقولة لم تجد هذه الحركة تلائمها ما خلا الوضْع أو الأين، ولا أيْن؛ فبقي الوضْع. فإنْ قال قائل إنَّ الفلك كلّ جزء منه متحرّك في المكان، وكلّ ما كلّ جزء منه متحرّك في المكان؛

respect to place, the whole of it undergoes motion with respect to place. The response is that this is not the way things stand. On the one hand, the celestial sphere does not have some actual part such that it undergoes motion. Even if we were to posit parts for it, they would not leave their places; rather, each part thereof would leave as a part of the place of the whole, if the whole of it is in a place. Now, the place of the part is not part of the place of the whole (although part of the place of the whole can, in fact, be part of the place of the part). That is because part of the place of the whole is not contained by the part, whereas, as you know, the *place* is what contains. The fact is that the parts of something continuous might be in place only potentially, and indeed this has been clearly explained to them in their books.[17] On the other hand, it is not the case, when every part leaves its own place, that the whole leaves its own place, since there is a distinction between *each part* and *the whole of the parts*. In other words, each part has a certain description, while the whole does not have that description because the whole has a certain proper reality distinct from a certain reality of each one of the parts. For starters, don't you see that each part is a part, while the whole is not a part? So each part of ten is one, but ten is not one. The fact is, returning to the issue at hand, that we say that some place might well enclose something possessing actual parts, like the sand [of a desert] and the like, and then every part of it leaves its place, whereas the whole does not leave its place. Indeed, by admitting [this] we should have no doubt that, even if we concede that each part of it leaves its proper place, the whole does not leave its proper place; and so the doubt about the whole not undergoing motion with respect to place would not have arisen, even if each part is moved. It seems to me that whoever considers what we have said and weighs the evidence will come to believe with certainty that there is a motion with respect to position.

17. Cf. Aristotle, *Metaphysics* 5.26.

فالـكل منه متحرّك في المكانّ – فالجواب عن هذا أنَّ الأمر بخلاف ذلك. أمّا الفلك فلا جزء له بالفعل حتى يتحرّك، ولو فرضنا له أجزاء فليست تفارق أمكنتها، بل يفارق كل جـزء منها جـزءاً من مكان الكل؛ إنْ كان كله في مكان. وليس مكان الجزء جزء مكان الكلّ، بل عسى أنْ يكون جزء مكان الكل جزء مكان الجزء؛ وذلك لأنَّ جزء مكان الكل لا يحيط بالجزء، والمكان كما تعلم محيط، بل عسى أنَّ المتصل ليست أجزاؤه في مكانٍ إلاّ بالقـوة، بـل قد صُرّح لهم بهذا في كتبهم. وبعد هـذا؛ فليس إذا كان كل جزء يفارق مكان نفسه فالكلّ يفارق مكان نفسه؛ لأنَّه فرقٌ بين قولنا كلّ جزء وبين قولنا كل الأجزاء. وذلك أنَّ كل جزء قد يكون بصفةٍ، والكلّ لا يكون بتلك الصفة لأنَّ للكلّية حقيقة خاصّة مباينـة لحقيقـة كل واحدٍ من الأجزاء. ألا ترى أول شـيء إنَّ كل جزء هو جزء، والكلّ ليس بجزء، فكلّ جزء من العشرة واحد والعشرة ليست بواحد. بل نرجع إلى ‹مسألتنا› فنقول: إنَّه يجوز أنْ يكون مكان يشتمل على شيءٍ ذي أجزاء بالفعل كالرمل وغير ذلك؛ ثم كل جزءٍ منه يفارق مكانه والكلّ لا يفارق مكانه. بل ما نحن بسبيله لانشكّ أنّا – وإنْ سـلّمنا فيهّ – أنَّ كل جزء منه يفارق مكانه الخاصّ، فالكلّ لا يفارق مكانه الخاص، فلم يقع الشك في أنَّ الكلّ غير متحرّكٍ في المكان، وإنْ كان كل جزء متحرّكاً. وعندي أنَّ كل مَنْ يتأمل ما قلناه ثم ينصف، سيعتقد يقيناً أنَّ الوضْع فيه حركة.

(16) Perhaps someone would say that the sense of motion with respect to place is not that the mobile leaves its place but that it is something moved that is in a place, even if it does not depart it. In that case, the response is that its being moved and changed must have some sense. Now, on the one hand, if its being moved and changed is not dependent on something that leaves, but belongs to it, then, in fact, there is no motion or change, and both the terms *motion* and *change* have been taken equivocally. On the other hand, if it depends upon something other than the place that changes, then there is a certain state that changes, with respect to which the motion is proper. Even if something is in a place, undergoing alteration while being in a place, that fact does not make the alteration necessarily an alteration of location, even though it is in a place. Nor is it our intent that the meaning of "motion with respect to such-and-such" is "to be moved in such-and-such," as you would have known.

(17) As for the category of possession, I have not as of yet undertaken an independent investigation of it. Now, it is said that this category indicates a body's relation to what it contains and is inseparable from it during transition.[18] So the change of this relation would primarily be only with respect to the containing surface and place, in which case, as I suspect, there would be no motion essentially and primarily with respect to it.

(18) As for the categories of action and passion, one might suppose that there is motion with respect to them for a number of reasons. One of them is that something [initially] is either not acting or not being

18. Cf. Aristotle, *Categories* 15.

(١٦) ولعــل قائلاً يقول إنَّ معنى الحركة في المكان ليس هو أنْ يكون المتحرّك يفارق المــكان، بل أنْ يكــون متحرّكاً وهو في مكانٍ وإنْ لم يفارقــه، فيقال له حينئذ يجب أنْ يكــون لكونه متحرّكاً متغيّراً معنى. فإنْ كان كونه متحرّكاً ومتغيراً غير متعلقٍ بأمرٍ يفارقه وأمر يوجد له، فلا حركة في الحقيقة ولا تغيّر، بل الحركة والتغيّر المذكوران هما باشتراك الإسم إنْ كان يتعلق بأمر يتغيّر وهو غير المكان فهناك حالة تتبدل فيها الحركة الخاصّة، وإنْ كان الشــيء في مكان كون الشــيء مستحيلاً وهو في مكان، وذلك لا يوجب أنْ تكون الاستحالة استحالة مكانية وإنْ كانت في مكان، ولا غرضنا في أنَّ الحركة في كذا معناه والمتحرّك في كذا؛ على ما علمت.

(١٧) وأمّا مقولة الجدة فإني إلى هذه الغاية لم أتحقّقها – والذي يقال إنَّ هذه المقولة تدل على نســبة الجسم إلى ما يشــمله ويلزمه في الانتقال، فيكون تبدل هذه النسبة على الوجه الأول إنّما هو في السطح الحاوي وفي المكان، فلا يكون فيها، على ما أظنّ، لذاتها وأولاً حركة.

(١٨) وأمّــا مقولة يفعــل وينفعل فربما ظنَّ أنَّ فيهما حركة مــن وجوه. من ذلك أنَّ الشــيء يكون لا يفعل، أو لا ينفعل، ثم يتدرج يســيراً يسيراً إلى أنْ يصير يفعل أو ينفعل،

acted upon, and thereafter there is a gradual progression until it is acting or being acted upon, in which case its acting and being acted upon are a certain end for that progression—as, for example, blackness is a certain end for blackening—and so it is supposed that there is a motion with respect to these two categories. Also, something might change from not being acted on by part[19] (or acting on it) to being acted upon by part (or acting upon it), where that occurs gradually, and so it is supposed that that is a motion. Again, being acted upon might be slow and then gradually progress until it is increasingly faster, and vice versa, so it is thought that that is moving toward fastness. As for the first reason, I say that the motion is not with respect to action and passion, but is with respect to acquiring the disposition and form by which the action and passion are able to arise. What we'll explain below[20] will resolve the second reason—namely, that it is impossible to proceed continuously from becoming cold to becoming hot, or from heating to cooling, except through a pause and intervening stop. As for the third reason, I know of no one who makes the gradual alteration from potentially fast to actually fast a motion (that is, a perfection of what is potency *qua* potency). The fact is that that is with respect to fastness and slowness, which are neither two motions nor actions nor passions, but two accidents, qualities, or dispositions belonging to either [motion], action, or passion.

19. **T** has *ḥarr* (heat), which corresponds with the Latin *calore* (by heat), which in Arabic script could be confused with *juzʾ* (part). If *heat* were accepted, the text would make more immediate sense, reading: "Also, something might change from not being acted on by heat (or acting on it) to being acted upon by heat (or acting upon it), where that occurs gradually, and so it is supposed that that is a motion." This reading has evidence in its behalf in Avicenna's response to this argument (at the end of this paragraph and again in the next), which involves becoming hot and heating (albeit the terms there are not derived from Ḥ-R-R, but S-Kh-N). So the response would seem to be immediately relevant to this position, if understood in terms of heat, whereas it is not clear that it is when *part* is read. Still, all the older Arabic manuscripts agree in reading *juzʾ*, and the principle of *lectio difficilior* suggests that it should be retained. If *juzʾ* is retained, then perhaps the case Avicenna has in mind is diffusion—as, for example, when one part of a quantity is heated and then, so affected, that part acts upon another part and heats it. This is a best conjecture.

20. See par. 19; also, the general issue of whether two contrary motions, such as heating and cooling, could be continuously joined is discussed at length at 4.8.

فيكون أنْ يفعل وأنْ ينفعل غاية لذلك التدرّج؛ مثل السواد فإنّه غاية للتسوّد ، فظنَّ أنَّ في هاتين المقولتين حركة . وأيضاً فإنّه قد يتغيّر الشيء من أنْ لا يكون ينفعل بالجزء أو يفعله إلى أنْ ينفعل بالجزء أو يفعله ، ويكون ذلك قليلاً قليلاً فيظنّ أنَّ ذلك حركة . وأيضاً فإنَّ الإنفعال قد يكون بطيئاً فيتدرج يسيراً يسيراً إلى أنْ يسرع ويشتدّ وبالعكس ، فيظنّ أنَّ ذلك حركة إلى السرعة . فأقول : أمّا الوجه الأول فلا تكون الحركة فيه في الفعل والانفعال ، بل في اكتساب الهيئة والصورة التي بها يصحّ أنْ يصدر الفعل أو الانفعال . وأمّا الوجه الثاني فيحلّه ما سنبيّن بعد من أنَّه لا سبيل إلى أنْ يتصل السبيل من تبردٍ إلى تسخّنٍ ، أو تبريدٍ إلى تسخينٍ إلاّ بانقطاعٍ وتخلّل وقفة . وأمّا الوجه الثالث فلا أعرف مَنْ يجعل الاستحالة من السرعة بالقوة إلى سرعةٍ بالفعل يسيراً يسيراً حركة ، وهو استكمال لما بالقوّة – من حيث هو بالقوّة – لكن ذلك في السرعة والبطء ، وليسا بحركتين ولا فعلين ولا انفعالين ، بل عارضين وكيفيتين وهيئتين لها ولفعلٍ أو انفعال .

(19) In general, it is not admitted that, with respect to the nature of passion and action, there is a motion in the way that motion is said to be in a category; for if it is admitted that there is a gradual transition from becoming cold[21] to becoming hot, then [that transition] must occur either while that cold itself is being produced or when the production of cold ends. On the one hand, if [the heating] occurs while the process of becoming cold[22] is still occurring—and the transition to becoming hot undoubtedly involves the nature of becoming hot, which in its turn involves the nature of heat—[the transition] would have becoming cold as its goal at the very same time that it has becoming hot as its goal, which is absurd. If, on the other hand, [the transition from becoming cold to becoming hot] occurs when the production of cold ends, it will be after coming to rest at cold and ending (as you will learn).[23] Additionally, in that case, the transition [from becoming cold to becoming hot] must be either the very state of becoming hot or a transition to becoming hot. If, on the one hand, [the transition from becoming cold to becoming hot] is the becoming hot itself, then, as you know, unless there is some period of time of resting or a certain instant during which there is neither a motion nor a rest, it won't be between becoming cold and becoming hot. On the other hand, if [that transition] is the progression to becoming hot, then that progression, in its turn, must either involve the nature of becoming hot or not. Now, if it does not, then that is not an alteration at all! If it does, then it inevitably involves the nature of heat. To involve the nature of heat, however, is to become hot, in which case the transition and advancement toward becoming hot would be an existing state of becoming hot [rather than, as was assumed, a transition to that state]—that is, unless it is assumed that *becoming hot* is to become hot at the extreme degree, while there is the transition toward it inasmuch as

21. The Arabic *tabarrud* has the sense of "to be or become cold"; however, since Avicenna has earlier contrasted it with *tabrīd* (to make or produce cold) and the present context is clearly about the category of passion and so *being acted upon,* I have in some cases overtranslated it in terms of "to be made cold" or "the production of cold" in order to bring out the passive nature under consideration. Similar comments hold for *tasakhkhun* (to be or become hot).

22. Rejecting **Y**'s proposed addition of *yantahī* (to end), which does not occur in **Z**, **T**, or the corresponding Latin. If retained, the sense of the text would be "when the state of cold terminates after being cold."

23. See 4.8.

(١٩) وبالجملة لا يجوز أنْ يكون في طبيعة أنْ ينفعل وأنْ يفعل حركة على سبيل ما تقال الحركة في المقولة، فإنَّه إنْ جاز أنْ يكون انتقالٌ من التبرّد إلى التسخّن يسيراً يسيراً، فــلا يخلو إمّا أنْ يكون ذلك التبرّد تبــرّداً، أو عندما ينتهي التبرّد. فإنْ كان عندما التبرّد بعد تبرّدٌ – ومعلوم أنَّ الانتقال إلى التسخّن أخْذٌ من طبيعة التسخن، وفي طبيعة التسخّن أخْذٌ من طبيعة السخونةّ – فيكون عندما يقصد الحر يقصد البرد وهذا محال. وإنْ كان عنــد منتهى التبرّد؛ فهو بعد الوقوف على البرد وبعد الانتهاء؛ كما ســتعلم. ومع ذلك، فحينئذ لا يخلو إمّا أنْ يكون ذلك الانتقال نفس التسخّن أو انتقالاً إلى التسخّن؛ فإنْ كان نفس التســخّن فليس بين التبرّد والتسخّن إلاّ زمان سكون أو آن لا حركة فيه ولا سكون كما تعلمه. وإنْ كان المصير إلى التســخّن فلا يخلو إما أنْ يكون في المصير إلى التســخّن أخْذ من طبيعة التســخن أو لايكونّ – فإن لم يكن فليس ذلك إســحالة البتة. وإن كان، فهناك أخذ لا محالة من طبيعة السخونة؛ والأخْذ من طبيعة السخونة هو تسخّن، فيكون عند الانتقال إلى التسخّن والتوجّه إليه تسخّنٌ موجودٌ، اللّهم إلاّ أنْ يفرض التسخّن ما هو في الغاية تسخّنٌ ويكون الانتقال إليه بما هو أضعف منه. ثم التسخّن نفسه وكل حركة فإنّه

it is weaker than it. In that case, [the response is that,] becoming hot (and every motion in fact) is itself divisible by time, as you will learn.[24] Now in the case where the heat is perfected at a certain instant, it is not *becoming* hot. [That] is because if it is becoming hot, it will be divisible into parts, where each part of becoming hot is assumed to be an instance of becoming hot, while the part proceeding it will be weaker and so will not be in the extreme degree. In that case, it is not an instance of becoming hot on the present assumption; but it was posited as an instance of becoming hot. This is a contradiction. Either becoming hot is not divisible, in which case there is no motion but a state of being hot, or it is divisible, in which case its becoming hot is not an extreme degree. Therefore, being at the extreme degree is not a condition of becoming hot but, rather, involves the state of being hot, not the process of being heated so as to be at that extreme. Now that you know the account about *being made hot* [that is, a passion], so have you learned the account about *making hot* [that is, an action], and this much should be enough.

(20) Now that we have finished going over every position concerning this topic, it will have become clear to you from this summary, once you have applied yourself to motion's relation to the categories, that motion occurs in only four of them: quality, quantity, *where,* and position. Now that we have explained the nature of motion, we should explain the nature of rest.

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24. See 2.11.3 and 2.12.7.

منقسمٌ بالزمان على ما ستعرف. وحينئذ تستكمل السخونة في آنٍ فلا يكون تسخّن، فإنْ كان تســخّناً فهو منقسم إلى أجزاء، ويكون كل جزء من التسخّن يفرض تسخّناً، ويكون الجزء المتقدّم فيه أضعف فلا يكون بالغاية، فلا يكون تسخّناً بهذا المعنى، وفُرض تسخّناً، هذا خُلْف. وأمّا أنْ يكون التسخّن غير منقسم البتة؛ فلا تكون حركة بل سخونة، وأمّا أنْ يكون منقســماً فلا يكون من التســخّن ما هو غاية، فليس إذن من شرط التسخّن أن يكون في الغاية، بل أنْ يكون آخذاً في الســخونة ولا يتســخّن في الغاية. وإذ قد عرفت الكلام في التســخّن عرفتَ ‹الكلام› في التســخين، ويجب أنْ يكون هذا القدر كافياً.

(٢٠) ونرفــض جميــع ما يذهب به ‹في› هــذا الموضع. فقد ظهــر لك من هذه الجملــة أنَّ الحركة إنّما تقع في المقولات الأربع التي هي الكيف والكم والأين والوضْع، فقد وقفتَ على نسبة الحركة إلى المقولات. وإذ قد عرفنا طبيعة الحركة، فحريٌّ بنا أنْ نعرف طبيعة السكون.

Chapter Four

Establishing the opposition of motion and rest

(1) There is some difficulty concerning the topic of rest. That is because it is generally accepted among the school of natural philosophers that rest is the opposite of motion in the way that a privation, not a contrary, is the opposite of possession.[1] Moreover, it is obvious that the only opposition that can be assumed between [motion and rest] is one of these two—I mean, being a privation or being a contrary—but we have already made the term *motion* something applying in the sense of a form, not a privation, since we said that it is a *first perfection*. So, if the opposition occurs in the way that privation is opposite of possession, then, of the two, motion cannot be the privation. On the other side, however, we do maintain that the body is said to be at rest when [(1)] it is [experiencing] a privation of motion but is of the character to be moved, where what we mean by *of the character to be moved* is that it exists as something with which motion is associated—namely, for instance, it occurs in a certain place during a certain time. It is equally said to be resting, however, when [(2)] it exists at a single place for a certain time. So here there are found two senses of *resting*, one of which is the privation of motion while being of the character to be moved, and the other [of which] is to exist at some *where* for a time. So, if rest is the first of the two (and the latter is just a necessary accident), then rest is a privation, whereas if rest is the second of the two (and the first is just a necessary accident), then rest is not in the sense of a privation.

1. Cf. Aristotle, *Physics* 5.2.226b15–16.

<الفصل الرابع>

في تحقيق تقابل الحركة والسكون

(١) إنَّ أمر السكون فيه إشكال أيضاً ؛ وذلك لأنَّ المشهور من مذهب الطبيعيين أنَّ السكون مقابلته للحركة هي مقابلة العدم للقنية لا مقابلة الضد . ثم من البيِّن أنَّه لا يصلح أنْ تُفرض بينهما مقابلة إلاّ إحدى هاتين المقابلتين ؛ أعني العدمية والضدّية وقد جعلنا لفظ الحركة واقعاً على معنى صوري ليس عدمياً ؛ إذ قلنا إنّها كمالٌ أول . فإن كانت المقابلة مقابلة العدم للملكة لم يمكن أنْ تكون الحركة منهما هي العدم ، بل نقول إنَّ الجسم إذا كان عادماً للحركة وكان من شأنه أنْ يتحرّك ؛ قيل له ساكن . ومعنى قولنا من شأنه أنْ يتحرك ؛ أن يكون ما تتعلّق به الحركة موجوداً ، وهو أنْ يكون مثلاً في مكانٍ وزمانٍ ، وأيضاً إذا كان له حصول في مكانٍ واحدٍ زماناً ؛ فيقال له إنّه ساكن . فها هنا معنيان موجودان في الساكن ؛ أحدهما عدم الحركة ومن شأنه أنْ يتحرّك ، والآخر أيْنٌ له موجوداً زماناً . فإنْ كان السكون منهما هو الأولّ – وهذا لازمٌ لهّ – كان السكون عدماً ، وإنْ كان السكون هو الثاني منهماّ – والأول لازمٌ لهّ – لم يكن السكون معنى عدمياً .

(2) Of the two, let us assume [for now] that the rest opposing motion is some formal factor and that its definition indicates a form. So, when we intend to compare this definition and *motion*'s definition, we must derive either *motion*'s definition from this definition or this definition from *motion*'s definition, as is required by the general rule for testing the adequacy of the definition of a contrary derived from the definition of its contrary. (Now, I am not saying that the way to define the contrary is that we derive [it] from the definition of its contrary, for this is something that we prohibited with respect to demonstrative teaching, although allowing it in a certain way with respect to dialectical teaching.[2] Again, I am not saying that [this] is the way to hunt down the definition; rather, I am saying that that contrary, even if it is not necessary, will be something possible. I mean that the definition of the contrary thereby will parallel the definition of its contrary, and [so] it is a way to test for adequacy.) So, if the two definitions are contraries and opposites, then *rest*'s being a possession is possible. If the two definitions are not opposites, then this account will not belong to rest (because rest is the opposite of motion), and instead it will be an account that necessarily follows upon the account of rest, while rest will be the account that the privative definition indicates.

(3) We say, firstly, that this description [namely, to exist at some *where* for a time] is not the one opposite of what motion is said to be, when the expression *motion* is understood in our technical vocabulary. So, when we intend [for example] *a first perfection belonging to what is in potency inasmuch as it is in potency* to pick out local motion specifically, it becomes the following: a first perfection with respect to *where* belonging to what potentially has a certain *where* inasmuch as it is in potency. Now, this definition is not the opposite of the definition of rest that we had

2. The reference appears to be to *Kitāb al-burhān* 4.3.

(٢) فلنضع أنَّ السكون المقابل للحركة هو المعنى الصوري منهما ، وأنَّ حدّه هو الدالّ على كونه صورياً ، فإذا أردنا أنْ نقايس بين هذا الحدّ الحركة وجب أنْ يكون لنا أن نقتضب إمّا حدّ الحركة من هذا الحدّ أو نقتضب هذا الحدّ من حدّ الحركة على ما يوجبه القانون الامتحاني في اقتضاب حدّ الضدّ من حدّ ضدّه . لستُ أقول إن سبيل التحديد للضدّ أنْ نقتضب من حدّ ضدّه ، فهذا شيء منعنا عنه في تعليم البرهان ، ورخّصنا فيه بوجهٍ مّا في تعليم الجدل . بل نقول إنَّ ذلك الضدّ – وإنْ لم يكن واجباً ولم يكن طريقاً لاقتناص الحدّ – فهو ممكنٌ ؛ أعني أنْ يكون حدّ الضدّ يوازي به حدّ ضدّه ، ويكون للامتحان سبيل إليه ، فإنْ كان الحدّان متضادين ويتقابلان جاز حينئذ أنْ يكون السكون قنْية . وإنْ كان الحدّان لا يتقابلان لم يكن حينئذ هذا المعنى هو للسكون لأنَّ السكون مقابل للحركة ، بل معنى يلزم معنى السكون ، والسكون هو المعنى الذي يدل عليه الحدّ العدّمي .

(٣) فنقول ؛ أمّا أولاً ، فإنَّ هذا الرسم لا يقابل الرسم المقول للحركة الذي هو باصطلاحنا مفهوم لفظة الحركة ؛ فإنَّ قولنا كمالٌ أولٌ لما بالقوة من حيث هو بالقوة ، إذا أردنا أنْ نخصّصه بالحركة المكانية صار هكذا ؛ وهو أنّه كمالٌ أولٌ في الأين لما هو بالقوة ، ذو أين من حيث هو بالقوة . وهذا الحدّ ليس بمقابلٍ لحدّ السكون الذي حدّدناه ، بل عسى

defined [again, as existing at some *where* for a time]. It might, in fact, necessarily follow upon what is opposite of that, but this is not something that we precluded; for we concede that the account of each of the two assumed descriptions of rest entails the other, while not itself being [that account]. If we wish to derive the definition of *rest* from the definition of *motion* (assuming that rest is a formal factor), we find ourselves at a loss but to say that either it is a first perfection belonging to what is actually a *where* inasmuch as it is actually a *where*, or it is a second perfection belonging to what is potentially a *where* inasmuch as it is in potentiality.[3] On the one hand, the first of the two definitions does not necessarily entail rest. [That] is because rest as rest does not need to be some first perfection such that the thing has some second perfection, since the intellect can conceive of the rest, as a rest, where there is no perfection in the thing other than what is in it.[4] On the other hand, the second definition stipulates a certain condition of the essence of rest as rest—namely, that motion has preceded it—which is not something necessary.[5] If, however, we omit the expression *first* and *second,* then we have not preserved the condition of opposition in the definition. If we make some other change, it would not have the right meaning at all—namely, if we mean to take the opposite of *perfection* to be *potentiality.* In this case, then, rest would be a member of the class of privatives, since we clearly cannot derive from the definition of *motion* a definition[6] that corresponds with the definition of *rest,* where rest is an opposite of [motion] and nonetheless is also a possession.

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3. Secluding the phrase *bi-l-fiʿl ayna aw naqūlu innahu kamāl thānin li-mā huwa bi-l-qūwah aynu min haythu huwa* (. . . actually a *where,* or it is a second perfection belonging to what is potentially a *where* inasmuch as it is . . .) which does not appear in all the manuscripts and is omitted in **Z**, **T**, and the Latin translation. The phrase is almost certainly a result of dittography, since Avicenna will only explicitly address two, not three, possible definitions in his response.

4. For instance, according to ancient and medieval elemental theory, the natural place of the element earth was at the center of the universe, understood as the center of the planet Earth. Hence any of the element earth resting at the center of the planet Earth would have no second perfection toward which it would be naturally directed.

5. Again, appealing to ancient and medieval elemental theory and the belief that the cosmos was eternal, the elemental earth at the center of the cosmos could have been at rest there from all eternity without its having previously been in motion.

6. **Y** (inadvertently) repeats a line, which does not appear in **Z**, **T**, or the Latin.

أنْ يلزمه ما يقابل ذلك، وهذا ممّا لا نمنعه. فإنّا نسلّم أنَّ معنى كل واحدٍ من الرسمين المفروضين للسكون يلزم الآخر، وليس هو هو. فإنْ شئنا أنْ نقتضب من حدّ الحركة حدّ السكونّ – على أنَّ السكون معنى صوريّ – لم نجد إلاّ أنْ نقول بأنَّه كمالٌ أولٌ لما هو بالفعل أيْنٌ من حيث هو بالفعل أيْنٌ، أو نقول إنَّه كمالٌ ثانٍ لما هو بالقوة أينٌ من حيث هو بالقوة فيكون الأول من هذين ليس حدّاً لازماً للسكون، فإنَّ السكون من حيث هو سكونٍ ليس يحتاج أنْ يكون كمالاً أولاً حتى يكون للشيء كمالٌ ثانٍ، فإنَّه يجوز أنْ يعقل السكون سكوناً والشيء لا كمال فيه غير ما فيه. وأمّا الحدّ الثاني فإنّه يجعل من شروط ماهيّة كون السكون سكوناً أنْ يكون قد تقدمته الحركة؛ وهذا ليس بواجب، فإنْ حذفنا لفظ الأول والثاني لم نكن قد حفظنا شرط التقابل في الحدّ؛ وإنْ غيّرنا تغييراً آخر، لم يكن له مفهوم صادق أصلاً. وإنْ أردنا أنْ نأتي بمقابل الكمال كان القوة فالتحق حينئذ السكون بالعدميات. فقد بانَ أنَّه ليس يمكن أنْ نقتضب من حدّ الحركة حدّاً يطابق حدّ السكون ويكون السكون مقابلاً لها، ويكون السكون مع ذلك قنية.

(4) If we make the definition of *rest* the original one that we mentioned [namely, to exist at some *where* for a time], then either time or something associated with time is immediately included in [the definition]. Time, however, is defined in terms of motion, and so rest would be defined in terms of motion; but one contrary is not part of the description of the other. Likewise, time would enter into the definition of motion, because it is something entering into what enters into its [own] definition. Now, motion precedes time conceptually, in which case motion cannot be a privation (assuming that rest is a possession) because *privation* does not enter into the concept of *possession*. In fact, just the reverse is the case, since the motion entering into the definition of time, which is [itself] entering into the aforementioned definition of rest, is a formal factor. Obviously, then, in this derivation we cannot say that motion is for the body not to have a single *where* for a period of time.

(5) So it is up to us to consider whether this derivation can occur in some other way. The best that can be said here is that rest is to be at a single *where* for a moment and to being at it both before and after [that moment], whereas motion is to be at a single *where* without being at it before or after. In so understanding [motion and rest], however, we have appealed to a temporal *before* and *after,* both of which are defined in terms of time; and again, time is defined in terms of motion, and so motion itself would have been taken in what is understood by it. So motion is apparently not understood in this way, and so this is not a description. Even weaker than this is to take a [temporal] expanse in [the definition] and so say that rest is to be at a single *where* for a period of time, whereas motion is to be at a single *where* for no period of time, for this entails the objection just given. Also, [this definition of motion and rest] would be shared in common with the mobile's state at the first and last moment of motion (for that is to be at a single place for no period of time), but [that state] is not a motion or a rest. So it has become evidently clear that there is no way to confirm the opposition between the definitions of motion and rest when the definition of *rest* [in the sense of] is a possession,[7] and so it remains that the definition of *rest* is in the sense of a privation.

7. Following **Z** and **T** that have the adjectival form of *qunya* (possession), which also corresponds with the Latin *habitus,* for **Y**'s *yaqīnī* (known with certainty).

(٤) فإنْ جعلنا الأصل حدّ السكون الذي ذكرناه؛ دخل فيه أول شيء الزمان، أو ما يتعلق بالزمان؛ والزمان يتحدّد بالحركة، فيكون السكون يتحدّد بالحركة – والأضداد ليس بعضها جزء رسم البعض – ويكون الزمان يدخل أيضاً في حدّ الحركة لأنَّه داخلٌ فيما يدخل في حدّه. والحركة قبل الزمان في التصوّر، فلا يجوز أنْ تكون الحركة حينئذ عدماً إنْ كان السكون قنية، لأنَّ العدم لا يدخل في مفهوم القنية، بل الأمر بالعكس؛ فإنَّ الحركة داخلة في حدّ الزمان الداخل في حدّ السكون المذكور بالمعنى الصوري. فبيّنٌ إذن أنّه لا يجوز أنْ نقول في هذا الاقتضاب إنَّ الحركة هي أنْ لا يكون للجسم أيْنٌ واحدٌ زماناً،

(٥) فننظر هل يمكن أنْ يكون هذا الاقتضاب على وجه آخر، فنقول: إنَّ أحسن ما يمكن أنْ يقال حينئذ هو أنَّ السكون كَوْنٌ في أيْنٍ واحدٍ وقتاً، والشيء قبله وبعده فيه، والحركة كَوْنٌ في أيْنٍ واحدٍ من غير أنْ تكون قبله أو بعده فيه. فيكون قد استعملنا في تفهيمهما القَبْل الزماني والبَعْد الزماني وهما متحدّدان بالزمان؛ والزمان متحدّدٌ بالحركة، فيكون قد صارت الحركة مأخوذة في مفهوم نفسها. فظاهرٌ أنَّ الحركة لا تفهم من هذه الجهة؛ فليس هذا رسماً. وأضعف من هذا أنْ يؤخذ متوسعاً فيه؛ فيقال: إنَّ السكون كون في أيْنٍ واحدٍ زماناً، والحركة كونٌ في أيْنٍ واحدٍ لا زماناً، فإنَّ هذا يلزمه ما قيل هناك ويشركه حال المتحرّك في ابتداء الحركة وانتهائها، فذلك كَوْنٌ في مكانٍ واحدٍ لا زماناً وليس بحركة ولا سكون. فقد تبيّن واتضح أنَّه لا وجه لتصحيح تقابل حدّ الحركة بحدّ السكون. والسكون حدّه المعنى القني، فبقي أن يكون السكون حدّه المعنى العدمي.

(6) Know that, with respect to every kind of motion, there is some opposing rest. So augmentation has some rest opposing it, and likewise alteration. Also, just as the rest opposing alteration is not the quality existing for a period of time, so likewise the rest opposing locomotion is not a single *where* existing for a period of time, but being at rest in that *where*. So resting is a privation of motion.

(7) Since we have now discussed motion and rest, we should provide the true and real definitions of *place* and *time*, since these are topics closely related to motion.

(٦) واعلم أنَّ في كل صنْف من أصناف الحركة سكوناً يقابله؛ فللنمو سكونٌ يقابله، وللاستحالة كذلك، وكما أنَّ السكون المقابل للاستحالة ليس هو الكيف الموجود زماناً، بل سكونٌ في الكيف، وكذلك السكون المقابل للنقلة ليس هو الأين الواحد الموجود زماناً، بل هو سكونٌ في ذلك الأين، فالسكون عدم الحركة.

(٧) وإذ قد تكلمنا في الحركة والسكون؛ فحريٌ بنا أنْ نعرف حقيقة المعنى المسمّى مكاناً، والمعنى المسمّى زماناً، إذ هما من الأمور الشديدة المناسبة للحركة.

Chapter Five

Beginning the account of place and reviewing the arguments of those who deny and those who affirm it

(1) The first thing that we must investigate about place is its existence and whether or not there is such a thing as place at all; nevertheless, in the following we shall not come to understand place itself, but only its relation to body (in that [the body] rests in it and is moved away and toward it). Certainly, one frequently investigates a thing's existence after identifying its essence. At other times, however, it is before identifying it, as when one knows a certain accident it has—as, for example, knowing that a certain thing has the aforementioned relation [that is, place's relation to body] while not knowing what that thing is. In the case where you understand that essence, you need to explain the existence of [that essence]; and thereafter, if the existence of that relation to which [that essence] belongs is not clear, then we need to explain that it is the essence itself that the relation specifies. This has been explained to you elsewhere.[1]

(2) So we say: There are some who refuse to accept that place has any existence whatsoever, whereas others make its existence necessary. As for the "refuse" of the one group, they could avail themselves of arguments close to what we present here, namely, if place exists, then it must

1. It is not clear what Avicenna's reference is here. Two possibilities are his discussion about the essential (*dhātī*) and accidental at *Kitāb al-madkhal* 1.6, or his discussion of the difference between demonstrations *quia* and *propter quid* at *Kitāb al-burhān* 1.7, although neither reference explicitly addresses the point made here.

<الفصل الخامس>

في ابتداء القول في المكان وإيراد حجج مبطليه ومثبتيه

(١) أول ما يجب أنْ نفحص عنه من أمر المكان وجوده وأنَّه هل ها هنا مكان أم لا مكان البتّة على أنّا نحن إنّما نفهم بعد من اســم المكان لا ذاته، بل نسبة له إلى الجسم بأنَّه يســكن فيه وينتقل عنه وإليه بالحركة. فإنَّ الفحص عن وجود الشيء قد يكون بعد تحقّق ماهيّتــه، وقد يكون قبل تحقّق ماهيّته، إذا كان قد وقف على عارضٍ له؛ مثلاً قد وقف على أنَّ ها هنا شــيئاً له النســبة المذكورة ولم يعلم ما ذلك الشيء، وحينئذ تحتاجّ – إذا فهمتَ تلك الماهيّة – أنْ نبيّن وجودها. ثم إنْ لم يكن وجود تلك النسبة بيّناً لها احتجنا إلى أنْ نبيّن أنّها هي الماهيّة التي تخصّها النسبة، وهذا شيءٌ قد بانَ لك في موضع آخر.

(٢) فنقول: إنَّ من الناس مَنْ نفى أنْ يكون للمكان وجود أصلاً، ومنهم مَنْ أوجب وجوده. فأمّا النفاة منهم فلهم أنْ يحتجوا بحجج منها ما تقرب منه عبارتنا هذه: وهو أنَّ

be either a substance or an accident. On the one hand, if it is a substance, then it is either a sensible or intelligible substance. Now, if it is a sensible substance, and every sensible substance has a place, then place has a place *ad infinitum*. If it is an intelligible substance, then it simply cannot be said that the sensible substance is joined with it and departs from it, because intelligibles cannot be pointed to and do not have a position, whereas whatever the sensible substance is joined to or departs from can be pointed to and has a position.[2] If, on the other hand, it is an accident, then that in which this accident inheres is like that in which whiteness inheres, and that in which whiteness inheres derives its name from it and so is said to be *whitened* and *white*. So the substance in which place inheres should derive its name from it and so be *placed*, in which case the place of the placed would be an accident in [the placed], and it would necessarily follow, then, that it remains permanently in it during local motion and occurs with it wherever it occurs. If that is the case, then nothing can move locally from it, but instead moves with it, whereas place (as you [Aristotelians] allege) is not that *together with* which something is moved locally, but that *in* which something is moved locally.

(3) Again, place must either be a body or not. On the one hand, if it is a body and the placed thing is in it, then the placed thing interpenetrates it; but [the idea] that some bodies interpenetrate others is absurd. Moreover, how could it be a body when it is neither among the simple bodies[3] nor a composite of them? If, on the other hand, it is not a body, then how can they say that it coincides with the body and is coextensive with it, when what is coextensive with body is a body?

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2. **Y** repeats the phrase *kull mā yuqārinuhu al-jawhar al-maḥsūs aw yufāriquhu fa-huwa dhū ishārah ilayhi wa-lā waḍ^{c} lahā* (whereas whatever the sensible substance is joined to or departs from can be pointed to and has a position), which is not found in **Z**, **T**, or the Latin. That repetition has been omitted here.

3. That is, the elements earth, air, fire, and water.

المكان إذا كان موجوداً فلا يخلو إمّا أنْ يكون جوهراً أو عرضاً ، فإنْ كان جوهراً فإمّا أنْ يكون جوهراً محسوساً أو معقولاً ، فإنْ كان جوهراً محسوساً – وكل جوهر محسوس فله مكانٌ – فللمكان مكان إلى غير نهاية ، وإنْ كان جوهراً معقولاً فيستحيل أنْ يقال إنَّ الجوهر المحسوس يقارنه ويفارقه ، لأنَّ المعقولات لا إشارة إليها ولا وضع لها ، وكل ما يقارنه الجوهر المحسوس أو يفارقه فهو ذو إشارة إليه ووضع له . وإنْ كان عرضاً فالذي يحله هذا العرض هو كالذي يحله البياض ، والذي يحله البياض يشتق له منه الاسم فيقال : مبيّض وابيضّ . فالجوهر الذي يحلّه المكان يجب أنْ يشتق له منه الاسم فيكون هو المتمكن ، فيكون مكان المتمكن عرضاً فيه ، فيلزم أنْ يلزمه في النقلة ويصير معه حيث صار ، وإذا كان كذلك ، لم يكن منتقلاً عنه بل منتقلاً معه ، والمكانّ – كما تزعمونّ – ليس هو المنتقل معه بل المنتقل فيه .

(٣) وأيضاً فإنَّ المكان لا يخلو إمّا أنْ يكون جسماً ، وإمّا أنْ يكون غير جسم ؛ فإنْ كان جسماً ، والمتمكّن يكون فيه ، فالمتمكّن مداخلٌ له ، ومداخلة الأجسام بعضها بعضاً محال . ثم كيف يكون جسماً ولا هو بسيط من الأجسام ولا مركّب منها ؟ وإنْ كان غير جسم ، فكيف يقولون إنَّه يطابق الجسم ويساويه ، ومساوي الجسم جسمٌ؟

(4) Furthermore, locomotion is nothing but change of proximity and remoteness and, just as it might apply to a body, so likewise [locomotion] might apply to a surface, line, and point. In that case, if locomotion requires a place for what undergoes local motion, the surface, line, and, in fact, [even] the point must have a place. Now, it is known that the place of the point must exactly equal it, since you all make place something exactly equaling the placed thing such that nothing else contains it; but what exactly equals the point is a point, and so the place of the point is a point. In that case, why does one of the two points become a place and the other the placed thing? Perhaps, on the contrary, each one of them is [both] a place and a placed thing, and so [the point] is a *placed thing* in the relation going from it to the other, whereas it is a *place* in the relation going from the other to it. This is something you blocked yourself off from when you denied[4] that *place* is something placed in the placed thing in which it is.[5]

(5) They have additionally said: If the point has a place, then they ought to make it have a certain heaviness or lightness. That [argument] is one that the group denying motion specifically pressed, saying that it is senseless to require that the body have a place and motion without equally requiring that the point have a place and motion—in which case, if you permit motion in the point, you have given it a certain inclination, making it have a certain lightness and heaviness. Now, this is commonly accepted as false, given that the point is nothing but the termination of a line, and the termination of a line is a privative notion, and how can a privative notion have a place or motion? The point is a termination of a line because it is an end point, where the end point terminates something such that nothing of it remains. Now, when the point has no place, the body will have no place, since whatever requires the body to have a place would require the point to have a place.

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4. Reading *abaytum* with **Z** and **T** for **Y**'s *ithbattum* and the Latin *vultis* (affirmed).
5. Cf. Aristotle, *Physics* 4.3.210b8–31.

(٤) وأيضاً فإنَّ الانتقال ليس إلاّ الاستبدال لقربٍ وبُعْدٍ، وكما أنَّ هذا الاستبدال قد يقعُ للجسم؛ فكذلك قد يقع للسطح وللخط وللنقطة. فإنْ كان الإنتقال يوجب للمنتقل مكاناً؛ فيجب أنْ يكون للسطح مكان وللخط مكان بلْ‹هَ› للنقطة مكان! ومعلومٌ أنَّ مكان النقطة يجب أنْ يكون مساوياً لها؛ إذْ جعلتم المكان مساوياً للمتمكن حتى لا يسعه غيره، وما يساوي النقطة نقطة، فمكان النقطة نقطة؛ فلِمَ صارت إحدى النقطتين مكاناً والأخرى متمكنة؟ بل عسى أن يكون كل واحدة منهما مكاناً ومتمكناً؛ فتكون بالقياس الآخذ منها إلى الأخرى متمكنة، وبالقياس الآخذ من الأخرى إليها مكاناً. وهذا ممّا حظرْتموه حين أبيتم أنْ يكون المكان متمكناً في المتمكن فيه.

(٥) وزادوا فقالوا إنْ كان للنقطة مكانٌ، فبالحري أنْ تجعلوا لها ثقلاً أو خفّة – قال ذلك خصوصاً القوم الذين نفوا الحركة – فقالوا لا معنى يوجب للجسم مكاناً وحركة إلاّ ومثله يوجب للنقطة مكاناً وحركة – فإنْ جوّزتم في النقطة حركة فقد أعطيتموها ميلاً، وجعلتم لها خفةً وثقلاً وهذا مشهور البطلان. على أنَّ النقطة ليست إلاّ فناء الخط؛ وفناء الخط معنى عدمي، وكيف يكون للمعنى العدمي مكانٌ أو حركةٌ؟ فأمّا أنَّ النقطة فناء الخط فلأنها نهاية، والنهاية هي أن يفنى الشيء فلا يبقى منه شيءٌ، وإذا لم يكن للنقطة مكان لم يكن للجسم مكان، إذ كان ما يوجب للجسم مكاناً يوجب للنقطة مكاناً.

(6) Moreover, in your opinion, place is something indispensable for motion, since you make motion need it and so it is one of the causes of motion. It is not an agent of motion, however. How could it be when you make every motion have an efficient principle that is known to be different from place? Similarly, it cannot be a material principle, since motion subsists only in what is moved, not in the place. Again, it cannot be a formal principle, because place is not motion's form. Moreover, it cannot be a final principle, and that is because [place] is something that, in your opinion, is [just as much] needed before arriving at the end and completion as it is needed upon arriving. So, if the place is an end, it is not because it is place [absolutely], but because it is a certain place with a present actuality for some motion with a present actuality, whereas our discussion concerns place inasmuch as it is absolute place. Were place a perfection so that the mobile desired it, whether by nature or will, then being in the places that one desires would also be one of the human perfections. Also, [one could deny the existence of place, arguing] on the basis that there fall under *perfection* both proper and common [perfections]. Now, the proper [perfection] is a thing's form, but place is neither the form of the mobile nor the form of the motion. As for the common [perfection], it belongs to one thing as well as something else, whereas place, according to your view, is something proper [to the thing].

(7) Also, if body were in a place, then growing bodies would be in a place; but, if they were in a place, then their place would grow with them; and, if their place should grow with them, then their place would move with them and their place would have a place, all of which you deem impossible.

(٦) وأيضـاً فإنَّ المكان عندكم أمر لا بُدّ منـه للحركة، إذ تجعلون الحركة محتاجة إليه، فهـو إحدى عِلل الحركة لكنه ليس بفاعلٍ للحركـة؛ وكيف، ولكل حركةٍ تجعلونها فـي المـكان مبدأ فاعلي معلوم غير المكان؟ ولا أيضاً هو مبدأ عنصري له، إذ الحركة إنّما قوامهـا في المتحـرّك لا في المكان، ولا أيضاً مبدأ صوري له؛ لأنَّ المكان ليس هو صورة الحركـة، ولا أيضاً مبدأ غائي له؛ وذلك لأنَّه ممّا يحتاج عندكم إليه قبل الوصول إلى الغاية والتمامّ – كما يحتاج إليه عند الوصول. فإنْ كان المكان غاية؛ فليس لأنّه مكان، بل لأنَّه مكان بحال لحركةٍ بحال، وكلامنا في المكان من حيث هو مكانٌ مطلقاً. ولو كان المكان كمالاً – لأنه يشـتاق إليه المتحرّك إمّا طبعاً وإمّا إرادةً – لكان من كمالات الإنسان أيضاً أن يحصل في أمكنةٍ يشـتاق إليها. على أنَّ التمام منه خاصٌ ومنه مشـتركٌ، والخاص هو صورة الشـيء، والمكان ليس هو صورة المتحرّك ولا صورة الحركة، وأمّا المشـترك فإنّه يكون للشيء ولغيره، والمكان عندكم خاص.

(٧) ولو كان الجسـم في مكان لكانت الأجسـام النامية في مكان، ولو كانت في مكان لكان مكانها ينمو معها ولو كان مكانها ينمو معها؛ لكان مكانها يتحرك معها، ولكان لمكانها مكان، وأنتم تمنعون هذا كلّه.

(8) Those who affirm [the existence of] place argued from the existence of locomotion, noting that locomotion certainly involves departing from one thing toward another. Now, that thing that is departed from is not some substance, quality, quantity, or some other thing within the [thing] itself, since all of these remain despite the locomotion. Instead, that [thing] departs from something that the body was in, thereupon replacing it. This [thing] is what we call *place*. Similarly, they argued from the existence of replacement. So [for instance] we observe that [some] body is present, and then we see that it is absent, seeing that some other body has become present where it was—as, for example, water was in a jar, and then afterwards air or oil came to be in it. Now the light of reason requires that what replaces and succeeds this thing do so in something that initially belonged uniquely to that first thing but that it has now left behind. That is neither a quality nor a quantity in the very being of either one of them, nor a substance; but, rather, it is the space in which the first was, and then something else came to be in it. Also, [they affirm the existence of place] because everybody intellectually recognizes that there is an up and down, whereas something does not come to be up owing to its substance or quality or quantity, but owing to that thing that is called *place*. Also, the estimative faculty does not even imagine mathematical figures unless they are distinguished by a certain position and space.[6] Also, were it not that place exists and has with its existence a certain specification, species differences, and properties unique to the species, then some bodies would not be moved naturally up and others down. They said that the power of place has reached such a degree that popular imagination refuses to believe that anything exists

6. In the Arabic paraphrase of John Philoponus's commentary on the *Physics* (see Arabic *Physics*, 276), Philoponus gives the example of a triangle, arguing that one cannot imagine a triangle without imagining a base and apex that are separated by space. Thus, even mathematical reasoning requires some idea of space.

(٨) وأمّا مثبتو المكان فقد احتجوا بوجود النقلة، وذكروا أنَّ النقلة لا محالة مفارقة شيءٍ لشيءٍ إلى شيءٍ، وليس ذلك مفارقة جوهر ولا كيف ولا كمّ في ذاته ولا غير ذلك من المعاني، إذْ جميع هذه تبقى مع النقلة، بل إنّما ذلك مفارقة شيءٍ كان الجسم فيه ثم استبدل به؛ وهذا هو الذي نسميه مكاناً. واحتجوا أيضاً بوجود التعاقب، فإنّا نشاهد الجسم حاضراً ثم نراه غابَ، ونرى جسماً آخر حضر حيث هو؛ مثلاً قد كانت جرّة فيها ماء، ثم حصل بعده فيها هواء أو دهن، والبديهة توجب أنَّ هذا المعاقب عاقب هذا الشيء وخلف في أمرٍ كان لذلك الشيء أولاً، وكان الأول مختصاً به؛ والآن فقد فاته، وذلك لا كيفٌ ولا كمٌّ في ذات أحدهما ولا جوهرٌ، بل الحيّز الذي كان الأول فيه ثم صار الآخر فيه. ولأنَّ الناس كلهم يعقلون أنَّ ها هنا فوق وأنَّ ها هنا أسفل، وليس يصير الشيء فوق بجوهرٍ له أو كيف أو كمّ فيه أو غير ذلك، بل بالمعنى الذي يسمى مكاناً. وحتى أنَّ الأشكال التعليمية لا تتوهم إلاّ أنْ تتخصّص بوضع وحيّز، ولولا أنَّ المكان موجودٌ ومع وجوده له تنوّعٌ وفصولٌ وخواصٌ لما كان بعض الأجسام يتحرّك طبعاً إلى فوق وبعضها إلى أسفل. قالوا؛ وقد بلغ من قوة أمر المكان أنَّ التخيّل العامّي يمنع وجود شيء لا في مكان،

that is not in place and demands that place be something self-subsistent, requiring that it be a certain preparatory [cause] to the extent that bodies come to exist in it. Also, when Hesiod desired to compose a poem in which he related the order of creation, he did not think that anything preceded the existence of place, and so said: "Place is what God created first, then the broad expanse of Earth."[7]

(9) As for solving the puzzles that were mentioned rejecting place, we shall put them off until the time that we fully grasp the essence of place. So let us first find out the essence of place.

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7. The reference is to Hesiod's *Theogony*, 116, where Hesiod states that the first of the gods was chaos, or infinite space. Cf. Aristotle, *Physics* 4.1.208b29–31.

ويوجب أنَّ المكان أمرٌ قائم بنفسه، يحتاج أن يكون معدّاً حتى توجد فيه الأجسام. ولمّا أراد ‹هزيود› الشاعر أنْ يقول شعراً تحدّث فيه عن ترتيب الخليقة، لم يرَ أنْ يقدّم على وجود المكان شيئاً فقال: إنَّ أول ما خلق اللّه المكان ثم الأرضَ الواسعة.

(٩) فأمّا حل الشكوك التي أوردها نُفاة المكان فسنؤخرها إلى وقت إحاطتنا بماهيّة المكان، فلنعرف أولاً ماهية المكان.

Chapter Six

The various schools of thought about place and a review of their arguments

(1) The common man frequently uses the term *place* in two ways. On the one hand, he sometimes means by *place* whatever something rests on. He does not go on, however, and distinguish whether it is the lower body or the outermost surface of the lower body unless he is one of those who has broken with common opinion a little, in which case some imagine that it is the outermost surface of the lower body, to the exclusion of the rest of it. On the other hand, sometimes they mean by *place* the thing that contains another, like the cask for wine and the house for the human and, in general, whatever something is in, even if it is not resting on it. This is the majority opinion even if they are not aware of it, since the general public thinks that the arrow passes through a place, and those who have a sense of the universe's form believe that Heaven and Earth are at rest in a place even if not supported by something.

(2) Philosophers, however, found certain attributes belonging to the thing to which the name *place* applies in the second sense.[1] Examples [of these attributes of place] include [the following]: something [call it x] is in it; [x] departs from it during motion; it encompasses [x] and nothing

1. For discussions of the earlier Greek philosophical positions surrounding place upon which Avicenna is drawing, see Richard Sorabji, *Matter, Space, and Motion: Theories in Antiquity and Their Sequel* (Ithaca, NY: Cornell University Press, 1988); Keimpe Algra, *Concepts of Space in Greek Thought* (Leiden: E. J. Brill, 1995); and Helen S. Lang, *The Order of Nature in Aristotle's* Physics: *Place and the Elements* (Cambridge, UK: Cambridge University Press, 1998).

<الفصل السادس>

في ذكر اختلاف مذاهب الناس في المكان وإيراد حججهم

(١) إنَّ لفظة المكان قد تستعملها العامة على وجهين: فربما عنوا بالمكان ما يكون الشيء مستقراً عليه؛ ثم لا يتميّز لهم أنَّه هو الجسم الأسفل أو السطح الأعلى من الجسم الأسفل إلاّ أن يتزعزعوا يسيراً عن العامية فيتخيّل بعضهم أنَّه هو السطح الأعلى من الجسم الأسفل دون سائره. وربما عنوا بالمكان الشيء الحاوي للشيء؛ كالدّن للشراب والبيت للناس، وبالجملة ما يكون فيه الشيء وإنْ لم يسبقر عليّ – وهذا هو الأغلب عندهمّ – وإنْ لم يشعروا به، إذ الجمهور منهم يجعلون السهم ينفذ في مكانٍ، وأن السماء والأرض عند مَنْ فهم صورة العالم منهم مستقرة في مكانٍ وإنْ لم تعتمد على شيء.

(٢) لكن الحكماء وجدوا للشيء الذي يقع عليه اسم المكان بالمعنى الثاني أوصافاً؛ مثل أنْ يكون فيه الشيء ويفارقه في الحركة ولا يسعه معه غيره، ويقبل المنتقلات إليه؛ ثم

else; and things undergoing local motion are received into it. In gradual degrees, then, their estimative faculties imagined it as a container, since the placed thing is described by its being *in* it. Once they were of a mind to find out the essence and substance of this thing, however, it was as if they became divided among themselves, saying: Whatever is proper to something and nothing else must either be inherent in or extrinsic to the thing itself. If it is inherent in the thing itself, then it is its material or its form. If it is extrinsic to the thing itself and yet exactly equals it and is proper to it, then either it is an extremity of some surface that meets [the thing] and is occupied by contacting it and nothing else and, whether it is what surrounds or [what] is surrounded, it remains at rest, whichever of the two it happens to be; or it is a certain interval exactly equaling the dimensions of [the thing] and so occupies it by permeating it.[2]

(3) Those who maintained that place is the material [asked], "How could it not be, when the material is what is susceptible to replacement?"[3] Those who maintained that place is the form [asked], "How could it not be, when it is the first defining container?"

(4) Those who maintained that place is intervals[4] said that between the extremes of the container holding water are certain naturally disposed[5] intervals that remain fixed, and that the bodies held in the container successively replace them. The situation brought them to the point of saying that this was commonly accepted and that, in fact, the light of reason is naturally disposed to it, for everyone judges that water

2. Cf. Aristotle, *Physics* 4.4.211b6–9.

3. Cf. the argument for place from *replacement* in 2.5.8.

4. The Arabic *buʿd,* which can also be translated "dimension," is almost certainly translating the Greek *diastēma,* which Aristotle mentions as a (rejected) candidate for place (see *Physics* 4.4.211b5ff), but which the Neoplatonist John Philoponus subsequently defended (see his corollaries on place from his commentary on the *Physics*).

5. Reading *maftūrah* with **T** for **Y**'s and **Z**'s *maqṭūrah* (dripped). The former not only makes better sense but also brings the text in line with the same expression that appears at the beginning of par. 8 of 2.7, where Avicenna discusses the independent interval. Still, *maqṭūrah* is clearly the *lectio difficilior;* and so, if retained, "dripped" might be understood as "wet," thus referring to the "watery" interval of the contained water. Alternatively, one of the terms Avicenna used for "dimension" (*quṭr*) is derived from the same root as *maqṭūrah,* and so, although it is unlikely, the phrase might mean "certain dimensional intervals." The Latin has *infinita* (infinite) both here and at 2.7.8, where the Arabic is clearly *maftūrah;* however, *infinita* is quite possibly a corruption of *insita* (inborn or innate), which would correspond nicely with the Arabic *maftūrah.*

تدرجوا قليلاً قليلاً إلى أنْ توهموا أنَّه حاوٍ إذ كان المتمكن موصوفاً بأنَّه فيه. فلما أرادوا أنْ يعرفوا ماهيّة هذا الشـــيء وجوهره، فكأنهم قسموا في أنفسهم، فقالوا إنَّ كل ما يكون خاصّاً بالشيء ولا يكون لغيره فلا يخلو إمّا أنْ يكون داخلاً في ذاته أو خارجاً عن ذاته. فإنْ كان داخلاً في ذاته؛ فإمّا أنْ يكون هيولاه وإمّا أنْ يكون صورته، وإنْ كان خارجاً عن ذاتهّ – ويكون مع ذلك يساويه ويخصّهّ – فهو إمّا نهاية سطح يلاقيه ويشتغل لمماسته ولا يماسّـــه غيره، إمّا محيط وإمّا محاط مستقر عليه أيّهما اتفق، وإمّا أنْ يكون بُعْداً يساوي أقطاره، فهو يشغله بالاندساس فيه.

(٣) فمنهـــم مَنْ زعم أنَّ المكان هو الهيولى؛ وكيـــف لا ، والهيولى قابل للتعاقب! ومنهم مَنْ زعم أنَّ المكان هو الصورة، وكيف لا؛ وهو أول حاوٍ محدّد!

(٤) ومنهـــم مَنْ زعم أنَّ المكان هـــو الأبعاد فقال: إنَّ بين غايات الإناء الحاوي للماء أبعاداً مفطورة ثابتة، وإنها تتعاقب عليها الأجسام المحصورة في الإناء، وبلغ بهم الأمر إلى أنْ قالوا إنَّ هذا مشهور؛ بل مفطور ‹ة› عليه البدنهة، فإنَّ الناس كلّهم يحكمون أنَّ الماء فيما

is in what is between the limits of the container and that the water disappears and departs and air comes be in that very same interval. They also argue by attacking [others'] arguments. So, addressing specifically the advocates of surface,[6] they said that, if place is a surface that meets the surface of another, then motion would be to depart from one surface while advancing toward another. In that case, the bird standing still in a [stream of] air and the rock standing still in [flowing] water, where both [the water and air] are changing (that is, one surface is being departed from for another), must be something undergoing motion.[7] That is because what they have made the place of [the mobile] is changing around it. If it is resting, then its resting is in which place? [The question arises] since a condition for something's being at rest is that it stay put in its place for a time; and this account is frequently what attests to something's being at rest. So, since the surface does not stay put, what stays put is only the interval that it occupies, which neither is snatched away nor changes, but is always one and the same.

(5) Again, they said that [conceptual] analysis results only in simple things, where the estimative faculty removes one thing after another from the things together in the composite until what remains in the estimative faculty after everything else is removed is something simple existing in itself, even if, taken alone, it cannot subsist. It is in this way that we recognize material, form, and simple [elements], which are certain units, in composite things. Once more, then, when our estimative faculty imagines the water and the other bodies as removed and eliminated in the container, it necessarily follows from that that the interval remaining between its limits exist and that that [interval] exist also at the same time [that] the former exists [namely, the water or other bodies].

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6. These would be those who advocate the Aristotelian account of place as Avicenna understands it. Whether Aristotle himself would have identified place with a surface is, however, an open question; see H. Lang, *The Order of Nature in Aristotle's* Physics: *Place and the Elements,* 104–111.

7. The "bird example," although employed in a different context, can be found in Galen, *On Muscular Movement,* 4.402, 12–403, 10; see *The Hellenistic Philosophers,* ed. A. A. Long and D. N. Sedley, 2 vols. (Cambridge, UK: Cambridge University Press, 1987), vol. 1, 283.

بـين أطراف الأناء ، وأنَّ الماء يزول ويفارق ويحصل الهواء في ذلك البُعْد بعينه . واحتجّوا أيضاً بضروب من الحجج فقالواّ – وهم يخاطبون خاصّة أصحاب السطوحّ – إنَّه إنْ كان المكان سـطحاً يلقى سطح الشيء ؛ فتكون الحركة هي مفارقة سطح متوجهاً إلى سطح آخـر ، فالطائر الواقف في الهواء والحجر الواقف في الماءّ – وهما يتبدلان عليّ – وهو يفارق سطحاً إلى سطح ، يجب أنْ يكون متحركاً . وذلك لأنَّ ما يجعلون‹ه› مكانه يتبدل عليه ، فإنْ كان ساكناً فسكونه في أيّ مكان . إذ من شرط الساكن أنْ يلزم مكانه زماناً ؟ إذ الساكن قد يصدق عليه هذا القول . فإذ ليس يلزمه السطح ، فما الذي يلزمه سوى البُعْد الذي شغله ، الذي لا ينزعج ولا يتبدل ؛ بل يكون دائماً واحداً بعينه؟

(٥) وقالوا أيضاً إنَّ الأمور البسـيطة إنّما يؤدي إليها التحليل وتُوهم رَفْع شيء شيء من الأشياء المجتمعة معاً وَهْماً ، فالذي يبقى بعد رفْع غيره في الوهم هو البسيط الوجود في نفسـه ، وإنْ كان لا ينفرد له قوام ، وبهذا السبب عرفنا الهيولى والصورة والبسائطّ – التي هي آحادّ – في أشياء مجتمعة . ثم إنّا إذا توهمنا الماء وغيره من الأجسام مرفوعاً غيـر موجود في الإناء ؛ لزم من ذلك أنْ يكون البُعْـد الثابت بين أطرافه موجوداً ، وذلك أيضاً موجود عندما تكون هذه موجودة معه .

(6) They further said that body is in place not by means of its surface, but through its volume and quantity. So what it is in by means of its corporeality must be what exactly equals it. In that case, [place must] be an interval, because place exactly equals the placed thing, and the placed thing is a body possessing three dimensions, and so place possesses three dimensions.

(7) Again, they said that place must in no way undergo motion nor disappear; but the extremities of what contains frequently do undergo motion in some way and do disappear.

(8) Moreover, they said that people say that place is sometimes empty and sometimes full, but they do not say that the simple [surface] is empty and full.

(9) They argued that, while the doctrine of the interval sees to it that every body is in a place, the school of thought associated with the advocates of the simple containing [surface] makes it impossible for certain bodies to have a place.[8]

(10) Furthermore, they claim that, in fire's motion upward and earth's motion downward, both seek a place for the whole of themselves. It is absurd, however, that they seek the extremity of a body that is above or below, for it is absurd that the whole of the body should meet with the limit. Hence it is the ordered position in the interval that is sought.

(11) These, then, are the arguments of the advocates of the interval [considered] absolutely. They are, however, of two schools of thought. Some of them deem it absurd that this interval should remain empty without something filling it, requiring that it never be absolutely stripped of what fills it save with the entry of something else that fills it.[9] Others do not deem that absurd but embrace the possibility that this interval

8. The body in question almost certainly is that of the cosmos itself, which, according to Aristotelian cosmology, is finite, and "outside" of which there is absolutely nothing, not even void space. Consequently, if *place* is understood as the innermost limit of a containing body, (Aristotle's preferred definition) and yet nothing is outside of the cosmos that could contain it, then the cosmos as a whole cannot have a place.

9. The proponent of this view is John Philoponus; cf. *In Phys*. 568.14ff.

(٦) وقالوا أيضاً إنَّ كون الجسم في مكانٍ ليس بسطحه؛ بل بحجمه وكمّيّته، فيجب أنْ يكون فيه بجسميته مساوياً له فيكون بُعْداً، ولأنَّ المكان مساوٍ للمتمكن؛ والمتمكن جسم ذو ثلاثة أقطار، فالمكان ذو ثلاثة أقطار.

(٧) وقالوا أيضاً إنَّ المكان يجب أنْ يكون شيئاً لا يتحرك بوجه ولا يزول، ونهايات المحيط قد تتحرّك بوجه مّا وتزول.

(٨) وقالوا أيضاً إنَّ الناس يقولون إنَّ المكان قد يكون فارغاً وقد يكون ممتلئاً، ولا يقولون إنَّ البسيط يكون فارغاً ويكون ممتلئاً؛

(٩) قالوا؛ والقول بالأبعاد يجعل كل جسم في مكان؛ ومذهب أصحاب البسيط الحاوي أوجب أنْ يكون من الأجسام ما لا مكانٍ له.

(١٠) وقالوا أيضاً إنَّ النار في حركتها إلى فوق، والأرض في حركتها إلى أسفل يطلبان مكاناً لكُلِّيَّتهما، ومحال أنْ يطلبا نهاية الجسم الذي فوقه أو تحته؛ فإن النهاية محالٌ أنْ تلاقيها كلّية جسم، فإذن يُطلب الترتيب في البُعْد.

(١١) فهذه حجج أصحاب البُعْد مطلقاً. لكن أصحاب البُعد على مذهبين: منهم مَنْ يحيل أنْ يكون هذا البُعد يبقى فارغاً لا مالىء له؛ بل يوجب أنّه لا يتخلّى عن مالىءٍ البتة؛ إلاّ عند لحوق مالىء. ومنهم مَنْ لا يحيل ذلك، بل يجوّز أنْ يكون هذا البُعد خالياً

is sometimes void and sometimes full—namely, those who advocate the void ([albeit] some of those who defend the void suppose that the void is not an interval, but is nothing, as if to be *something* is to be body).[10] Now, the first thing that incited the imagination to believe in the void was air. That is because the initial common opinion was that whatever is neither a body nor in a body does not exist. Moreover, their initial opinion about existing bodies was that they are perceptible by sight, whereas whatever is not perceptible by sight was supposed not to be a body and so, then, must be nothing. Therefore, it was imagined, in the case of air, not that it was something that fills but that it was nothing. On their initial view, then, the air in the container was[11] imagined to be void[12] intervals, not some thing. The first to rouse them from their [intellectual] slumber did so by showing them that inflated wineskins resist prodding, and so, by prodding, it became obvious to them that air is a body, just like the rest of the bodies *qua* body. Some of those who saw that backtracked and no longer considered void an existing thing, since the thing that they had supposed was a void—that is, air—turned out to be full. Others, not voiding themselves of the void, conceded that air is not a pure void but, rather, a mixture of void and something that fills, since they found certain arguments and reasoning that conclude that the void exists.

(12) One of the arguments for that is their claim that we see bodies rarefy and condense without anything entering or leaving. Thus, rarefaction involves the parts being separated in such a way that what is left between them is a void, whereas condensation is the return of the parts to fill the void produced by rarefaction.

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10. For Avicenna's sources of the earliest accounts of the void, see Aristotle, *Physics* 4.6.

11. Reading *kāna* with **Z**, **T**, and the Latin (*est*) for **Y**'s *ka-anna* (as if).

12. Reading *khālīyah* with **Z**, **T**, and the Latin (*vacua*) for **Y**'s *ʿālīyah* (high), which simply makes no philosophical sense in the present context and may simply be a typographical error in **Y**'s edition.

تــارة ومملوءاً تارة؛ وهم أصحاب الخــلاء . وبعض القائلين بالخلاء يظن أنَّ الخلاء ليس هو بُعداً ، بل هو لا شيء ؛ كأن الشيء هو الجسم. وأول شيء خيّل اعتقاد الخلاء هو الهواء ، وذلك لأنَّ الظنّ العامي الأول هو أنَّ ما ليس بجسم ولا في جسم فليس بموجودٍ ! ثم ظنّهم الأول في أمر الأجســام الموجودة؛ هو أن تكون محسوسة بالبصر ، وما لا يحسّ بالبصر يُظن أنه ليس بجســم ، ثم يوجب أنّه ليس بشــيء . فلذلك يتخيل من أمر الهواء أنّه ليس بملاء ، بل لا شيء . فكان الإناء الذي فيه هواء لا يتخيّل عندهم من أمره، في أول الأمر ؛ أنَّ فيه شيئاً ؛ بل يتخيّل أنَّ هناك أبعاداً خالية. فأول مَنْ نبههم بأنْ أراهم الأزقاق المنفوخة تقاوم المسّ ؛ فأظهر لهم بالمسّ أنّ الهواء جســمٌ كســائر الأجسام في أنّه جسم. فمن الذين أراهم ذلك مَنْ رجع فلم يرَ ها هنا خلاء موجوداً ، إذ صار الشيء الذي كان يظّنه خلاء وهو الهواء ملاء . ومنهم من ســلّم أنَّ الهواء ليس بخلاءٍ صرف ، بل ملاء ويخالطه خلاء ولم يخلُ عن الخلاء ، إذ قد وجد حججاً وقياسات انتجت أن الخلاء موجود .

(١٢) فمــن الحجج على ذلك قولهم : إنّا نرى أنَّ الأجســام تتخلخل وتتكاثف من غير دخول شيء أو خروجه ؛ فالتخلخل إذن تباعد الأجزاء تباعداً يترك ما بينها خالياً ، والتكاثف رجوع من غير دخول شيء أو خروجه ؛ فالتخلخل إذن تباعد الأجزاء تباعداً يترك ما بينها خالياً ، والتكاثف رجوع من الأجزاء إلى ملء الخلاء المتخلخل .

(13) They also said that we see something completely filled with ashes being completely filled with water; but were there not a void, it would be impossible that it should be filled with water. Similarly, they said: There is also the wine cask that is completely filled with wine, and then that same wine is placed into a wineskin, and then both [the wine and the wineskin] are placed back into that same wine cask such that the cask simultaneously contains both wine and wineskin.[13] Were there no void in the wine into which the magnitude measuring the wineskin is contracted, it would be impossible that what had been completely filled by the wine alone should now contain both the wineskin and wine together.

(14) They further said that what grows does so only by extending into something that it is in but that, undoubtedly, that thing cannot extend into what is already filled, but only into what is void. Also, some of them generalized this argument, saying that the mobile must be moved into either a void or something already filled. If it moved into something already filled, however, then what is full would move into what is full! Thus, it remains that it is moved into a void. Also falling under that form of their argument is the phial that is sucked on and then inverted into water such that water enters into it, but if [the phial] were already full, then it could not contain some other thing that enters into it.

(15) Again, they said that when the mobile is moved, it must either repel what is full, and so move it, or it must interpenetrate it. Interpenetration, however, is absurd. So it remains that it repels it so as to move it, but the situation concerning what is repelled will be just like what is moved into it, and so, when it is moved, it necessarily follows that the universe is moved. Also, when any given thing is moved violently, there would be a ripple effect such that the universe [itself] would undulate violently imitating the undulation of [that thing].

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13. Aristotle mentions this example at *Physics* 4.6.213b15–18.

(١٣) قالوا : ونحن نرى إنه مملوءاً من رماد يسع مَلْؤه ماء ، فلولا أنَّ هناك خلاء لا ستحال أن يسع ملؤه ماء . وقالوا أيضاً : والدنّ يُملأُ شراباً ، ثم يجعل ذلك الشراب بعينه في زقّ ، ثم يجعلان في ذلك الدنّ بعينه ، فيسع الدنّ الزقّ والشراب معاً . فلولا أنَّ في الشراب خلاء قد انحصر فيه مقدار مساحة الزقّ ، لا ستحال أن يسع الزقَّ والشراب معاً ما كان يملؤه الشراب وحده .

(١٤) وقالوا : إنَّ النامي أيضاً إنما ينمو بنفوذ شيءٍ فيه ، فلا شك أنَّ ذلك الشيء ينفذ لا في الملاء ، بل في الخلاء . وبعضهم جعل هذا الاحتجاج كلّياً فقال : إنَّ المتحرك لا يخلو إما أنْ يتحرك في خلاء أو يتحرك في ملاء ، لكنه إن تحرّك في ملاء دخل ملاء في ملاء ، فبقي أن يتحرك في خلاء . ومن ذلك احتجاجهم بالقارورة التي تُمصّ ثم تُكبّ على الماء فيدخلها الماء . ولو كانت مملؤة لما وسعتْ شيئاً آخر يدخل فيها .

(١٥) وقالوا أيضاً : إنَّ المتحرك إذا تحرّك فلا يخلو إما أنْ يدفع الملاء فيحرّكه ، وإما أنْ يداخله ؛ لكن المداخلة محالة ، فبقي أنْ يدفعه فيحركه . وكذلك حال المدفوع فيما يتحرك فيه ، فيلزم إذا تحرّك أن يتحرك العالم ، وأن يكون إذا تحرّك متحرّك بعنفٍ أن يتموج العالم تموجاً بعنفٍ ومضاهياً لتموّجه .

(16) Those claiming that whatever the thing is on is *place* draw on [the belief] of the common man, since he calls wherever he sits his *place.* Our concern is not with the one who call this a *place,* but with identifying this place that the placed thing is on, which, in fact, is what contains and is exactly equal [to it] and is necessary for everything that undergoes locomotion, wherever it might be, even if it is not resting on anything supporting it.

(17) As for those who argue that place is the simple [surface], however it might be, they say that, just as the surface of the jar is a place for the water, so likewise is the surface of the water a place for the jar, since a touching surface belongs entirely to any given simple [surface] continuous with it. Also, they say that the outermost celestial sphere is moved. Now, whatever is moved has a place, and so the celestial sphere has a place; however, it does not have a containing limit of some surrounding thing. So, not every place is a containing limit of that which surrounds, but, rather, the place of [the outermost celestial sphere] is the upper surface of the sphere below it.[14] As for those who defend place's being a containing surface, we shall relate the facts about their school of thought and confirm it later;[15] but first we must refute those [other] schools of thought and then follow it up by revealing the errors in their reasoning.

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14. Cf. Themistius *In Phys.* 121.1–4.
15. See 2.9.1.

(١٦) أما القائلون بأنَّ المكان ما يكون الشـــيء عليه؛ فيأخذون ذلك من العامة، إذ يســـمون مجالســـهم أمكنة لهم. ونحن لا نبالي أنْ يسمّي مسمّ هذا مكاناً، لكنا لا نشتغل بتحقيق هذا المكان الذي يكون المتمكن عليه؛ بل الذي قيل إنّه حاوٍ مســـاوٍ، ولا بُدّ منه لكل منتقلٍ حيث كان، وإنْ لم يكن مستقراً على مستند.

(١٧) وأما القائلون بأنَّ المكان هو البسيط كيف كان؛ فهم يقولون إنّه كما أنَّ سطح الجرّة مكان للماء كذلك ســـطح الماء مكانٌ للجرّة لأنّه سطحٌ مماس لجملة بسيطٍ متصلٍ به. ويقولون إنَّ الفلك الأعلى متحركٌ، وكل متحرّك فله مكان؛ فالفلك الأعلى له مكان، لكن ليـــس لـــه نهاية حاوية من محيط. فليس كل مكانٍ هو النهاية الحاوية من المحيط، بل مكانه هو الســـطح الظاهر من الفلك الذي تحته. وأما القائلون بأنَّ المكان هو الســـطح الحاوي، فســـنذكر مذهبهم ونحقّقه. فيجب أنْ نبدأ أول شـــيءٍ بإبطال هـــذه المذاهب، ثم نتبعها بكشف المغالطات في قياساتهم.

Chapter Seven

Refuting the view of those who say that place is matter or form or any indiscriminate contacting surface or an interval

(1) The claim of those who think that the material or form is place is shown to be false in that one knows that the place is left behind when there is motion, whereas the material and form are not left behind. Also, motion is *in* place, whereas motion is not *in* the material and form, but *with* them. Also, motion is *toward* place, while motion is in no way *toward* the material and form. Also, when something is generated, as when water becomes air, its natural place changes, whereas its natural material does not change; and, at the start of the generation, [the generated thing] is *in* the initial place, whereas it is not *in* its form. Also, it is said that the wood *was* a bed, and that vapor was *from*[1] water, and [that] a human was *from* semen, while it is not said that place *was* such-and-such a body or that such-and-such a body was *from* place.

(2) On the view of those who say that place is any simple [surface] that contacts a complete simple [surface], whether as what surrounds or as what is surrounded, it necessarily follows that one body would have two places. In other words, according to their view, the jar must have two places: one place that is the surface of the water that is in it, and another that is the surface of the air that surrounds it. Now, it is known that one

1. For Avicenna's use of the preposition *ʿan* in relation to the material cause, see 1.2.18–19.

<الفصل السابع>

في نقض مذهب من قال إنَّ المكان هيولى أو صورة أو أي سطحٍ ملاق كان أو بُعْداً

(١) أمّا بيان فساد قول مَنْ يرى أنَّ الهيولى أو الصورة مكان، فبأن يعلم أنَّ المكان يفارق عند الحركة، والهيولى والصورة لا يفارقان. والمكان تكون الحركة فيه، والهيولى والصورة لا تكون الحركة فيهما بل معهما. والمكان تكون إليه الحركة، والهيولى والصورة لا تكون إليهما الحركة البتة. والمتكون إذا تكون استبدل مكانه الطبيعي كالماء إذا صار هواء ولا يستبدل هيولاه الطبيعية؛ وفي ابتداء الكون يكون في المكان الأول، ولا يكون في صورته. ويقال إنَّ الخشب كان سريراً، ويقال عن الماء كان بخاراً، وعن النطفة كان إنساناً، ولا يقال إنَّ المكان كان جسم كذا، ولا عن المكان كان جسم كذا.

(٢) وأمّا القائلون بأنَّ المكان كل بسيطٍ ملاقٍ لبسيطٍ تام كان محيطاً أو كان محاطاً؛ فيلزمهم أنْ يجعلوا للجسم الواحد مكانين، وأنه يلزمّ - على مذهبهمّ - أن يكون للجرّة مكانان، مكان هو سطح الماء الذي فيها، ومكان هو سطح الهواء المحيط بها. وقد علم

body does not have two places, but that a single placed thing has a single place. They were forced to this position simply because they did not understand the motion of the celestial sphere and supposed that it was local—that is, it is something moved with respect to place—while finding that the outermost body is not in a place that contains from outside. If our view concerning positional motion[2] is recognized, we are spared this inconvenience and saved from this exigency.

(3) As for those who claim that place is the fixed interval between the limits of what contains, we shall single out those of them who deem it absurd that this interval [ever] be devoid of what is placed [in it].[3] This interval must either exist together with the interval belonging to the contained body or not. On the one hand, if it does not exist [together with the interval belonging to the contained body], then a place would not exist together with the thing placed in place, because the placed thing is this contained body and the place is this interval that [is being assumed] to not exist together with the interval of the body. If, on the other hand, it does exist together with it, then one or the other of the following must be the case: It might have an existence that is numerically different from the existence of the interval of the contained body and so is distinct from it, receiving certain properties and accidents that numerically belong to it to the exclusion of those belonging to the interval of the contained body. Alternatively, it might not be different from it and instead might be united with it so as to become identical with it. If, on the one hand, it is different from it, then there is an interval between the limits of what contains, which is place, and another interval in the placed thing that is likewise between the limits of what contains and is numerically

2. For Avicenna's account of motion with respect to position, see 2.3.13–16.
3. The position mentioned is that of John Philoponus; see the note to 2.6.11.

أنَّ الجسم الواحد لا يكون في مكانين، وأنَّ للمتمكن الواحد مكاناً واحداً. وإنّما اضطروا إلى هذا القول بسبب جهلهم بحركة الفلك وظنّهم أنّها مكانية، ووجودهم الجرم الأقصى لا في مكانٍ حاوٍ من خارجٍ وهو متحرّك حركة مكانية. وإذا عُلم مذهبنا في الحركة الوضعية، اُستغني عن هذه الكُلْفة وتخلّص عن هذه الضرورة.

(٣) وأما القائلون بأنَّ المكان هو البُعد الثابت بين أطراف الحاوي؛ فنخصّ الذين يُحيلون منهم خلو هذا البُعد عن المتمكن، أنَّ هذا البُعد لا يخلو إما أنْ يكون موجوداً مع البُعد الذي للجسم المحوي عليه، أو لا يكون موجوداً؛ فإنْ لم يكن موجوداً فليس مع وجود المتمكن في المكان مكانٌ، لأنَّ المتمكن هو هذا الجسم المحوي، والمكان هو هذا البُعد الذي لا يوجد مع بُعْد الجسم. وإنْ كان موجوداً معه؛ فلا يخلو إمّا أنْ يكون له وجود هو غير وجود بُعْد الجسم المحوي بالعدد، فهو ممايز له، يقبل خواص وأعراضاً هي بالعدد أعراضاً له من دون التي لبُعد الجسم المحوي. وإمّا أنْ لا يكون غيره، بل يتحد بل فيصير هو هو وإنْ كان غيره. فهناك بُعْد بين أطراف الحاوي هو مكانٌ وبُعْدٌ آخر في المتمكن أيضاً هو بين أطراف الحاوي، غير ذلك بالعدد. ولكن معنى قولنا البُعْد الشخصي الذي بين

different from the former. Our saying "the individual interval that is between these two things" means that this [interval] is the continuous thing that is susceptible to division between the two [limits] in a particular way so as to be pointed to, and so whatever is between *this* limit and *that* limit is this interval that is between the two. Now, whatever is this interval that is between the two definite limits is necessarily a single individual, not something different, and so whatever is between *this* limit and *that* limit is a single individual interval, not one interval and another. Consequently, between *this* limit and *that* limit there does not exist one interval belonging to the body and also some other interval; however, the interval that belongs to the body between the two limits does exist, and so the "other" interval, the latter, does not exist. If, on the other hand, [the purported interval identified with *place*] is identical with [the interval of the contained body], then there is no interval but this one; and similarly, when some other body replaces it, there would be no interval but that which belongs to the other body. So there simply does not exist between the limits of what contains any other interval than the interval of what is contained, but they do not believe that it is possible for it to be wholly devoid of what is placed [in it]. So, then, the separate interval exists only in the estimative faculty's imagining certain absurdities, similar to its imagining that that containing body remains [something that contains] without some of the internal limits being covered by others nor having any body in it. This is just like one who says that when our estimative faculty imagines that five has been divided into two equal parts, the odd in that case has been increased by one unit.[4] So, when this necessarily follows on the estimative faculty's imagining some absurdity, then it need have no reality in existence.

4. It was a standard conception among ancient and medieval mathematicians that the *even* is what can be divided into two equal parts without remainder, whereas the *odd* is that which cannot be equally divided, but always has a unit left over; see, for instance, Euclid, *Elements* 7, defns. 6–7. Thus, to imagine that five has been divided into two equal parts is tantamount to imagining that what is odd is simultaneously even—an obvious absurdity.

هذين الشيئين هو أنّه هذا الأمر المتصل الذي يقبل بينهما القسمة الواحدة المشار إليها ، فكل مـــا بين هذا الطرف وهذا الطرف هو هـــذا البُعْد الذي بين الطرفين . وكل ما هو هذا البُعْد الذي بين الطرفين المحدودين ، فهو لا محالة واحد شخصي لا غير ، فيكون كل ما بين هذا الطرف وهذا الطرف بُعْداً شخصياً واحداً ليس بُعْداً وبُعْداً آخر . وإذا كان كذلك ؛ لم يكن بين هذا الطرف وهذا الطرف بُعْدٌ للجسم وبُعْد آخر . لكن البُعْد الذي للجسم بين الطرفين موجـــودٌ ، فالبُعْد الآخر ليس بموجودٍ . هذا فأمّا إنْ كان هو هو فليس هناك بُعْدٌ إلاّ هذا . وكذلك إذا تعقّبه جسم آخر لم يكن هناك بُعْدٌ إلاّ الذي للجسم الآخر ، فلا يوجد البتة بين أطراف الحاوي بُعْدٌ هو غير بُعْد المحوي ، ولا يجوز عندهم خلوّه البتة عن المتمكن . فإذن لا يوجـــد البُعْد المفرد إلاّ في توهم محالات ؛ مثل أنْ يتوهم أنْ يبقى ذلك الجســـم الحاوي غير منطبق النهايات الداخلة بعضها على بعضٍ ولا جسم فيه . وهذا كمَنْ يقول إذا توهمنا الخمســـة منقسمة بمتساويين فيكون حينئذ زائداً على الفرد بواحدٍ ، فليس يجب ، إذا لزم هذا ، عن توهم محالٍ هناك أنْ تكون له حقيقة في الوجود .

(4) Also, how could it even be possible for the two intervals to be together when it is obvious that two intervals are greater than one interval, because (and for no other reason than) they are *two* and a composite? Now, the whole of any composite interval is greater than one interval, and is thus greater than it because the *greater* is that which is quantitatively more than some other by a number that exceeds the other; and the greater with respect to magnitudes is like the many with respect to number, where whatever is quantitatively more with respect to magnitudes is greater. So, when one interval enters into another, either the interval that is entered into ceases to exist, such that an existing interval has entered into a nonexisting one, or it remains and the one interpenetrates it, forming a composite that is greater than either one of them, such that the two intervals would be greater than a single one. The situation is not like that, however, since the composite of the two would be that which is between the limits, and that is the exact amount of each one of them; and so the composite would not be greater than either one [taken individually].

(5) Here, one might ask about the state of the line when it is folded such that half of it is superimposed upon the other half, in which case there would be two lines, the composite of which does not exceed in length the length of either one of them. This, however, is absurd, because either one of the following cases must hold: On the one hand, each half might have a distinct position from the other, in which case the composite of the two lines would make an interval different from and bigger than the interval of either one of them, whereas if it is not [folded] rectilinearly, then it would not have been folded [as required], nor would there be one interval derived from the composite of both, but, instead, one interval would be distinct from another.[5] On the other hand, the two might unite so as to form a single line (if that is possible), in which case there would not be two lines, but only one.

5. The two scenarios Avicenna seems to have in mind are (1) one line is lying on top of another similar to an equal sign (=), in which case the composite is greater, i.e., thicker, than any single line in the composite, or (2) rather than being folded, the line is bent like a horseshoe (⊃), in which case not only is it not folded as instructed, but also there is no actual composite of the two.

(٤) كيف يمكن أنْ يكون بُعْدان معاً؟ ومن البيّن أنَّ كل بُعْدين اثنين أكثر من بُعْدٍ واحدٍ؛ لأنهما إثنان ومجموع لا لأجل شيء آخر. وكل مجموع بُعْدٍ أكبر من بُعْدٍ؛ فهو أعظم منه، لأنَّ العظيم هو الذي يزيد على القدر بعددٍ خارج عن الشيء. والعظيم في المقادير كالكثير في العدد، وكل ما هو أكبر في المقادير قدراً فهو أعظم. فإذا كان بُعْدٌ يدخل في بُعْدٍ فإمّا أنْ يعدم البُعْد المدخول فيه؛ فيكون قد دخل بُعْدٌ موجودٌ في معدوم، وإمّا أنْ يبقى هو والداخل فيه مجموعين أعظم من واحدٍ منهما، فيكون البُعْدان أعظم من واحدٍ، وليس الأمر كذلك؛ لأنَّ مجموعهما هو الذي بين النهايات، وذلك بعينه قدر كل واحدٍ منهما؛ فليس المجموع أعظم من الواحد.

(٥) ولسائلٍ أنْ يسأل ها هنا حال الخط إذا عطف حتى لزم نصفُه نصفَه فيكون خطّان، ومجموعهما في الطول لا يزيد على طول واحد منهما، لكن هذا محالٌ؛ لأنّه لا يخلو إمّا أنْ يتميّز كل نصفٍ عن الآخر في الوضع، فيكون مجموع الخطّين يفعل بُعْداً غير بُعْد واحدٍ منهما وأكبر منهّ – وإنْ كان ليس على الاستقامة لم يكن الإنعطاف، ولا يكون البُعْد الواحد متناولاً لمجموعهما بل يتميّز بُعْد وبُعْدٌ – وإمّآ أنْ يتحدا خطّاً واحداً إنْ أمكن ذلك، فحينئذ لا يكون خطّان، بل خطٌ واحد.

(6) [In contrast with lines, however,] bodies are precluded from interpenetrating.[6] Now, what precludes the bodies from doing that is not that there is included in that body some set of forms, qualities, or the like comprising the body as such; for whichever forms or qualities you care to take, were they not to exist, while the body is assumed to exist, the interpenetration would still be impossible. Moreover, the material does not preclude something's interpenetrating some numerically different material.[7] That is because when we say that the material is precluded from interpenetrating some other material, this might be taken in either one of two ways: On the one hand, this might be by way of negation, like saying that sound is not seen and that the soul does not interpenetrate motion, since neither one of these is characterized as being with the other such that the estimative faculty imagines that there is interpenetration. On the other hand, [the material's precluding interpenetration] might not be like this, but in the sense that opposes interpenetration as a proper opposite. For, just as the meaning of *interpenetration* is that anything you take from one of two [interpenetrating] things, you find locally with it something of the other (since one is not locally separate from the other), so that which opposes it is that *this* very thing is locally distinguished from *that* very thing, and so its parts are taken to be distinct from the parts of that one.

(7) If the claim is that the material precludes interpenetration in the negative sense (that is, the first [sense]), then our discussion is not about it, and it is conceded that, in itself, the material does have this description. Our discussion instead concerns the second option. Now, that second option is inconceivable with respect to the material unless [the material] itself is assigned a location; but that happens only accidentally on account of the interval it happens to have, in which case it is [the interval] that resists being partitioned and divided. So the material is so disposed as to bear this opposite (that is, interpenetration), whereas

6. For a detailed discussion of Avicenna's argument against the interpenetration of bodies, see Jon McGinnis, "A Penetrating Question in the History of Ideas: Space, Dimensionality and Interpenetration in the Thought of Avicenna," *Arabic Sciences and Philosophy* 16 (2006): 47–69.

7. Cf. John Philoponus, *In Phys.* 559.9–18, who argues that it is the materiality that precludes two bodies from interpenetrating.

(٦) والأجسام التي تمتنع عن التداخل، ليس الذي منع ذلك من هذا الجسم أنْ يدخل في ذلك الجسم جملة ما يشتمل عليه الجسم من الصورة والكيفيات وغير ذلك. فإنَّ الصورة والكيفيات أيّها فُرضتْ، لو لم تكن وفُرض الجسم موجوداً، كان التداخل ممتنعاً أيضاً، وليس الهيولى هي التي تمتنع عن مداخلة هيولى أخرى بالعدد. وذلك أنّا إذا قلنا إنَّ الهيولى تمتنع عن مداخلة هيولى أخرى، إمّا أنْ يكون هذا على سبيل السلب كقولنا: إنَّ الصوت لا يرى، بل كما نقول إنَّ النفس لا تداخل الحركة؛ إذ ليس من شأن كل واحد منهما أنْ يكون مع الآخر بحيث يتوهم عليه المداخلة. وإمّا أنْ لا يكون على هذا، بل على المعنى الذي يقابل المداخلة مقابلة خاصيّة. فإنّه، كما أنَّ معنى المداخلة هو أنْ يكون أيَّ شيءٍ أخذت من أحد الأمرين، نجد معه في الوضع شيئاً من الآخر؛ إذ لا ينفرد أحدهما بوضع عن الآخر، فالذي يقابله هو أنْ يكون ذات هذا متميّزاً في الوضع عن ذات ذلك، فتؤخذ أجزاؤه مباينة لأجزاء ذلك.

(٧) فإنْ قيل إنَّ الهيولى يمتنع عليها التداخلّ – بمعنى السلب الذي هو المعنى الأولّ – فليس كلامنا في ذلك، وذلك مسلّم أنَّ الهيولى في نفسها بهذه الصفة. ولكن كلامنا في القسم الثاني؛ وذلك القسم الثاني لا يتصور في الهيولى إلاّ أنْ تُجعل ذات وضع، ولا تصير كذلك إلاّ بالعرض، بسبب البُعْد الذي يعرض لها، فحينئذ تتعرض ‹للتجزؤ› والإنقسام. فيكون استعداد الهيولى لأنْ تُحمل عليها هذه المقابلة، وهي التداخل وغير

the other opposite ([that is,] noninterpenetration), follows as a concomitant of the interval. The interval causes this opposite to follow as a concomitant of [the material] and be conceptualized as such. It is because of the interval that the material does not interpenetrate other material (even if the interval is the sort of thing to which that might belong), while it is not in the nature of the material alone to be an obstacle that opposes interpenetration and so to preclude the material's being something that interpenetrates. How could this material that possesses the interval in such as way as not to preclude itself from having the corporeal interval possibly preclude that very [interval] from receiving another corporeal interval? The material has nothing to do with whether something is insusceptible to the nature of the interval when it encounters it, nor has it anything to do with whether it is insusceptible to a given interval and increase, whereas it will be revealed that [the material] is susceptible to rarefaction once we investigate and confirm that.[8] So, if the interval in itself does not preclude the interpenetration of some other interval, whereas the material is what is prepared such that it does receive the interval, and it is not in its nature *qua* material that it be unique to one space such that it would oppose interpenetration,[9] then the interpenetration of two bodies must be possible. So, if there is something [that is] composed of two things and [that] is itself nothing but the composite of the two (without there occurring a certain alteration and affection [so as to produce] a third form or factor different from the two), then, when each one of them is judged to be possible, the whole is [also judged] to be possible, and when one after another is not prevented, the whole is not prevented. The whole body, however, is precluded from interpenetrating another body! So what prevents that is owing to its parts. It is not, however, that every part of it prevents that, since the material is not a cause preventing that, whether by some proper action or affection. So it remains that it is the nature of the interval that does not suffer interpenetration; and if, additionally, the material informed by the interval cannot interpenetrate the interval, then the body cannot enter into an interval at all.

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8. The reference is to *Kitāb fī al-kawn wa-l-fasād,* although there is also a brief discussion at 2.9.17 and 20–21.

9. Reading *al-mudākhilah* with **Z**, **T**, and the Latin (*infusio*), which **Y** (inadvertently) omits.

التداخــل المقابــل له أمراً يلحقها من البُعْد ؛ والبُعْد هو الســبب في أنْ تلحقها هذه المقابلة وتتصور فيها ، وهو السبب في أنْ صارت الهيولى لا تداخل الهيولى الأخرى لأجل البُعْد ، وأنْ كان البُعْــد جائزاً له ذلك . وليــس في طبيعة الهيولى وحدها مَنْعٌ يقابل المداخلة ، فلا يمتنع على الهيولى المداخلة . وكيف يمكن أنْ تمانع هذه الهيولى ذات البُعْد لنفسها لا لامتناع البُعْد الجســماني ، أنْ تلقى ذاته البُعْد الجسماني الآخر؟ وليست الهيولى ممّا لا يقبل طبيعة البُعْد ويلاقيه ، ولا أيضاً ممّا لا يقبل بُعْداً أو زيادةً ؛ ويكشــف قبولها التخلخل ، وذلك حين نحقّقه ونصحّحه . فإنْ كان البُعْد لا يمتنع عن مداخلة بُعْدٍ آخر في نفسه ، والهيولى مستعدة لأن يلقاها البُعْد ، وليس في طباعها – بما هو هيولىّ – أنْ تنفرد بحيّز فتتقابل المداخلة ، فواجب أن يكون التداخل في الجسمين جائزا . فإن كلّ مؤلف من شيئين ، ليس المؤلف إلاّ نفس مؤلفهما ، من غير أنْ حدث هناك اســتحالةٌ وانفعالٌ ، هي صورةٌ ثالثة ومعنى ثالث غيرهمــا . فإنَّ الحكم إذا كان جائزاً على كل واحدٍ منهمــا كان جائزاً على الجملة ، وإذا لم يمنعه واحد واحد منهما لم تمنعه الجملة . لكن جملة الجســم تمانع مداخلة جسم آخر ، بســبب أنَّ في أجزائه ما يمنع ذلك ، وأنّه ليس كل جزءٍ منه غير مانع لذلك ، إذ ليســت الهيولى سبباً يمنع ذلك ، ولا بسبب فعلٍ خاص وانفعالٍ خاص . فبقيَ أنْ تكون طبيعة البُعْد لا تحتمل التداخل ، فإنْ كان مع ذلك يجب للهيولى المتصورة بالبُعْد أنْ لا تُداخل البُعْد ، لم يجزْ أنْ يدخل الجسم في بُعْدٍ البتة .

(8) Moreover, the matter and material of the thing placed in the container that has been filled must either encounter that naturally disposed interval or not. Now, on the one hand, if [that interval] remains independent and separate from [the material], then the body possessing the material will have neither filled the container nor entered into it. [That is] because that naturally disposed interval is something that subsists independently, which does not encounter the matter of the body entering into it, whereas the body entering into it is itself never devoid of its matter. On the other hand, if that interval permeates the matter itself along with the interval in the matter, then two equal intervals agreeing in nature will have permeated the matter. It is well known, however, that things agreeing in [their] natures that are not divided into species by differences in their substance do not make up a multiplicity of individuals except through the multiplicity of the matters that underlie them, whereas, when there is only one matter for [the nature], there simply is no multiplicity, and so there will not be *two* intervals. Also, were we to assume that in the matter the interval has become many, then there would be two intervals; but, then, which intervallic property would the matter have owing to one of the intervals that permeates it, and which other property would it have owing to the other interval that permeates it? [That] is because we find in the matter one [intervallic property] that corresponds with the continuous and another that corresponds with being divisible; and, accordingly, were there but one interval in [the matter], then the form would be that form.

(9) So this is what we have to say in refuting the existence of this naturally disposed interval. During the refutation of that, something was said that will provide a basis for [showing that] it is impossible for intervals to exist within intervals *ad infinitum*. At this point, however, we have not reached a full understanding of that according to a true sense that commands confidence; but later, we, or someone else, will reach it.[10]

10. The reference may be to his doctrine expounded in 3.2.8 and elsewhere that within a continuous magnitude, there is not an infinite number of actual, potential, or even latent half-intervals; rather, the potentially infinite divisibility of a continuous magnitude refers to the fact that nothing in the material precludes the estimative faculty from imagining as many divisions and as small an interval as one wants.

(٨) ثم لا يخلو ؛ إذا كان المتمكن في الإناء قد ملأه من أنْ تلقى مادته وهيولاه ذلك البُعْد المفطور أو لا يلاقيها ، فإنْ انفرد عنها وفارقها فلا يكون الجسم ذو الهيولى قد ملأ الإناء ولا دخل فيه ، إذ يكون ذلك البُعْد المفطور قائماً على حياله ، ليس ملاقياً لمادة الجسم الداخل فيه . والجسم الداخل فيه لا تكون ذاته خالية عن مادته ؛ وإنْ سرى ذلك البُعْد في ذات المادة مع البُعْد الذي في المادة ، فتكون المادة قد سرى فيها بُعْدان متساويان متفقا الطبيعة . وقد عُلم أنَّ الأمور المتفقة في الطباع ، التي لا تتنوع بفصولٍ في جوهرها ، لا تتكّثر في هوياتها إنّما تتكّثر بتكّثر المواد التي تحملها ، وإذا كانت المادة لها واحدة لم تتكّثر البتة ، فلا يكون بُعْدان . ولو أنّا فرضنا البُعْد قد تكّثر في المادّة لكان فيها بُعْدان . فأيّة خاصية بُعْدية تكون للمادة بسبب سريان أحد البُعْدين فيها ؟ وأيّة خاصية أخرى تكون لها بسريان البُعْد الآخر فيها ؟ فإنّا لا نجد في المادة إلاّ نحواً من الاتصال واحداً ونحواً من الانقسام واحداً ، وعلى ما لو كان فيها بُعْد واحد فقط ، لكانت الصورة تلك الصورة .

(٩) فهذا ما نقوله في إبطال وجود هذا البُعْد المفطور . وقد قيل في إبطال ذلك شيء مبني على استحالة وجود أبعادٍ في أبعادٍ بلا نهاية ، ونحن لم نحصل إلى هذه الغاية فهم ذلك على حقيقةٍ يُوجب الركون إليها ، وسندركها بعد ؛ أو يدركها غيرنا .

Chapter Eight

The inconsistency of those who defend the void

(1) The first thing we must do is to explain to the proponents of the void that it is not absolutely nothing, as many people suppose and imagine. Indeed, if the void is simply nothing, there would be no dispute between them and us. So let the void be nothing that has any determinate reality, and we shall happily grant them this.[1] The descriptions applied to the void, however, demand that it be some existing thing—namely, that it is a certain quantity, and that it is a certain substance, and that it has a certain active power. [That is] because *nothing* cannot exist between two things to a greater and lesser extent, whereas the void might exist between two bodies to a greater and lesser extent, for the void measured between Heaven and Earth is greater than that occurring between two cities on the Earth. In fact, it will have a certain ratio, and, indeed, each one of the two will exist as some measured distance having a magnitude, such that one void would be a thousand cubits and the other ten. Also, one void would terminate at a certain occupied place, while the other would go on infinitely. These states simply cannot be predicated of pure nothing.

(2) Now, since [the void] has these properties, and these properties essentially belong to quantity (and, by means of quantity, to whatever else [has them]), the void must have them either primarily and essentially or accidentally. If it has them essentially, then it is quantity [which will

1. For a discussion of Avicenna's argument, which runs through paragraphs 1–4, see Jon McGinnis, "Logic and Science: The Role of Genus and Difference in Avicenna's Logic, Science, and Natural Philosophy," *Documenti e Studi* 18 (2007): 165–86, esp. §4.

<الفصل الثامن>

في مناقضة القائلين بالخلاء

(١) وأمّا القائلون بالخلاء ؛ فأول ما يجب علينا هو أنْ نعرّفهم أنَّ الخلاء ليس لا شيء مطلقاً ، كما يظنّ ويتوهم قومٌ كثير ، وأنّه إنْ كان الخلاء لا شيء البتة ؛ فليس ها هنا منازعة بيننا وبينهم ، فليكن الخلاء لا شيئاً حاصلاً ؛ ولنسلّم هذا لهم . لكن الصفات التي يصفون بها الخلاء تُوجب أنْ يكون الخلاء شيئاً موجوداً ، وأنْ يكون كمّاً ، وأنْ يكون جوهراً ، وأنْ تكون له قوة فعّالة ، فإنَّ اللاشيء لا يجوز أنْ يكون بين شيئين أقل وأكثر ، والخلاء قد يكون بين جسمين أقل وأكثر . فإنَّ الخلاء المقدّر بين السماء والأرض أكثر من المتحصل بين بلدين في الأرض ، بل له إليه نسبة ما ، بل وكل منهما يوجد ممسوحاً مقدّراً لمقدارٍ ؛ فيكون خلاء ألف ذراعٍ وخلاء آخر عشرة أذرع ، وخلاء يتناهى إلى ملاء ، وخلاء يذهب إلى غير نهاية . وهذه الأحوال لا تحمل البتة على اللاشيء الصرف .

(٢) ولأنّه يقبل هذه الخواص ، وهذه الخواص بذاتها للكمّ وبتوسط الكم ما يكون لغيرهّ – فلا يخلو إمّا أنْ يقبلها الخلاء قبولاً أولياً بالذات ، أو قبولاً بالعرض . فإنْ كان قَبِلَها

be considered shortly]. If it has them accidentally, then it is something possessing a quantity, doing so as either a substance or an accident. Now, the accident possesses a quantity only because it exists in a substance that possesses a quantity; and so the void would need to be essentially joined to a substance and a quantity, where that quantity would be nothing but the continuous quantity that is divisible in three dimensions. Now, if the substance and the quantity [together] internally constitute it, and every substance having this description [namely, having three dimensions] is a body,[2] then the void will be a body. If the two are joined to it from without and do not constitute it, then the states of [the void] reduce to that of an accident in a body; but a body does not enter into the accident in the body, and so a body would not enter into the void. On the other hand, if that [namely, the aforementioned properties] belongs to it essentially, then it must be essentially quantity. Now, it belongs to the nature of what is essentially a three-dimensional extended quantity that it be impressed into matter and that it be either a part or a configuration of the sensible body. If it is not impressed into the matter, then [its not being so] is not because it is a quantity, but because of some accidental factor. Now, that accidental factor must be of the character that it either subsists without being in a subject or not. On the one hand, if it is of the character that it subsists without being in a subject[3] while being joined to the interval, then this interval inherently subsists as joined to something else that subsists without being in a subject. So that to which [the void] is joined and by which it subsists (namely, what subsists in itself) is a subject by which the void's interval subsists. So the subject of the interval will, in fact, be nothing but a thing that, in

2. Cf. 1.2.2.

3. Reading with **Z**, **T**, and the corresponding Latin *aw yakūnu laysa min shaʾnihi dhālika. Fa-in kāna min shaʾnihi an yuqūma lā fī mawḍūᶜ* (. . . or not. On the one hand, if it is of the character that it subsists without being in a subject), which **Y** (inadvertently) omits.

بالذات فهو كمٌّ، وإنْ كان قبلها بالعرض فهو شيء ذو كمّ؛ إمّا عرضٌ ذو كمّ، وإمّا جوهرٌ ذو كمّ. والعرض لا يكون ذا كمّ إلاّ لوجوده في جوهرٍ ذي كمّ، فيلزم أنْ يكون الخلاء ذاتاً مقارنة لجوهرٍ وكمّ، وليس ذلك الكمّ إلاّ الكمّ المتصل القابل للقسمة في الأقطار الثلاثة. فإنْ كان كلّ واحدٍ من الجوهر والكمّ داخلاً في تقويمّ - وكل جوهرٍ بهذه الصفةّ - فهو جسم؛ فالخلاء جسم. وإن كانا مقارنين له من خارج غير مقومين له، فأقلّ أحواله أنْ يكون عرضاً في جسم، والعرض في الجسم لا يدخله جسم، فالخلاء لا يدخله جسم. وإنْ كان قَبِلَ ذلك بالذات فهو لا محالة كمٌّ بالذات، ومن طباع الكمّ بالذات، الذي له ذهاب في الأبعاد الثلاثة، أنْ تنطبع به المادة وأنْ يكون جزءاً أو هيئة للجسم المحسوس. فإنْ لم تنطبع به المادة فلا يكون لأنّه كمٌّ؛ بل لأمرٍ عارض، وذلك العارض لا يخلو إمّا أنْ يكون من شأنه أنْ يقوم لا في موضوع أو يكون ليس من شأنه ذلك. فإن كان من شأنه أن يقوم لا في موضوع وقد قارن البُعْد؛ فهذا البُعْد لا يخرج عن أنْ يقوّم مقارناً لقائم لا في موضوع غيره. فما يقارنه البُعْد ويقوم بهّ - وهو قائم في نفسهّ - فهو موضوع يقوم به بعد الخلاء، فإنّ الموضوع للبُعْد ليس إلاّ شيئاً هو في نفسه لا في موضوع ويقارنه بُعْدٌ ويكمّمه. وإنْ

itself, is not in a subject and with which a certain interval is conjoined and that gives to [the interval] a certain quantity. On the other hand, if that [accidental] factor is of the character that it subsists with a subject, then the only existence it and whatever accompanies it will have is in a subject. So, then, how does the interval come to be something that subsists without a subject, when it needs a subject? If it is said that its subject is the void and that when it is in its subject, it makes its subject be without a subject, the sense of the claim is that what has no subsistence in itself is accidental to what has no subsistence in itself except in a subject, and then it makes it subsist in itself without a subject. Now one of the things would be in its nature an accident, while accidentally being a substance, and so the substantiality would be something accidental to one of the natures—which is impossible, as will become clear, particularly in First Philosophy.[4] In short, the indicated interval admits of both situations,[5] [and yet] it is numerically one nature and so is itself ordered only to one genus, in which case that nature [must] fall under either what exists in a subject or what does not.

(3) Moreover, if [that nature] is sometimes in itself a substance and at other times in itself a nonsubstance, then, when it becomes a nonsubstance, it itself will have been corrupted absolutely such that its highest genus—namely, substantiality—will have passed away. In that case, [that nature itself] will no longer remain, for if its species below its highest genus were corrupted, its substance would no longer remain. So, when its highest genus is corrupted, how can you think that its specific nature, by which it is a substance, will remain? If this factor underlying the interval is something inseparable that does not cease, then either it is inseparable

4. Cf. *Ilāhīyāt* 2.1.
5. That is, it can either exist in a subject or not exist in a subject.

كان ليس من شـــأن ذلك المعنى أنْ يقوم لا في موضوع؛ فيكون لا وجود له مع ما هو معه إلاّ فـــي موضوع. فكيف يصير البُعْـــد قائماً لا في موضوعٍ وهو يحتاج إلى موضوع؟ فإنْ قيل إنَّ موضوعه هو البُعْد ، وأنّه إذا حصل في موضوعه جعل موضوعه لا في موضوع؛ كان معنى هذا الكلام أنَّ ما لا قوام له بنفسه يعرض لما لا قوام له في نفسه إلاّ في موضوع، فيجعله قائماً في نفســـه لا في موضوع. ويكون بعض الأشـــياء هـــو في طبيعته عرض، ويعرض له أنْ يكون جوهراً ، فتكون الجوهرية ممّآ يعرض لبعض الطباع وهذا الاســـتحالة، وخصوصاً في الفلسفة الأولى. وبالجملة فإنَّ البُعْد المشار إليه؛ القابل للأمرين، هو طبيعة واحدة بالعدد ، فلا تترتب هي بعينها إلاّ في جنسٍ واحدٍ ، فتكون تلك الطبيعة إمّا تحت ما وجوده في موضوع، أو تحت ما وجوده لا في موضوع.

(٣) وأيضـــاً إنْ كانت تـــارة هي بعينها جوهراً ، وتارة هـــي بعينها لا جوهراً ، فإذا صارت لا جوهراً فقد فســـدت منها ذاتها فســـاداً مطلقاً ، حتى زال أعلى أجناسها وهي الجوهرية، فلا تكون باقية لا محالة. فإنّها لو كان يفسد نوعها دون جنسها الأعلى، لكان جوهرها لا يبقى؛ فكيف إذا فســـد جنســـها الأعلى، فترى تبقـــى نوعيتها التي هي بها جوهـــر؟ وأمّا إنْ كان هذا المعنى الموضوع للبُعْـــد ملازماً غير زائلٍ، فلا يخلو إمّا أنْ يلزم

from the void because it is a certain dimensionally extended interval (in which case every interval will be separate from matter) or it is inseparable from it because of a certain thing upon which it follows as a consequence that an interval is dimensionally extended (in which case the account about that thing will be the same as the former account, going on *ad infinitum*). Also, this consequence [namely, that an interval is dimensionally extended] will be unlike the species difference belonging to a genus, since (given that the nature of the interval is such as to be divided into three dimensions) the specific nature [of being dimensionally extended] will [equally] belong to magnitude, as well as the natures of a line and a surface. [That is] because the distinction between the specific nature upon which accidents follow and the generic nature upon which differences follow is that the generic nature is divided into different [species] by differences that follow upon the [specific] nature as such. Even when they do not follow as consequences, the intellect needs them to follow at least to the extent that they are perfectly conceptualized in the intellect and so might be given some determinate existence in [the intellect]. In short, on the grounds that [something] is, it should have some difference. So, when it is said that there is an absolute void—that is, some indeterminate thing susceptible to continuous division—the difference upon which this follows as a consequence is that (whether in one, two, or all directions) there should be some difference that qualifies the intelligible concept of the interval and gives it some determinate existence in reality and in the intellect, and that the intellect needs in order to determine whether it is some existing thing or [simply] a vain intelligible.

الخلاء لأجل أنّه بُعْدٌ ذاهبٌ في الأقطار، فيكون كل بُعْدٍ مفارقاً للمادة أو يلزمه لمعنى يلحقه بعد كونه بُعْداً ذاهباً في الأقطار، ويكون الكلام في ذلك المعنى هو ذلك الكلام بعينه؛ ويذهب إلى غير ‹نهاية›. وليس هذا اللحوق، كلحوق المعنى الفصلي للمعنى الجنسي، إذ طبيعة البُعْدّ – إذا كان بحيث ينقسم في الأبعاد الثلاثة – فهي طبيعة نوعية للمقدار. وكذلك طبيعة الخط، وكذلك طبيعة السطح؛ لأنَّ التمييز بين الطبيعة النوعية على ما يلحقها من العوارض، والجنسية على ما يلحقها من الفصول ‹هو› أنَّ الطبيعة الجنسية تنفصل بفصولٍ تلحق الطبيعة بما هي. وإذا لم تلحق يكون العقل مقتضياً للحوقها حتى يُستكمل في العقل تصوّرها، ويجوز عنده تحصيل وجودها. وبالجملة قد يكون فصلاً له لأنّه هو؛ فإنّه إذا قيل بُعْدٌ مطلقاً، أي أمر يقبل الانقسام المتصل بلا تحصيل؛ كان الفصل الذي يلحق هذا أنّه في جهةٍ أو جهتين أو جميع الجهات فصلاً يكيف المعنى المعقول من البُعْد ويحصلّه مقرّراً في الوجود وفي العقل، ويفتقر إليه العقل في تحصيله موجوداً أو معقولاً مفروغاً عنه.

(4) As for part of the interval's coming together with white or black and part of it needing matter while another part subsists without matter, [such considerations] neither qualify its intervallic nature nor does it need them in order to be an interval and subsist. In fact, they follow upon it inasmuch as [the interval] is in matter, and, inasmuch as it exists, its existence is qualified by some external factor. Species differences are those things by which something's essence is qualified, whether it is assumed to exist in concrete particulars or that [assumption] is not taken into account. (The complete scientific account of this is given in another discipline.)[6] In fact, the nature of the interval is completed in[7] its essence as an interval in that it determinately has some manner of division and extension. Everything else simply are concomitants that follow upon it, which we do not need in order to establish that there is a given interval that is correctly assumed to exist. [Other than the interval's having some manner of division and extension,] the intellect [simply] does not require anything else upon which [the interval] follows as a consequence so as to believe that the interval determinately exists—[unlike] the way that [the intellect], when it believes that color or animal exists, requires that there needs to be some species in a certain state and having some description in order that [either color or animal] exist. Therefore, the intellect cannot allow that the true difference is absent from the species while its share of its genus remains, which was explained elsewhere.[8] Consequently, this differentiation between an interval that is in matter and one that is not in matter is not such as to

6. The reference may be to *Kitāb al-madkhal* 1.2, if Avicenna means that the existence of essences is assumed to be either in concrete particulars or in conceptualization. Alternatively, if he is referring to the role of species differences, the reference may be to *Kitāb al-madkhal* 1.13.

7. Reading *fī* with **Z**, **T**, and the Latin (*in*), which is (inadvertently?) omitted in **Y**.

8. Cf. *Kitāb al-burhān*, 2.10, where Avicenna argues that the existence of the genus is simply the existence of its species.

(٤) وأمّـا كون البُعْد بعضه ملاقياً للبياض أو السـواد، وكون بعضه ملازماً للمادة وبعضـه قائماً بلا مـادة، فليس يكيّف بُعْديته ولا يُحتاج إليها في تحصيل أنّه بُعْدٌ وتقويمه، بـل هي أمورٌ تلحقه من حيث هو في مادة، ومن حيث وجوده، ويكيّف وجوده أمرٌ من خارج. والفصول هي التي تتكيّف بها ماهية الشـيء سواء فرض موجوداً في الأعيان أو لم يلتفت إلى ذلك؛ وهذا العلم يستتم من صناعةٍ أخرى. بل طبيعة البُعْد تستتم بُعْداً في ماهيته بأنْ يكون له نحوٌ من أنحاء الانقسـام والامتداد محصلاً، ويكون ما سواه لواحق تلحقـه لا نحتاج إليها في تقرير كونه بُعْداً ما يصـح أنْ يفرض موجوداً. ولا يقتضي العقل لحوق شـيء آخر به يجعله محصل البُعْد؛ كما يقتضي إذا جُعل اللون موجوداً أو الحيوان موجـوداً أنْ يكون صار بحالٍ ووصفٍ نوعاً متـى وجد، لذلك لا يجوّز العقل أنْ يكون الفصل الحقيقي يبطل عن النوع وتبقى حصة جنسـه له، وهذا موضحٌ في مواضع أُخر. وإذا كان كذلك، فلا يكون هذا الانفصال بين بُعْدٍ في مادة وبُعْدٍ لا في مادة انفصالاً بفصلٍ

be through a species-making difference, but is a differentiation by certain accidents necessarily external to the subsistence of the interval's nature as a species. Now, it is possible for the estimative faculty to imagine that each one of the things sharing the same nature has the accident that belongs to the other, even though that is almost always impossible owing to a certain obstacle, a [difference of] time, or some other external cause.

(5) It would seem that we just now got carried away with something other than our intended topic of discussion when there is a way more in keeping with the arguments of natural philosophy. So we say: If there is a separate interval [namely, a void], then it must be either finite or infinite. In the opinion of all of those who require the existence of the void, however, its nature is such that it is not finite save [where it terminates] at the interval of some plenum, and that, if the plenum is finite, then it similarly terminates at the void. According to their view, it would necessarily follow that an infinite interval is either a void alone, or a plenum alone (which limits the void), or a composition of void and plenum. Now, it is absurd that there be an infinite interval having this description, as we shall explain soon,[9] and so it is absurd that there be a void according to what they say.

(6) Moreover, if there were a void, then necessarily either the plenum would enter into it, or it would not. On the one hand, if the plenum enters it, then either the void interval continues to exist simultaneously with the interpenetration, or it ceases to exist. Now, if it ceases to exist, it cannot be called a *place;* rather, the place is the void surrounding the body that is joined with it. That is because it is *in* that only, since the void interval between that has ceased to exist. Moreover, [the place] is not

9. See 3.8.

منوّع؛ بل انفصالاً بأعراض لازمة خارجةً عن تقويم طبيعة البُعْد نوعاً . والأشـياء المتفقة بالطبيعة لا يسـتحيل أنْ يتوهم لكل واحدٍ منها العارض الذي للآخر ، لكنه ربما اسـتحال ذلك لعائقٍ ولزمانٍ ولسببٍ من خارج.

(٥) وكأنّـا أمعنـا الآن في غيـر النظر الذي من غرضنا أنْ نتكلـم فيه وهو النمط الأشـبه بالكلام الطبيعي فنقول : إن كان بُعْدٌ مفارقٌ فلا يخلو إمّا أنْ يكون متناهياً ، وإمّا أنْ يكـون غير متناهٍ. لكن طبيعة الخـلاء ، عند جميع مَنْ يُوجب وجوده ، هي بحيث لا تنتهي إلاّ إلى بعد ملاء ، وأنّه إنْ كان الملاء متناهياً انتهى أيضاً إلى الخلاء . فيلزم أنْ يكون عندهم بُعْدٌ غير متناهٍ ، إمّا خلاء وحده أو ملاء وحده يتحدّد به الخلاء ، أو تأليف خلاء ومـلاءّ – ومحالٌ أنْ يكـون بُعْدٌ غير متناهٍ ، إمّا خلاء وحـده أو ملاء وحده يتحدّد به الخـلاء ، أو تأليف خلاء وملاءّ – ومحـالٌ أنْ يكون بُعْدٌ غير متناهٍ على هذه الصفة كما نوضّحه بعد ، فمحالٌ أنْ يكون خلاء على ما يقولون.

(٦) وأيضـاً إنْ كان خلاء ؛ فلا يخلـو إمّا أنْ يدخله الملاء أو لا يدخله ، وإنْ دخله الملاء فلا يخلو إمْا أنْ يبقى بعد الخلاء مع المداخلة موجوداً أو معدوماً . فإنْ كان معدوماً فلا يجوز أنْ يسـمّوه مكاناً ، بل يكون المكان هو ما يحيط بالجسـم من الخلاء المقارن له وذلـك لأنّـه في ذلك لا غير ، إذ قد عدم ما بين ذلك من بُعد الخلاء ولا يكون أيضاً جميع

the whole of that [void], but only its limit that is adjacent to the placed thing, because, if the estimative faculty were to imagine the whole of that [void] as not existing except this limit, then the placed thing would be *in* something that, if it is moved, would depart so as to make way for what succeeds it. Also, many bodies might be at rest in what is beyond that [limit], but the place of the body does not contain other bodies together with it. If, despite that, this interval sometimes does not exist and sometimes does, then sometimes it will be in potentiality and sometimes in actuality. Now, as such, its being in potency means that, before its existence, there is something existing in a certain nature that is receptive to the existence of [the interval]. (Let the natural philosophers concede this as a posited principle.)[10] In that case, the void is a composite of an interval and a matter that is informed by that interval so as to have a certain position, and [a form that] can be pointed at. This, however, is a body, and so the void is a body. On the other hand, if [the void interval] continues to exist with the [plenum's] interpenetration, then one interval will enter another; but we have already undermined the possibility of this.[11]

(7) We also say that there can be neither motion nor rest in the void, while there [can] be motion and rest in every place, and so the void is not a place. There cannot be motion in it because every motion is either natural or forced. Now, we argue that there cannot be natural motion in the void because it will either be circular or rectilinear.

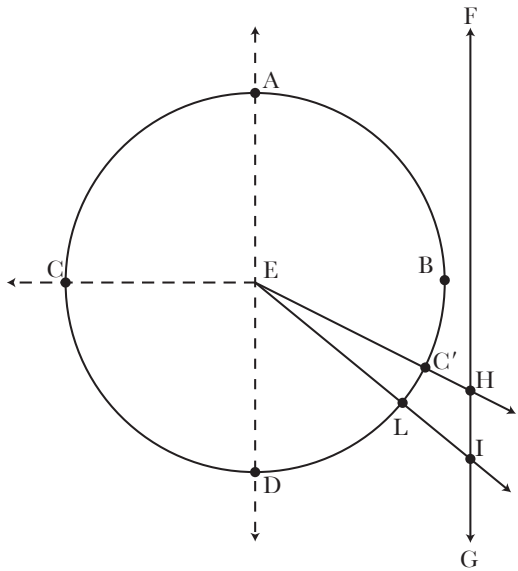
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10. For Avicenna's full account concerning the nature of potency, see *Ilāhīyāt* 4.2.
11. See 2.7.6–7.

ذلــك، بل نهايته التي تلي المتمكن، لأنَّ جميع ذلك لو تُوهم معدوماً إلاّ هذا الطرف لكان المتمكن في شــيءٍ إنْ تحرّك فارقه مهيئاً لعاقبٍ يخلفه، وأيضاً ما وراء ذلك قد تســكنه أجســامٌ كثيرة. ومكان الجسم لا يسعه معه جسمٌ آخر، ومع ذلك فإنْ كان هذا البُعْد تارة يُعدم وتارة يوجد؛ فيكون تارة بالقوة وتارة بالفعل، وكل ما كان كذلك فإنَّ كونه بالقوة معنى موجود قبل وجوده في طبيعةٍ قابلةٍ لوجوده. ليســلّم الطبيعيون هذا على ســبيل الأصل الموضــوع، فيكون الخلاء مؤلفاً من بُعْدٍ ومن مادةٍ تتصــور بذلك البُعْد، فيصير ذا وضع وتكون إليه إشــارة؛ وهذا هو الجسم، فيكون الخلاء جسماً، وإنْ كان يبقى مع المداخلة فيكون بُعْدٌ يدخل في بُعْدٍ، وهذا قد أبطلنا إمكانه.

(٧) ونقول؛ إنّه لا يجوز أن يكون في الخلاء حركة ولا ســكونٌ – وكل مكان ففيه حركة وسكونٌ – فالخلاء ليس بمكان. وأمّا أنّه لا حركة فيه؛ فلأنَّ كل حركةٍ إمّا قسرية وإمّــا طبيعيــة. ونقول إنَّ الخلاء لا تكــون فيه حركة طبيعية، وذلــك لأنّها إمّا أنْ تكون مستديرة، وإمّا أنْ تكون مستقيمة.

(8) There cannot be circular motion in the void because the void is of the character that it neither comes to an end nor is exhausted unless there is a certain finite body beyond it and that body prevents it from extending infinitely. So let us posit a certain body that is rotated so as [to describe] a circle ABCD, and let us also stipulate that the circle itself is being moved.[12] Now let [the circle's] center be E, and let us posit outside of [the circle] an infinite rectilinear extension, GF, parallel to AD (whether [that extension] be in a void, a plenum, or both together).



Now let a line, EC, which connects the center and the point C, rotate. Because the line EC is perpendicular (or nearly so) to the line AD in a direction other than FG, when [EC] is extended infinitely in the direction of C, it will not cross FG, since there will undoubtedly be some

12. Avicenna is probably imagining a sphere that is fixed in place but rotating, much like the way that he and other ancient and medieval philosophers imagined the various spheres of the planets and fixed stars. If one then imagines some point on this fixed, rotating sphere, that point will describe the circle Avicenna has in mind.

(٨) ولا يجوز أنْ تكون في الخلاء حركة مستديرة؛ وذلك لأنَّ الخلاء من شأنه أنْ لا يقف ولا يفنى إلاّ أنْ يكون وراءه جسمٌ متناهٍ؛ فذلك الجسم يمنعه أنْ يمتد إلى غير ‹نهاية› . فلنفرض جسماً يتحرّك على الاستدارة؛ على دائرة (أ ب ج د) ولنجعل الدائرة نفسها تتحرّك، وليكن مركزها (ط) – ولنفرض خارجاً عنها إمتداد (ر هـ) المستقيم بلا نهاية موازياً لـ(أ د) إما في خلاء وإمّا في ملاء أو فيهما جميعاً . وليكن خط (ط ج) يصل بين المركز وبين نقطة (ج) المنتقلة كيف كانت الاستدارة، فلأنَّ خط (ط ج) عمود أو كالعمود على (أ د) في غير جهة (هـ ر) ، فإذا أخرج من جهة (ج) إلى غير النهاية؛ لم يلاق (هـ ر) إذ لا شك أنَّ لنقطة (ط) جهة لا تلي بعد (هـ ر) وما ينفذ فيها

direction from the point E that does not lie next to the interval FG, and whatever passes in [that direction] does not contact [FG]. [That] is because, otherwise, the interval FG would be finite, circumscribing the circle ABCD in every direction; but it was not posited as such. So let EC be a certain interval or line that does not cross FG as long as it is in that direction until it coincides with the line AED and then crosses through it. At that time it, [EC′] will intersect FG, for when it is in the direction of FG and is perpendicular (or otherwise) to AD, then when it is extended infinitely, it inevitably intersects FG and crosses some point on it. Now, [the point where EC′ crosses FG] will not always be one and same point. [That] is because, along the line FG, you can posit many points and connect them to the center by many lines, [all] of which will come to be along the projected path of the intersecting point from which that line is produced whenever EC′ corresponds with it. Now, since there will be the projection toward [FG] after not projecting toward [it], there must be a first instant of time of the projection that divides the two times, which [corresponds with] a certain point along some projected path. Let the point be H. Now, let us take a point I that is before the point H and connect E and I along a line ELI, [where L is a point on the circumference of the circle ABCD]. In that case, when the line EC′ reaches the place where C′ would correspond with the point L during the rotation, there would have been a projection to point I on FG that was before [the projection to] point H. It was said, however, that H[13] is the first point on the line FG to which there is a

13. **Y** has *jim* (=C), but the sense of the argument clearly demands *hā* (=H), which, in fact, is what occurs in **Z**, **T**, and the Latin.

لا يصـــل إليـــه ، وإلاّ فبعد (هـ ر) متناهٍ يطيف بدائرة (أ ب جـ د) من كل جهةٍ ، ولم يفرض كذلك. فليكن (ط جـ) بُعْداً أو خطًّا لا يلاقي (هـ ر) ما دام في تلك الجهة إلى أنْ ينطبق على خط (أ ط د) ثم يجاوزه، فهناك لا محالة يقاطع (هـ رّ) – فإنّه إذا صار في جهة (هـــ ر) وكان عموداً على (أ د) أو غير عمود ، فإذا أخرج إلى غير النهاية قاطع (هـ ر) لا محالة ولاقى نقطة منه ، وليســت نقطة واحدة بعينها . فإنّك يمكنك أنْ تفرض في خط (هـ ر) نقطاً كثيرة وتصلها بمركز (ط) بخطوط كثيرة كلما انطبق خط (ط جـ) على خطٍ منها صار في ســمت مقاطعة النقطة التي جاء منها ذلك الخط . ولمّا كانت المسامتة بعد لا مسامتة ، فيجب أنْ يكون أول آن زمان المسامتة هي فصل بين الزمانين في سمت نقطةٍ ولتكن نقطة (حـ) ، ولنأخذ نقطة (ك) قبل نقطة (حـ) ، ولنا أنْ نصل بين (ط) و(ك) على خط (ط ل ك) فيكون خط (جـ ط) إذا بلغ في الدور حتى يلقى (جـ) نقطة (ل) كان مســامتاً لنقطــة (ك) في خط (هـ ر) قبل نقطة (حـــ) – وقيل إنَّ (حـ) أول نقطة

projection. This is a contradiction.[14] In fact, [the line] will always be projecting toward [FG] and always away from it, which is absurd.[15] So, then, there can be no circular motion in the void as they suppose.

(9) We also say that there would be no natural rectilinear motion. That is because natural motion departs from one direction and is directed toward another, and that from which it naturally departs must be different from that toward which it naturally tends. So, if that which it departs is in every respect like that toward which it tends, there will be no sense that the natural thing naturally departs it so as to acquire its like. [That] is because to depart naturally is to avoid naturally, but it is absurd that what something naturally avoids be what it naturally tends toward.

(10) Let us, instead, take it from the top: Natural motion must either be naturally directed in some direction or not. Now, it is absurd that motion should not be directed in some particular direction; so, if it is directed in some direction, the direction must be either some existing

14. Avicenna offers a condensed version of this argument in the *Kitāb al-najāt,* 241–43, where he argues thus: "We might be able to explain that [i.e., that the void is not infinite] quickly. So, we say, let there be circular motion in an infinite void (if an infinite void is possible) and let the moved body, for instance a sphere ABCD, be moved around a center, E. Now let us imagine a line GF in the infinite void and let there be a line EC [extending] from the center toward C away from the line GF. When the sphere rotates, this line [EC] will be such as to cut, pass through, and then depart from [GF] such that there will inevitably be two points where the projected line [EC] encounters and then departs [from GF]; let them be I and H. Yet there will also be a point, J, whose projection [on to GF] is before point I, and [yet] the point I was the first point at which the line [EC] projected [on to GF]. This is a contradiction; however, there is circular motion, and so the void is not infinite." Avicenna generates the contradiction by having us assume any point as the *first* point of contact with the line GF. A structurally similar argument, albeit employed for a radically different end (namely, to show that an infinite could be crossed in a finite period of time) was given by Abū Sahl Bijān al-Qūhī (or al-Kūhī); see Roshdi Rashed, "Al-Qūhī vs. Aristotle: On Motion," *Arabic Sciences and Philosophy* 9 (1999): 7–24.

15. In this sentence, Avicenna extends the general reasoning of the first argument to create another one, which seems to be the following: On the basis of the first argument, *mutatis mutandis,* there cannot be any last moment of projecting toward FG, since there will always be some point after that purported last point to which his initial argument applies. Consequently, there will always be another point toward which the rotating line EC must project before it ceases projecting toward FG. Equally, however, one could construct a line KL paralleling FG that is on the opposite side of the circle ABCD and, since the above argument will hold for the line EC when it projects toward KL, EC will always project away from FG. Clearly, this outcome is absurd, just as Avicenna concludes.

تســامت من خط (هـ ر) ؛ وهذا خُلفٌ، بل يلزم أنْ يكون دائماً مســامتاً ودائماً مبايناً، وهذا محالٌ، فإذن لا حركة مستديرة في الخلاء الذي فرضوه.

(٩) ونقول ولا حركة طبيعية مستقيمة، وذلك لأنَّ الحركة الطبيعية تترك جهة وتنحو جهة، ويجب أنْ يكون ما تتركه بالطبع مخالفاً لما تقصده بالطبع. فإنّه إنْ كان ما تتركه في جميــع أحواله في حال ما تقصده؛ فلا معنى لأنْ تكون الطبيعة تتركه طبعاً لتأخذ مثله؛ فــإنَّ الترك الطبيعي نفارٌ طبيعي، ومن المحال أنْ يكون منفورٌ عنه بالطبع مقصوداً بالطبع.

(١٠) بل نقول من رأس: إنّه لا يخلو إمّا أنْ تكون الحركة الطبيعية تنحو بالطبع جهةً أو لا تنحــو جهةً. ومحال أن تكون الحركــة لا تنحو جهة خاصّة. فإن كانت تنحو جهةً فلا يخلو إمّا أنْ تكون الجهة شــيئاً موجوداً أو غير موجود، فإنْ كان شــيئاً غير موجود

thing or some nonexisting thing. If it is some nonexistent thing, then it is absurd that it be such that something either departs from or is directed toward it. If it is some existing thing, then either it is an intellectual object, not itself having a position and so not the sort of thing that one can point to, or it has a position [such as up/down, left/right, front/back] and so can be pointed to. Now, it is absurd that [the void] be an intellectual object that has no position, because no motion is directed toward that. So we are left with its having a position, in which case the interval either can or cannot be divided into parts that are reached during the traversal. On the one hand, if it is divided, then there will be one part that is next to the mobile and, once the mobile is there, either it will have become fully realized in [its natural] direction, and so the part is the intended direction and the rest are superfluous, or it will not be fully realized in the direction and, instead, it will need to cross through it, and so [the part] will be an intermediary to the direction and not part of the intended direction, but its status is like that of everything else adjacent to it. On the other hand, if it is not divided into parts that are reached, the absence of such a division is either because, while it itself allows the division by supposition, it is not in its nature to be broken up, or it is in no way divisible into parts (as they say about the celestial sphere). Now, if it is [the sort of thing that] is not divisible into parts by being broken up, while being divisible by supposition, then it is a body other than the void; and so, as long as no body exists in the void, [the void] will have no direction. In that case, there will be no direction in the absolute void taken alone. Moreover, that body must either be proper by nature to the space of the void that it is in or not. If [that body] is proper to it, then one part of the void will

فمحـــالٌ أنْ يكون متروكاً أو نحواً متوجهاً إليه. وإنْ كان شـــيئاً موجوداً؛ فإمّآ أنْ يكون موجوداً عقلياً لا وضع لذاته فلا يشـــار إليه، أو يكون له وضعٌ فيشـــار إليه. ومحالٌ أنْ يكـــون عقلياً لا وضـــع له؛ لأنَّ ذلك لا حركة إليه. فبقي أنْ يكـــون له وضعٌ، وحينئذ لا يخلو إمّا أنْ يكون شيئاً لا يتجزأ من حيث يُصار إليه بالقطع للبعد، أو يكون يتجزأ. فإنْ كان يتجـــزأ؛ فالبعـــض منه يكون أقرب من المتحرّك إليه، وإذا وصـــل إليه المتحرك، فإمّا أنْ يكون قـــد حصل في الجهةّ - فالبعض هو الجهة المقصودة والباقي خارج عنهّ - وإمّا أنْ لا يكـــون حصل في الجهة، بل يحتاج أنْ يتعداه، فإن كان يحتاج أن يتعداه فهو ســـبيل إلى الجهة لا بعض الجهة المقصودة، وحكمه حكم ســـائر ما يليه. وإذا كان غير متجزٍ من حيث يصار إليه؛ فلا يخلو إما أنْ يكون فقدانه التجزي لا لأنّه في نفســـه لا يحتمل فرض القسمة؛ بل لأنّه ليس في طباعه الانكسار كما يقولونه في الفلك أو يكون لا يتجزأ أصلاً. فإنْ كان لا يتجزأ بالتفكّك ويتجزأ بالفرض؛ فهو جسم غير الخلاء. فما لم يكن في الخلاء جســـمٌ موجودٌ لا تكون له جهة، فيكون حينئذ لا جهة في الخلاء المطلق وحده. وذلك الجســـم أيضـــاً لا يخلو إمّـــا أنْ يكون مختصاً بالطبع بالحيّز من الخـــلاء الذي هو فيه أو لا

differ from another in the nature [of the void itself] in order that some bodies be naturally proper to [a given space] to the exclusion of others. If [that body] is not proper [to that space], then it will pass through it when it departs from it. Now, when the body departs that space in the void (assuming that [the body] is moved), it either must be moved naturally [(1)] toward [some space]—whether it is the earlier space of the void that that body was in or the later space that it will reach—or [(2)] it [must be moved naturally] toward the body that was in [the space]. [As for (1)] it cannot be moved to the earlier space [or some later space], otherwise its motion to *that* space is the natural motion and that which is [proper] to it itself.[16] [As for (2)] the motion [to that space] is, then, accidental, and so it could not have been moved naturally to that other space. [That] is because, if that moved body is not in some way aware of the transition of that body from one place to another, then how can it just happen to leave one direction toward which [its] motion tended because that [body] was in it, and its nature spontaneously tend toward another direction? Unless, that is, that body emits to [the nature] a certain influence or power, and[17] that influence and power are a certain principle that triggers the moved body to move naturally toward [the body], as in the case of the magnet and iron, in which case the motion is forced, not natural. If [the moved body] is aware, then a certain perception will have in fact occurred, and [the motion] will have been volitional, not natural—all of which is vacuous. The discussion of that body's transition, whether naturally or not, however, returns us to our enumeration [of the various options]—namely, if what is directed and has a position is not divisible in any way whatsoever into parts that are reached, it is either a point, a line, or a surface. Additionally, either all the

16. In other words, that other space (in fact, either the space it was in or the space it will come to be in) will be the body's proper place, in which case the immediately preceding argument applies—namely, that there will be natural parts in the void—which, on the present horn of the argument is assumed to be false.

17. Reading *wa* with **Z** and **T**, which is omitted in **Y**.

يكـون مختصـاً به؛ فإنْ كان مختصاً به فبعض الخلاء مخالـفٌ لبعضه في الطبيعة حتى تختص به بعض الأجسـام طبعاً دون بعـض، وإنْ كان غير مختص جاز فيه مفارقته له. وإذا فـارق ذلـك الحيّز من الخلاء لم يخلُ إمّا أنْ يتحرك الجسـم، المفروض متحرّكاً إليه، بحركته الطبيعية إلى الحيّز الأول الذي كان فيه ذلك الجسـم من الخلاء أو يتحرك إليه نحو الحيّـز الآخر الذي صار إليه. ولا يجـوز أنْ يتحرك إلى الحيّز الأول وإلاّ فحركته إلى ذلك الحيّز هي الحركة الطبيعية، والتي بالذات، وإمّا إلى ذلك الجسم الذي كان فيه، فقد كانت ‹الحركة› بالعرض. ولا يجوز أنْ يتحرك بالطبع إلى الحيّز الآخر، لأنَّ الجسـم المتحرك إنْ لم يشـعر بوجهٍ من الوجوه بانتقال ذلك الجسـم عن حيّزٍ إلى حيّز؛ كيف يتأتى أنْ يترك جهـة كانت مقصودة بحركته لأنَّ ذلك فيهـا ويقصد جهةً أخرى من تلقاء طباعه؟ إلاّ أنْ يكون ذلك الجسـم يبعث إليها أثراً أو قوة وذلك الأثـر وتلك القوة تكون مبدأ ما لانبعاث حركة الجسم المتحرّك بالطبع إليه؛ كحال ما بين المغناطيس والحديد، فحينئذ تكون الحركة قسـرية لا طبيعية. وإنْ شعر، فقد حصل هناك إدراكٌ وحصلت إرادية لا طبيعية، وهذا كله باطل! على أنَّ الكلام في انتقال ذلك الجسـم بالطبع أو بغير الطبع، يرجع إلى ما نحن نسـرده ونقوله. وإنْ كان المتوجه إليه لا يتجـزأ من حيث يُصار إليه بوجهٍ من الوجوه وله وضعٌ؛ فهو إمّآ نقطة وإمّا سـطح. فلا يخلو بعد ذلك إمّا أنْ تكون الجهات كلها متشـابهة في أنها نقط وخطوط وسـطوح، أو تكون جهة نقطة، وجهة خطاً وجهة سـطحاً. فإنْ

directions will be the same in that they are points, lines, or surfaces, or one will be a point, another a line, and another a surface. On the one hand, [consider] if all of them are either points, or lines, or surfaces. Now, points, lines, and surfaces are distinguished only by certain accidents that they happen to have—namely, from those things of which they are predicated, whether through what is proper to them as such or foreign to them. All of that, however, belongs to them because of things that vary in shapes and natures that are their extremities, whereas the void is not like that. So, then, on the basis of this description, there would be no specifically different directions in it. If, on the other hand, it is not like that but, instead, one direction is a point and another a surface or line, or according to some other way in which it can be divided, then how is it possible that, in some location within the void, there is only an actual point, and in another, only an actual line or actual surface, or whatever? The void is one and continuous with no discontinuity in it because it has no matter on account of which it would be susceptible to these states; and, since it is self-evident, we have stipulated that that is not because of a body. So there will not be different directions in the void; but when there is no difference of directions and places, then it is impossible that there be some place that is naturally left behind and another that is naturally tended toward. So, then, there will be no natural rest in the void, since within the void there will be no location that is better suited than another to there being natural rest in it.

(11) Also, we witness bodies being moved naturally toward various directions and, moreover, varying in speed. Now, their variation in speed is either because of some factor in what is moved or something in the medium.[18] The factor in that which is moved is sometimes due to a difference of inclinatory power, since, because of its [inclinatory] power, there is the increase in the heavy thing's descent or the light thing's ascent;

18. The Arabic *masāfah,* which I translate "medium" here, literally means "distance" or "spatial magnitude"; however, since, in paragraph 12, Avicenna will speak of the "distance's" being rarer and denser, he is clearly not thinking of distance in the sense of a kilometer or a mile, but the nature of the traversed medium. Thus, I have preferred "medium" in the present context.

كانت الجهات كلها نقطاً أو خطوطاً أو سطوحاً ؛ والنقط والخطوط والسطوح لا تختلف إلاّ بعوارض تعرض لها أي من حواملها ، بما تختص بها من حيث هي كذلك ؛ وإمّا غريبة عنها ، وجميع ذلك يلزمها من جهة الأشياء المختلفة الأشكال والطبائع التي هي نهايات لها ، والخلاء ليس كذلك ، فإذن لا يجوز أنْ يكون فيه اختلاف جهات على هذه الصفة بالنوع. وإنْ كان ليس كذلك بل من جهة نقطة وجهة أخرى سطح أو خط ؛ أو على وجهٍ آخر مما تحتمله القسمة ، فكيف يمكن أنْ يكون في الخلاء ‹في› موضع نقطة بالفعل فقط ، وفي موضع خط بالفعل فقط ، أو سطح بالفعل ، أو وجهٌ آخر؟ والخلاء وأحدٌ متصلٌ لا انقطاع فيه لأنّه لا مادة له ، فيقبل لأجلها هذه الأحوال ، ووضعنا أنَّ ذلك ليس بسبب جسم لما بانَ من البيان . فالخلاء ليس فيه اختلاف جهات ، وإذا لم يكن هناك اختلاف جهات وأماكن ، استحال أنْ يكون مكان متروكاً بالطبع ، ومكان مقصوداً بالطبع ، فليس إذن في الخلاء سكونٌ طبيعي ، إذ ليس في الخلاء موضعٌ هو أولى بالسكون فيه بالطبع من موضع .

(١١) وأيضاً فإنّا نشاهد الأجسام تتحرك بالطبع إلى جهاتٍ ما ، وتختلف مع ذلك في السرعة والبطء ، فلا يخلو اختلافها في السرعة والبطء أنْ يكون إما لأمرٍ في التحرّك منها ، أو لأمرٍ في المسافة . أمّا الأمر الذي في المتحرّك فقد يكون لاختلاف قوة مَيْلية ؛ فإنَّ الأزيد في الثقل النازل أو الخفّة الصاعدة لقوته أو لزيادة عِظَمه يسرع ، والأنقص يبطيء .

or it is faster owing to the increase of its bulk and slower owing to the decrease. At other times, [the bodily factor] is due to its shape. So, when, for instance, the shape is a square and it crosses the medium with its surface [projecting forward], it will not be like a cone crossing the medium with its vertex [projecting forward], or even when the square crosses the medium with one of its angles [projecting forward], since, in the former case, it needs to set into motion a larger thing (namely, what it meets first), while in the latter cases it does not need to. So, in every case, the cause of fastness is the greater strength to repel what obstructs and to oppose whatever stands in its way and to penetrate more forcefully. [That] is because the greater the repulsion and penetration, the faster [something] moves, and the weaker they are, the slower it moves; whereas this is indeterminable in the void. Let us, however, set this to one side, since it is not of much use for what we are trying to do now.

(12) [The factor effecting speed] that is due to the medium is that, whenever [the medium] is rarer, it is crossed more quickly, whereas whenever it is denser, it is traversed more slowly (assuming that what is undergoing the natural motion is one and the same). In general, the cause of it is the strength and weakness to resist pushing and being penetrated, for the rarer is affected more readily by what pushes and penetrates, whereas the thickly dense opposes it more forcefully. Thus, something does not pass through earth and stone as it passes through air, while its passing through water will be between the two. Now, rarity and density increase and decrease in varying degrees, which, we have confirmed, causes that opposition. So, whenever the opposition is less, [the mobile] moves faster, whereas whenever the opposition increases, it moves slower;

وقد يكون لاختلاف شكله؛ فالشكل مثلاً إذا كان مربعاً وقطع المسافة بسطحه، لم يكن كمخروطٍ يقطع المسافة برأسه، وكذلك المربع إذا قطع المسافة بزاويته، إذ ذلك يحتاج أن يحرّك شيئاً أكبر؛ وهو الذي يلاقيه أولاً، وهذا لا يحتاج إلى ذلك. فيكون سبب السرعة في كل حال الاقتدار على شدة دفع ما يمانع الشيء ويقاومه مقاومة ما وعلى شدّة الخرق. فإنَّ الأدفع والأخرق أسرع، والأعجز عنهما أبطأ، وهذا لا يتقرّر في الخلاء، بل لنترك هذا الوجه فإنّه لا كثير نفع لنا فيما نحاوله منه.

(١٢) وأمّا الذي يكون من قبل المسافة؛ فهو أنّها كلّما كانت أرق كان قطعها أسرع، وكلما كانت أغلظ كان قطعها أبطأ، وذلك بحسب المتحرّك بالطبع الواحد، وبالجملة، السبب فيه الاقتدار على مقاومة الدافع الخارق والعجز عنه. فإنَّ الرقيق شديد الإنفعال عن الدافع الخارق، والغليظ الكثيف شديد المقاومة له، ولذلك ليس نفوذ المتحرّك في الهواء كنفوذه في الأرض والحجارة، ونفوذه في الماء بين الأمرين. والرّقة والغلظ تختلف في الزيادة والنقصان، ونحن نتحقّق أنَّ السبب في ذلك المقاومة؛ فكلّما قلّتْ المقاومة زادت السرعة، وكلّما زادت المقاومة زاد البُطء، فيكون المتحرك تختلف سرعته وبطؤه

and so the variation of the mobile's fastness and slowness are commensurate with the opposition. Whenever we posit less opposition, the motion must be faster, while whenever we posit more opposition, the motion must be slower. So, when the mobile undergoes motion in the void, it will cross the void[19] medium either in a certain amount of time or in no time. Now, it is absurd that that would take no time, because it crosses some of the medium *before* crossing all of it, and so it must take some time. Now, inevitably, that time will have some proportion to the time of the motion in a plenum that offers opposition, and it will be just as much as an amount of time of a certain opposition (were there such) whose proportion to the plenum's opposition is the proportion of the two times, but slower than an amount of time of opposition that is smaller in proportion to the posited opposition than the proportion of the time. Now, it is absurd that the proportion of the motion's time, where there is absolutely no opposition, should be like a proportion of some amount of time of a motion during a certain opposition (were it, in fact, to exist), let alone slower than some amount of time of some other opposition (were it imagined to be even less than the initial smaller opposition).[20] In fact, whatever requires any opposition imagined as existing for some time cannot have any proportion to a time having absolutely no opposition. So, then, the motion will neither take some time nor not take some time. This, however, is absurd.

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19. Reading *khālīyah* with **Z**, **T**, and the Latin (*vacuum*) for **Y**'s *ḥālīyah* (present).

20. In more concrete terms, the argument may be expressed thus: Assume that it takes one minute to cover a given distance in a void that offers no opposition, while it takes two minutes to cross the same distance in a certain medium—say, water—that does offer some opposition. Thus, it takes half the time to cross through the void that it does to cross through the water. Now, imagine that there is another opposing medium that is half as rare as water—say, air. Since Avicenna has argued that, ceteris paribus, fastness and slowness of some mobile is proportional to the opposition offered by the medium through which it travels, something traveling through the air would travel twice as fast as it does through the water; however, the same object likewise traveled twice as fast through the void as it did the water, and so the mobile traveling through the air, which offers a certain amount of opposition, would cover the same distance in the same time as it would traveling through a void that offers no opposition. Moreover, were there some medium even rarer than air, the mobile would move through it faster than through a void, while being opposed in the former medium but not being opposed in the void.

بحسب اختلاف المقاومة، وكلّما فرضنا قلّة مقاومةٍ وجب أنْ تكون الحركة أسرع، وكلّما فرضنا كثرة مقاومة وجب أن تكون الحركة أبطأ. فإذا تحرّك ‹المتحرّك› في الخلاء لم يخلُ إمّا أنْ يقطع المسافة الخالية بالحركة في زمان أو لا في زمانٍ – ومحالٌ أنْ يكون ذلك لا في زمانٍ – لأنّه يقطع البعض من المسافة قبل قطعه الكل. فيجب أنْ يكون في زمانٍ، ويكون لذلك الزمان نسبة إلى زمان الحركة لا محالة، في ملاء مقاوم، ويكون مثل زمان مقاومة لو كانت نسبتها إلى مقاومة الملاء نسبة الزمانين، وأبطأ من زمان مقاومةٍ هي أصغر في النسبة إلى المقاومة المفروضة من نسبة الزمان. ومحالٌ أنْ تكون نسبة زمان الحركةّ – حيث لا مقاومة البتّة – كنسبة زمان حركةٍ في مقاومةٍ مّا لو صحّ لها وجود، فضلاً عن أنْ تكون أبطأ من زمان مقاومةٍ أخرى لو توهمت أقلّ من المقاومة القليلة الأولى. بل يجب أنْ لا يكون لما توجبه أي مقاومة تُوهمت موجودة من الزمان نسبة إلى زمان لا مقاومة أصلاً، فيجب إذن أن تكون الحركة لا في زمان ولا ليست في زمان؛ وهذا محال!

(13) We do not have to stipulate in our proof of this whether this opposition (which is according to the noted proportion) must exist or not, because our claim is that the amount of time for this motion in a void would be equal to the amount of time during a certain opposition *were it to exist,* and this premise is true in the way we explained. Also, every motion in a void is a motion in what does not oppose, and this premise is likewise true. Also, any motion in what does not oppose will not at all be equal to some motion during a certain opposition having a given proportion, were it to exist. So, from these premises, it necessarily follows that, in a void, there is no motion whose time is equal to some amount of time of a motion during a certain opposition, were there such. From these [premises] and the first, it necessarily follows that none of the motions in the void is a motion in the void, which is a contradiction.[21]

(14) Now, one thing that could be said against this is that every motive power is in a body, and so, as a result of the body's magnitude with respect to its bulk and [that power's] magnitude with respect to its strengthening and weakening, [the motive power] requires a certain amount of time, even if there were no opposition at all. Besides that, the times might increase in accordance with an increase of certain oppositions, while it does not follow that every given opposition will produce some influence on that body. [That] is because it does not necessarily follow, when a given opposition has some influence, that half of it, or half of half of it, would have an influence. Indeed, when a certain number of

21. The reasoning is clear once the proportion is given. Assume two finite periods of time, t_1 and t_2, and two magnitudes of opposition, M_1 and M_2. Also, let M_1 be the amount of opposition imposed by the void, which, by assumption, is 0, while the other variable will be some finite magnitude and so be expressed by some finite number. Consequently, the proportion must be this: $t_1{:}0{::}t_2{:}M_2$, which can equally be expressed as $t_1/0 = t_2/M_2$. Since the ratio on the left-hand side involves division by 0, however, it will be infinite, whereas, since the ratio on the right-hand side involves two finite numbers, it must be finite. In that case, however, an infinite will equal a finite, which, as Avicenna observes, is a contradiction. What is important to note is that the contradiction is generated simply by assuming (1) that there is some proportion, expressed as, $t_1/M_1 = t_2/M_2$, between the time it takes to cross through a given distance in a void and a plenum, and (2) that the void offers no (i.e., 0) opposition.

(١٣) ولا نحتاج، في بياننا هذا، إلى أنْ نجعل لهذه المقاومةّ – التي على النسبة المذكورةّ – استحقاق وجودٍ أو عدم، لأنّا نقول إنَّ زمان هذه الحركة في الخلاء يكون مساوياً لزمان حركةٍ في مقاومةٍ مّا لو كانت موجودة، وهذه المقدمة صادقة أوضحنا صدقها. وكل حركة في الخلاء فهي حركة في عدم مقاومة، وهذه المقدمة أيضاً صادقة، وكل حركة في عدم مقاومة فليست مساوية البتة لحركةٍ في مقاومةٍ مّا على نسبةٍ مّا، لو كانت موجودة. فيلزم من هذه المقدمات أنْ لا حركة في الخلاء هي مساوية الزمان لزمان حركةٍ في مقاومةٍ مّا لو كانت، ويلزم منها ومن الأول أنْ لا شيء من الحركات في الخلاء حركة في الخلاء، وهذا خُلْف.

(١٤) وممّا يمكن أنْ يقول القائل على هذا؛ أنَّ كل قوة محرّكة تكون في جسم فإنّها تقتضي، بمقدار الجسم في عِظَمه ومقدارها في شدتها وضعفها، زماناً لو لم تكن مقاومة أصلاً. ثم بعد ذلك، فقد تزداد الأزمنة بحسب زيادة مقاوماتٍ مّا، وليس يلزم أنْ تكون كل مقاومةٍ مّا تؤثّر في ذلك الجسم، فإنّه ليس يلزم إذا كانت مقاومة مّا تؤثّر أنْ يكون نصفها يؤثّر ونصف نصفها يؤثّر. فإنّه ليس يلزم إذا كان عدّة يحركون ثقلاً وينقلونه؛ أنْ يكون

men move and transport some heavy object, it does not necessarily follow that half the number would move a given thing; nor does it follow that, when many drops of water fall on something and erode a hole in it, a single drop would have an influence. So the opposition whose time corresponds with the proportion of the opposition of the void might not have any influence at all, and only some other opposition (were it to exist) would do so. The response to this is that we took *opposition* on the condition that it should be an opposition having an influence, [with respect to] which (were it to exist) the amount of time for it would [equal] a certain amount of time for some unopposed motion. We did not need to say "opposition having an influence" simply because to say that the opposition has no influence is like saying that the opposition does not oppose, for the meaning of *to oppose* is nothing but *to have some influence*. Now, having this influence is taken in two ways, one of which is to break down the inclination's fierceness and power, and the second [of which] is a certain rest that we suppose that the opposition produces such that, as a result of certain interceding oppositions, rests are continually produced that are imperceptible individually while they are perceived collectively as slowness.[22] (Later you will learn that what has an influence is only according to one of the two.)[23] Be that as it may, the mobile is, in its nature, susceptible to lesser [degrees of influence] (should there be some agent to produce such an influence on it), from which it is necessary that some of those oppositions that the nature of the body experiences be equal in their time to what is unopposed. This, however, is absurd.

22. This second position is, in fact, that of certain Atomists, who explained differences in speeds by appealing to the number of purported intervallic rests a mobile makes during the course of its motion.

23. See book 3.4.13–14 where Avicenna argues against the notion of atomic motion with its accompanying intervallic rests.

نصف العدّة يحرّك شيئاً ، أو كانت قطرات كثيرة تثقب المقطور عليه ثقباً ، أن تكون قطرة واحدة تؤثّر أثراً . فيجوز أنْ تكون المقاومة ، التي زمانها على نسبة مقاومة الخلاء ، لا تؤثر شـــيئاً وإنّما تؤثّر مقاومة أخرى لو كانت موجـــودة . فالجواب عن هذا ؛ إنّا أخذنا المقاومة على أنّهاّ – لـــو كانت موجودة مقاومة مؤثّرة – لكان زمانها زمان حركةٍ في لا مقاومة ، وإنّمـــا لم نحتج أنْ نقول مقاومة مؤثّـــرة ؛ لأنَّ المقاومة إذا قيل إنّها غير مؤثّرة كان كما يقال : مقاومة غير مقاومة ، فمعنى المقاومة هو التأثير لا غير . وهذا التأثير على وجهين : أحدهما الكســـر من الحمية ومن قوة الميل ، والثاني ما نظنّ من إحداث المقاومة ســـكوناً ، فلا تزال تحدث سكونات عن مقاومات متشافعة لا يُحسّ بأفرادها وتُحسّ بالجملة كالبُطءّ – وأنت ستعلم بعد ، أنّه ما من تأثير على أحد الوجهين إلاّ وفي طباع المتحرّك أن يقبل أقل منه ، لو كان مؤثّرٌ يؤثره . فيجب من ذلك أنْ يكون بعض تلك المقاومات التي تحتملها طبيعة الجسم مساوياً في زمانه لغير المقاومة ، وهذا محال .

(15) Since it has become apparent that there is no natural motion whatsoever in a void, we say that there is also no forced motion. That is because forced motion is the result of [something] that is either joined with or separate from the mover. So, on the one hand, if it is by being joined with the mover and the mover is moved, then [that mover] likewise will be moved as a result either of a force, or a soul, or a nature. If it is by force, the discussion will continue until it terminates at either a soul or a nature. If it is moved by a soul, the soul will cause motion by producing a certain inclination that also varies in strength as well as weakening to the point that that [inclination of the soul] is seen together with the coming to rest that is brought about by what opposes the motion, just as is seen in what is moved naturally when it is opposed and prevented from moving. In other words, the inclination varies in power and strength, and [all the problems] accompanying natural inclination [in a void] will accompany it.[24] If it is [moved] by nature, then it entails what was argued [earlier]. When there can be neither psychic nor natural [inclination] in the void, neither can there be forced motion in the void, where the agent producing the motion in it is necessarily moved [either by the soul or by nature].

(16) If the mover is separate from the motion when it produces it, then [the motion] frequently entails some difference of direction with respect to which it is moved, and the same thing that we said about natural motion will necessarily follow.[25] Moreover, the forced motion that is produced by the separate mover might exist while the mover's production of the motion has ceased. Now, it is absurd that the motion that is continuously being renewed should exist while its cause does not exist. So there must be some cause that preserves the motion, and that

24. In other words, Avicenna believes that the argument of pars. 11–13 can be expressed not only in terms of natural inclination, as it was above, but also, *mutatis mutandis,* in terms of psychic inclination.

25. See par. 10.

(١٥) فقد ظهر أنّه لا تكون في الخلاء حركة طبيعية البتة؛ نقول ولا حركة قسرية، وذلك لأنَّ الحركة القسرية إمّا أنْ تكون بمقارنة المحرّك أو بمفارقته، فإنْ كان بمقارنة المحرّك فالمحرّك متحرّك، فهو أيضاً إمّا متحرك عن قاسرٍ أو عن نفسٍ أو عن طبع. فإنْ كان عن قاسرٍ لزم الكلام إلى أنْ ينتهي إلى نفسٍ أو طبيعة. وإنْ كان عن نفسٍ، فالنفس تحرّك بإحداث ميلٍ مّا يختلف أيضاً في الشدّة والضعف، حتى أنَّ ذلك ليُحسّ مع التسكين المقاوم للحركة، كما يحسّ في المتحرك طبعاً إذا قووم فمُنعت حركته. وذلك الميل يختلف بالقوّة والشدة، ويلزمه ما يلزم الميل الطبيعي، وإنْ كان طبيعياً لزم ما قيل. فإذا كان النفسي والطبيعي لا يصح في الخلاء، لم يصحّ أنْ يكون في الخلاء تحريك قاسر يلزم المحرّك فيه المتحرّك.

(١٦) وإنْ كان المحرّك يفارق عند إيجاد الحركة، فقد يلزمها الاختلاف من جهة ما تتحرك فيه، ويلزم ما قلنا في الحركة الطبيعية بعينها . وأيضاً ، فإنَّ الحركة القسريّة – المفارقة للمحرّك – قد تكون موجودة وتحريك المحرّك قد زال، ومحالٌ أنْ يكون ما يتجدّد على الاتصال من الحركة موجوداً وسببه غير موجود . فيجب أنْ يكون هناك سببٌ

cause will exist in the mobile, producing an effect on it. Now, that [cause] will either be some accidental power that is incorporated into the mobile from the mover, like the heat in water as a result of fire, or a certain influence that the mobile encounters resulting from that which it passes through. The latter influence is understood in two ways:[26] On the one hand, when, as a result of something's being moved, the mover contacts and pushes the first part of the [medium] in which there is the motion, then that [first part] will push what is next to it, and so on to the last parts, and the projectile placed into this medium will be moved as a necessary result of [the medium's being moved] (on the assurance that those pushed parts are moved faster than the projectile thrown by the mover, since that [medium] is more easily pushed than this projectile).[27] On the other hand, what pushes that body might push through that medium, and so what is pushed would be something forced to contract and then collectively curve around behind [the projectile], and that contraction will necessarily push the body forward.[28] All of this, however, is inconceivable in the void.

(17) These were the only options, since this motion is either by some power [whether from the soul or from nature] or by some body that causes motion by contact, where the body that causes motion by contact does so either in that it [itself] is carried along (where the status of what is attracted by contact is like that of what is carried along) or in that it is pushed by contact.

(18) If there is forced motion in the projectile as a result of some power in the void, then [the motion] must continue and never abate or discontinue. That is because, when the power is in the body, it either remains or there is a privation of its existence. If it remains, then the

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26. The two ways mentioned here are discussed at greater length later at 4.4, where both are, in fact, rejected.

27. This account of how the medium can bring about motion is roughly Aristotle's account of projectile motion found at *Physics* 8.10.266b28–267a20.

28. The theory presented here might be the doctrine of *antiperistasis*, or mutual replacement, which Aristotle mentioned (*Physics* 8.10.267a16–19) as one possible, albeit ultimately rejected, account of projectile motion. The general idea is that the medium moves the mobile in a way similar to that of contractions pushing a baby out of a womb during parturition. This interpretation is further confirmed at par. 18, where Avicenna's use of the expression *ʿalá sabīl ḥamlin wa-waḍʿin* (or *wuḍʿin*) evokes the image of childbirth.

يســتبقي الحركة، وأنْ يكون ذلك الســبب موجوداً في المتحرّك <و> يؤثّر فيه؛ فذلك إمّا قــوة عرضيــة ارتبكت في المتحرّك من المحرّك كالحرارة في الماء عــن النار، وإمّا تأثيرٌ ممّا يلاقــي المتحرك ممّا ينفذ فيه. وهذا التأثير معقــولٌ على وجهين: إمّا أنْ يكون الجزء الأول من الشــيء الذي فيه الحركــة، لمّا دفعه المحرّك بالمتحرّك وهو يلاقيــه، دفع ذلك ما يليه، واستمر إلى آخر الأجزاء، وكان هذا المرمي المقذوف موضوعاً في ذلك المتوسط فيلزمه أنْ يتحرك، في ضمن تلك الأجزاء المتدافعة المتحركة، أسرع من حركة المرمي الذي دفعه المحرّك، لأنَّ ذلك أســهل إندفاعاً من هذا المرمي. وإمّا أنْ يكون خرق الدافع لذلك الجسم المتوســط، فالمدفوع يلجيء الشــيء إلى أنْ يلتئم فينعطف من ورائه مجتمعاً، ويلزم ذلك الاجتماع دفع الجسم إلى قدّام؛ وهذا كلّه لا يتصور في الخلاء.

(١٧) وإنّما كانت الأقسام هذه، إذ كانت هذه الحركة إمّا تكون عن قوةٍ أو عن جسم يحرّك بالملاقاة. والجسم المحرّك بالملاقاة فإمّا أن يحرّك بأنّه يُحمل أو أنّه يدفع بالملاقاة. وأما الذي يجذب بالملاقاة؛ فحكمه حكم الحامل.

(١٨) فــإنْ كانــت الحركة القســرية في المرمي عن قوةٍ في الخــلاء فيجب أنْ تبقى فــلا تفتر البتة، ولا تنقطع البتة، وذلك لأنَّ القوة إذا وجدت في الجســم فلا يخلو إمّا أنْ

motion would always continue. If there is a privation of its existence, or it even weakens, the privation of its existence or weakening is either from a cause or is essential to it. The discussion concerning the privation of its existence will provide you the way to proceed with respect to weakening. We say: It is impossible for the privation of [the power's] existence to be essential, for whatever is essentially a privation of existence necessarily cannot exist at any time. If the privation of its existence is by a cause, then that cause is either in the moved body or in something else. If [the cause of the privation of the motion] is in the moved body and, at the beginning of the motion, it had not actually been causing that [privation] but had in fact been overpowered, and then later became a cause and dominated, then there is another cause for its being such, in which case an infinite regress results. If either the cause or the auxiliary cause, which assists the cause that is in the body, is external, then the agent or auxiliary cause acts either by contact or not. If it acts by contact, then it is a body in contact with the mobile, but this cause would not exist in a pure void, and so the forced motion would neither abate nor stop in the pure void. If it does not act by contact but is something or other that produces an effect at a distance, then why did it not do so initially? The discussion is just like the one about the cause if it were in the body. The fact is that the most appropriate [explanation] is that the continuous succession of opposing things is what causes this power to decrease and corrupt, but this is possible only if the motion is not in the pure void—that is, if the cause of the motion is a power. If the cause is a contacting body that produces motion in the manner of bearing forth and delivering, then the discussion returns to the separated[29] cause, and what was said there will be said here. So, clearly, in a pure void, there is no forced motion, whether conjoined with or separate from the mobile.

29. There is some confusion in **Y**'s text, which reads *al-sabab al-mufāraq al-muqāran* (the separated, conjoined cause). Not only does such a reading involve a contradiction, but it is not confirmed by **Z**, **T**, or the Latin text, which all have "the conjoined cause." Still, both **Y** and **Z** note that there are manuscripts with "the separated cause" (sigla H and M in **Y**'s edition, and, while neither is the earliest MS consulted, both are among the earliest, thirteenth and fouteenth century, respectively). Since the present language here in terms of childbirth is similar to that of how a separate cause might impart motion to a medium such that the medium causes motion (par. 16), "the separated cause" seems preferable.

تبقى، وإمّا أنْ تُعدم. وإنْ بقيت، فالحركة تبقى دائماً، وإنْ أعدمت أو إنْ ضعفت فلا يخلو إمّا أنْ تكون تعدم أو تضعف عن سبب، أو تعدم أو تضعف لذاتها. والكلام في العدم يعرّفك المأخذ في الكلام في الضعف، فنقول: ويستحيل أنْ تُعدم لذاتها، فإنَّ ما يستحق العدم لذاته يمتنع وجوده زماناً. وإن عُدمت لسببٍ، فإمّا أنْ يكون ذلك السبب في الجسم المتحرّك أو يكون في غيره، فإنْ كان في الجسم المتحرّك، وقد كان غير سببٍ لذلك بالفعل عند أول الحركة، بل كان مغلوباً ثم صار سبباً وغالباً، فلكونه كذلك سببٌ آخر، والأمر في ذلك يتسلْسل إلى غير نهاية. فإنْ كان السبب خارجاً عن الجسم، أو كان المعين للسبب الذي في الجسم خارجاً، فيجب أنْ يكون الفاعل أو المعين ممّا يفعل بملاقاة، أو يكون يفعل بغير ملاقاة. فإنْ كان يفعل بملاقاةٍ فهو جسم يلاقي المتحرّك فلا يكون في الخلاء المحض هذا السبب، فالحركة القسرية لا تفتر في الخلاء المحض ولا تقف. وإنْ كان لا يفعل بملاقاة، بل يكون شيئاً من الأشياء يؤثّر على المباينة، فما باله لم يؤثّر في أول الأمر؟ ويكون الكلام عليه كالكلام في السبب لو كان في الجسم، بل الأولى أنْ يكون تواتر المقاومات على الاتصال هو الذي يسقط هذه القوة ويفسدها؛ وهذا لا يمكن إلاّ أنْ لا تكون الحركة في الخلاء الصرف، هذا إذا كان سبب الحركة قوة. فإنْ كان السبب جسماً ملاقياً تحرّك على سبيل حَمْلٍ ووضْع، فيرجع الكلام إلى السبب المفارق، وقد قيل فيه ما قيل. فبيّنٌ أنْ لا حركة قسرية مفارقةً للمتحرّك أو مقارنة إياه في خلاء صرف.

(19) Since our argument has made it clear that there is no motion in the void, whether natural or forced, we say that neither is there rest in it. That is because, just as that which is at rest is what is not moving but such that it can be moved, so likewise that *in* which there is rest is that *in* which there is no motion, but it is such that there can be motion *in* it; whereas the void is such that there cannot be motion in it.

(20) The defenders of the void, however, were at their most outrageous when they gave it a certain attractive or motive power, even if in some other way, such that they claimed that the cause of water's being retained in the vessels called clepsydrae and its being attracted into the instruments called siphons[30] is nothing but the attraction of the void and that it first attracts what is denser and then what is more subtle. Others have said instead that the void moves bodies upward—namely, when the body becomes rarefied by a greater amount of void entering it [and] then becomes lighter and moves upward more quickly.

(21) We say that, if the void were to have some attractive power, there could be no differences in strength and weakness in it, since the way that each part of the void would attract would be like any other. So, necessarily, something's being attracted into it is no more fitting than another's,[31] nor is one thing's being retained in it any more fitting than another's. Also, if what retains the water in the clepsydra is the void that became filled by it, then why does [the water] descend when it is free of the instrument? The fact is that [the void] by itself should retain and hold onto the water and not let go of it such that it leaves. Additionally, it should not let the container that [the water] was in descend, since, [if the void] retained that water there, it should equally retain the container [there]. What would they say, then, about a container that is assumed to be lighter than the water?

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30. The term *zarāqāt al-māʾ* (or perhaps *zurāqāt al-māʾ*) is not found in the *Physics* of the Arabic Aristotle nor in any of the Arabic commentaries that I have consulted, most notably the Arabic paraphrase of John Philoponus. The skeleton *z-r-ā-q-ā-t* could be vocalized either as *zarāqāt,* "a short javelin," or *zurāqāt,* "an instrument made of copper, or brass, for shooting forth naphtha" (see E. W. Lane, *Arabic-English Lexicon,* s.v. Z-R-Q). Neither is particularly helpful, but perhaps the Greek siphōn, "a reed or tube," was confused with a short javelin, and hence the tentative *siphon.*

31. **Y** has (inadvertently) omitted the phrase *minhu awlá min al-injidhāb ilá shayʾ,* which appears in **Z**, **T**, and the Latin and completes the thought.

(١٩) فقد وضح ممّا قلناه أنَّ الخلاء لا حركة فيه لا طبيعية ولا قسرية، فنقول ولا سكون فيه. وذلك لأنّه كما أنَّ الذي يسكن هو عادم الحركة ومن شأنه أن يتحرّك، كذلك الذي يسكن فيه هو الذي تعدم فيه الحركة ومن شأنه أن يتحرك فيه، والخلاء ليس من شأنه أنْ يتحرّك فيه.

(٢٠) وقد بلغ من غُلو القائلين بالخلاء في أمره، أنْ جعلوا له قوة جاذبة أو محرّكة ولو بوجهٍ آخر، حتى قالوا إن سبب احتباس الماء في الأواني التي تسمى سراقات الماء، وانجذابه في الآلات التي تسمى زراقات الماء؛ إنّما هو جذب الخلاء، وأنّه يجذب أول شيء الأكثف ثم الألطف. وقال آخرون؛ بل الخلاء محرّك للأجسام إلى فوق، وانّه إذا تخلْخل الجسم بكثرة خلاءٍ يداخله صار أخف وأسرع حركة إلى فوق.

(٢١) فنقول: لو كان للخلاء قوة جاذبة لما جاز أنْ يُختلف في أجزاء الخلاء بالأشد والأضعف، إذ سبيل كل جزء جذّابٍ من الخلاء سبيل الآخر، فما كان يجب أنْ يكون الإنجذاب إلى شيءٍ منه أولى من الانجذاب إلى شيء آخر، ولا الاحتباس في شيء منه أولى من الاحتباس في شيءٍ منه آخر. وسراقة الماءّ – إنْ كان حابس الماء فيها هو الخلاء الذي امتلأ بهّ – فلِمَ إذا خُلّي عن الآلة نزل؟ بل كان يجب أنْ يحبس الماء في نفسه، ويحفظه ولا يتركه يفارقه، ولا يدع الإناء الذي فيه أنْ ينزل أيضاً، لأنَّ ذلك الماء احتبس هناك، فيحبس الإناء أيضاً. فما يقولون في إناء يُتخذ أخفّ من الماء؟

(22) The same holds for their claim about the void's raising bodies, for either one of two situations must be the case. On the one hand, the interstitial void that belongs to the parts of the rarefied body might be what is required for its upward motion, and, being something required, it would be inseparable from it. In that case, the void will be inseparable from the rarefied body during its motion and so will locally move with it and will also need some place, when it is something locally moved, having a distinct interval with respect to position. On the other hand, it might not be inseparable, and, instead, during [the rarefied thing's] motion, one void after another [might] be continually replaced. If that is the case, then, for any void that we care to take, it will encounter it for an instant; but one thing does not move another in an instant, and after the instant it no longer is something being encountered in it. Perhaps, however, [the void] gives to [the rarefied body] some power that is of such a character as to remain in it and cause it to move—as, for example, it heats it or produces some other effect on it that remains in it. The mover would be that effect; and, as a result of that effect, each new void would produce some effect; and so that effect would continually strengthen and the motion would accelerate. Be that as it may, it would require that there be a certain direction in the void to the exclusion of some other that also belongs to that effect, whereas the void is homogeneous, making [the suggestion] necessarily impossible.

(23) Also, the void's being dispersed throughout the parts of a plenum miraculously necessitates a certain state in the sum of the parts without its being necessitated in each one of the parts. Indeed, it is absurd that each one of the discontinuous parts should not be moved by some motive cause, but that the whole be moved by it. The fact is that the whole that is composed of separate parts that are touching should undergo locomotion precisely because the local motion produced in each one of the parts

(٢٢) وكذلك قولهم في رفع الخلاء للأجسام، فإنّه لا يخلو إمّا أنْ يكون الخلاء المخلّل لأجزاء الجسم المتخلخل هو الذي يوجب حركته إلى فوقّ – وموجب الشيء ملازمٌ لهّ – فيكون ذلك الخلاء يلازم المتخلخل في حركته؛ فيكون متنقلاً معه ويحتاج إلى مكانٍ أيضاً إذا كان متنقلاً ذا بُعْدٍ متميّزٍ في الوضع، أو لا يكون ملازماً له، بل لا يزال يستبدل بحركته خلاء بعد خلاء. فإنْ كان كذلك، فأي خلاء نفرضه تكون ملاقاته له في آنٍّ – وفي الآن لا يُحرّك شيءٌ شيئاً – وبعد الآن لا يكون ملاقياً فيه. بل عسى أن يعطيه قوة من شأن تلك القوة أنْ تبقى فيه وتحرّكه؛ مثلاً أنْ تسخّنه أو تؤثّر فيه أثراً آخر يبقى فيه، ويكون المحرّك ذلك الأثر، ويكون كل خلاء جديد يؤثّر فيه من ذلك الأثر. فلا يزال ذلك الأثر يشتد والحركة تسرع، إلاّ أنَّ إيجاب جهةٍ من الخلاء لذلك الأثر أيضاً من دون جهةٍّ – والخلاء متشابهّ – إيجابٌ مستحيل.

(٢٣) ومن العجائب أنْ يصير انبثاث الخلاء بين أجزاء الملاء موجباً حكماً في الجملة من الأجزاء دون أنْ يوجب في واحدٍ واحدٍ من الأجزاء. فإنه محالٌ أنْ تكون أجزاء منفصلة لا يتحرّك واحدٌ واحدٌ منها عن سببٍ محرّك، ولكن الجملة تتحرّك عنه؛ بل من الواجب أنْ تكون الجملة المركّبة عن أجزاء متباينة ومماسة إنّما تنتقل لوجود انتقال يحدث

exists. Now the rarefied thing whose parts are separated by the void is moved only as a result of the void, in which case each one of its parts will arrive above first; but when we take the simple finite parts in it, there is no void in any one of those parts, and so its ascending is not owing to the dispersal of the void [in it], but, rather, because the void surrounds it. In that case, it seems that, when [the rarefied thing's parts] are joined together and many, they are not acted upon by the void, while, when its parts are separated and few, its fewer parts will be acted upon as a result of the void, and it will just so happen that the whole moves upward. Despite that, not all the parts will be acted on in this way, but only certain bodies having specific natures; and it is their natures that require that the rarefaction come to be in this way, by the void. The reality of this would be that there is something that belongs to the bodies whose nature requires that some of its parts be at a certain distance from others, which produces the volume for that instance of rarefaction, while other bodies require a greater distance than that.

(24) It is also bizarre to picture some of these homogeneous parts running away from others until certain well-defined distances are completed between them, whereas that flight is in ill-defined directions haphazardly—one part fleeing upwards and another downwards, one to the left, another to the right—until the rarefaction is created. In this case, you will see either all the parts undergoing a mass retreat, or one standing its ground and being fled from, while others make a hasty retreat. Now, on the one hand, it would be amazing for one part of them to run away while the others do not, when their parts as well as the void that they are in are both homogeneous. On the other hand, however, it would be equally amazing for one part to take off to the right and another to the left, when the two parts are one and the same with respect to [their] nature and there is no variation in that in which there is the motion. From these things, then, it is clear that there is nothing to the void.

فــي واحدٍ واحدٍ من الأجزاء . فيكون المتخلخل المتباين الأجزاء بالخلاء ، إنّما يتحرك عن الخــلاء فيبلغ أولاً إلى فوق جزء جزء منه ، وكل جــزء من تلك الأجزا لا خلاء فيه ، إذا أخذنا البســيط من الأجزاء المتناهية فيه ، فيكون ليس صعوده لانبثاث الخلاء ، بل لأجل إحاطة الخلاء به . فحينئذ يشبه أنْ يكون إذا اجتمع وكثر لم ينفعل عن الخلاء ، وإذا تفرّق وصغرت أجزاؤه انفعلت أجزاؤه الصغار من الخلاء ، وعرض فيه أنْ يتحرّك الكلّ إلى فوق . ويكون مع ذلك ليس كل الأجسام تنفعل هذا الانفعال ، بل أجسامٌ مّا لها طبائع مخصوصة ، وطبائعها توجب أنْ تتخلخل هذا التخلخل الكائن بالخلاء ، فتكون حقيقة هذا أنَّ شــيئاً من الأجســام تقتضي طبيعته أنْ تتباعد أجزاؤه بعضها عن بعض بُعْداً مّا يفعل حجم ذلك التخلخل ، وأجســام أُخر تقتضي ما هو أشــدّ من ذلك بُعْداً . ومن العجائب تصوّر هرب هذه الأجزاء المتجانسة بعضها عن بعض حتى يتمّ بينها أبعادٌ محدودة ، وكون ذلك الهرب إلــى جهــاتٍ غير محدودة كيف كانت ؛ فجزء يهرب بالطبع إلى فوق وجزء إلى أســفل ، وجزء يمنة وجزء يسرة حتى يحدث التخلخل ، فترى أنَّ كل واحدٍ من هذه الأجزاء يعرض له الهرب ، أو يكون واحدٌ قارّاً مهروباً عنه ، والبواقي هاربة غير قارّة .

(٢٤) ومن العجائب أنْ يكون جزء منها واحدٌ لا يهرب والبواقي تهرب ، وأجزاؤها متشــابهة والخلاء الذي هي فيه متشابة ! ومن العجائب أيضاً أنْ يكون جزء واحدٌ يأخذ يمنة ، وجزء واحدٌ يأخذ يســرة ، وحكم الجزئين فــي الطبيعة واحد ؛ وما فيه الحركة غير مختلف ! فمن هذه الأشياء يتبين أنَّ الخلاء لا معنى له .

(25) Also, in the clepsydra and siphon, certain things outside the natural course occur because of the *impossibility* of the void and the necessity that the flat surfaces[32] of bodies adhere to one another. In the case where there is a forcible separation, however, there results from the separation a certain replacement together with a change of a contacting surface, without there being any time at which one surface is free of some other contacting surface. So, when the flat surface of the water in the clepsydra naturally adheres to the flat surface of some contacting body, such as the surface of the finger, [the water] must be kept from falling as long as that surface accompanying it is prevented from falling, and so it necessarily stays put [in the clepsydra]. Were a void possible, however, and were the surfaces separated without a replacement, then [the water] would fall [from the clepsydra]. Also because of that, the water's attraction in the siphon turns out to be due to the adhesion of something having two extreme limits, where [that thing] has fallen to the second limit, [coupled with] the impossibility that, when the things being sucked give way to the suction, there should be a discontinuity in between [the two extreme limits] that would result in the existence of a void. That is why it is possible to raise a great weight by a small bowl snugly fitted to it and other amazing devices that are achieved as a result of the impossibility of the void.

32. Omitting *quwā* (powers) after *ṣafāʾiḥ* with **Z**, **T**, and the Latin.

(٢٥) وأنَّ هــذه الآلات الســرّاقة والزرّاقة إنّما تكون فيها أمــورٌ خارجةٌ عن المجرى الطبيعي لأجل امتناع وجود الخلاء، ووجوب تلازم صفائح الأجسام، إلاّ عند افتراقٍ قسري يكون مع بدلٍ ملاقٍ عوضاً عن المفارق بلا زمان يخلو فيه ســطحٌ عن سطح يلاقيه. فإذا كانت صفيحة الماء الذي في السرّاقة تلزم بالطبع صفيحة جسم يلاقيه، كسطح الأصبع، فيلزم أنْ يكون محبوســاً عن النزول عند احتباس ذلك الســطح معوقاً عن النزول معه. فلزم أنْ يقف ضرورة، ولو جاز أنْ يكون خلاء وافتراق ســطوحٍ لا عن بدلٍ، لنزل. ولذلك ما صحّ انجذاب الماء في الزرّاقة للزوم ما قد نزل من طرفيه للطرف الثاني، وامتناع الانقطاع في البين المؤدي إلى وجود الخلاء وطاعة الممتصات للمصّ، ولذلك ما أمكن رفع ثقلٍ كبير بقِدْحٍ صغير مهندم عليه، وأشياء أُخر من الحيل العجيبة التي تتم بامتناع وجود الخلاء.

Chapter Nine

The essence of place and its confirmation and the refutation of the arguments of those who deny and are in error about it

(1) [Let the following be taken as given:] *Place* is that in which the body alone exists, and no other body can exist together with it in it (since [place] is coextensive with [body]). It can be entered anew and departed, and a number of placed things can successively enter into one and the same [place]. These descriptions (whether all or some) exist only because of a certain material or form or interval or some contacting surface, however it might be. Now, not all of them exist in the material and form, whereas the [absolute] interval has no existence (whether as void or not). Also, the noncontaining surface will not be a place, and only that which is the limit of the enclosing body contains. [Given all this,] *place* is itself nothing but the surface that is the extremity of the containing body. So it is what is proved to contain and be coextensive with the things subject to local motion, and which the locally moved thing fully occupies, and from which and to which the thing subject to local motion departs and arrives during motion, and in which it is impossible that two bodies exist simultaneously. So the existence and essence of place have become apparent.

<الفصل التاسع>

في ماهية المكان وتحقيق القول فيه ونقض حجج مبطليه والمخطئين فيه

(١) فإذا كان المكان هو الذي فيه الجسم وحده، ولا يجوز أنْ يكون فيه معه جسم آخر غيره؛ إذ كان مساوياً له، وكان يستجد ويفارق، والواحد منه تتعاقب عليه عدّة متمكنات، وكانت هذه الصفات كلّها أو بعضها لا توجد إلاّ لهيولى أو صورة أو بُعْد أو سطح ملاق كيف كان، وجميعها لا توجد في الهيولى ولا في الصورة، والبُعْد لا وجود له خالياً ولا غير خالٍ، والسطح <غير> الحاوي ليس بمكان، ولا حاوٍ منه إلا الذي هو نهاية الجسم الشامل. فالمكان هو هو السطح الذي هو نهاية الجسم الحاوي لا غير. فهو حاوٍ ومساوٍ ثابت للمتنقلات، ويملؤه المنتقل شغلاً، ويفارقه المنتقل بالانتقال عنه، ويواصله بالانتقال إليه. ويستحيل أنْ يوجد فيه جسمان معاً؛ فقد ظهر وجود المكان وماهيته.

(2) Sometimes the place coincides with a single surface, while at others it coincides with a number of surfaces from which a single place is formed (like the water in a river). Also, sometimes some of these surfaces happen to be moved accidentally, while others remain at rest; and at still other times all of them happen to rotate around the moving thing, while the moving thing remains at rest. What surrounds and what is surrounded might even move away from each other in some extremely complex way, as is the case with much of the Heavens.

(3) Here is something we should consider: When, for example, water is in a jar, and in the middle of the water there is something else that the water surrounds, and we now know that the water's place is the concave surface of the jar, then is it alone its place, or is the water's place [the concave surface] together with the outward convex surface of the body existing in the water? It would be as if the water had a figure that is surrounded by a concave surface and a convex surface and two other surfaces, having this form [i.e. Figure 1]: [In this case,] its place would not be the concave surface of what surrounds alone, but instead the sum of the surfaces that are in contact with all of its sides. So it would seem that its place is the sum of the surfaces that are in contact with the water on all sides: one as concave (belonging to the jar), one as convex (belonging to the body in the water) [see figure 2]. The earlier [figure, 1], however, is a single thing that the latter is not: namely, that the concave surface of the figure that we drew [that is, figure 1] does not alone surround, but, rather, the surfaces as a whole surround like one thing, whereas the latter [figure 2] is not something like that and, instead, the

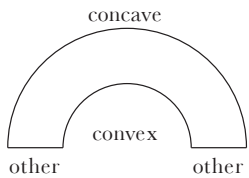


Figure 1

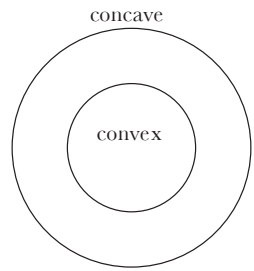


Figure 2

(٢) وقد يتفق أنْ يكون المكان سطحاً واحداً، وقد يتفق أنْ يكون عدّة سطوح يلتئم منها مكان واحدّ – كما للماء في النهرّ – وقد يتفق أنْ تكون بعض هذه السطوح متحركة بالعرض وبعضها ساكنة، ويتفق أنْ تكون كلّها متحرّكة بالدور على المتحرّك والمتحرّك عليه ساكن. وربّما كان المحيط والمحاط متخالفي المفارقة؛ كما في كثيرٍ من السماويات.

(٣) ويجب أنْ ننظر هنا: إذا كان ماء مثلاً في جرّة، وفي وسط الماء شيء آخر يحيط به الماء، وقد علمنا أنَّ مكان الماء هو السطح المقعّر من الجرّة؛ فهل هو وحده مكانه أو هو والسطح المحدّب الظاهر من الجسم الموجود في الماء مجموعين مكان الماء؟ كما لو كان الماء على شكلٍ يحيط به سطح مقبّب وسطح مقعّر، وسطحان آخران على هذه الصورة، ولم يكن السطح المقعّر من المحيط به وحده مكانه، بل جملة السطوح التي تلاقي جميع جهانه. فيشبه أنْ تكون جملة السطوح التي تلاقي الماء من جميع جهاته مقعّراً من الجرّة ومحدباً من الجسم الذي في داخل الماء، هو المكان له. ولكن ها هنا شيء واحد ليس هناك، وهو أنَّ المقعّر من الشكل الذي صوريناه ليس يحيط به وحده، بل تحيط به السطوح جملة كسطحٍ واحدٍ، وهناك ليس الأمر كذلك، بل بالمقعّر كفاية في الإحاطة

concave surface is enough to surround, whether there is or is not the convex surface. Moreover, in the latter [figure] there are two distinct surfaces from which no single thing, which would be the place, is composed. As for the earlier figure, a single surface, which contacts as a single surface, is composed from the sum of the contacting surfaces. So it would seem that, inasmuch as a single thing comes to be from the sum, then the sum would be a single place, whereas the parts would be the place's parts; but none of them would be a place for the whole, and inasmuch as [nothing] makes up [that place], it will not exist.

(4) As for the arguments denying place, against the first one[1] it is said that place is an accident, and, from it, the name of that in which it is an accident [that is, the substance of the accident] might be derived. It has not been so derived, however, because it has not been common practice. Instances of this are frequent.[2] Even when it is derived, that name need not be the term *placed.* [That] is because the term *placed* is derived from being placed, but to be placed is not that something possessing an accident *is* something's place. A certain accident might be in something, while the name for something else is derived from it, like *begetting* in the *begetter,* and *knowledge* in the *knower,* where the name for the *object of knowledge* is derived from [the *knower*], but knowledge is not in [the object of knowledge]. So it might be that from *place* the name *placed thing* is derived, where the place is not in it, but it is in the place. The fact is, being the body [*x*] that surrounds another body [*y*] so that [*x*'s] internal surface is a place for [*y*] is an intelligible concept from which one might derive the name for that surrounding thing if the infinitive[3] of it were derived from it; but *place* is not an infinitive, and an infinitive has not turned out to be derived from it in this way. It does not necessarily follow from this, however, that place is not an accident.

1. See 2.5.2.

2. For example, it is an accident belonging to me that I am in my office right now, but most frequently we would not refer to me as the *officed one.* Similarly (to take an example from outside the category of *where*), it is accidental to me that I ate steak last night, but we probably would not normally call me the *having-eaten-steak one.*

3. The *maṣdar,* translated here *infinitive,* is the *nomen verbi* or abstract substantive, and it is the simple idea from which most Arab grammarians derive the compound idea of the finite verb. See W. Wright, *A Grammar of the Arabic Language,* 3rd ed., (Cambridge, UK: Cambridge University Press, 1967), vol. 1, §195.

بهّ – كان السطح المحدّب أو لم يكنّ – وهناك أيضاً سطحان متباينان ليس يأتلف منهما شيء واحد يكون مكاناً . وأمّا في هذا الشكل فإنّه يأتلف من جملة السطوح ‹المتلاقية› سطحٌ واحدٌ يلاقي سطحاً واحداً . فيشبه أنْ يكونّ – حيث يحصل من الجملة واحدّ – فإنَّ الجملة تكون مكاناً واحداً ، وتكون الأجزاء أجزاء المكان ، ولا يكون شيء منها مكاناً للكل ، وحيث لا يأتلفه لا يكون .

(٤) وأمّا حجج نفاة المكان ؛ فالحجّة الأولى يقال عليها أنَّ المكان عرضٌ ، ويجوز أنْ يشتق منه الاسم لما هو عرض فيه ، لكنه لم يشتق ، لأنّه لم يوقف عليه بالتعارف ، ومثل هذا كثير . وإذا اشتق فلا يجب أنْ يكون ذلك الاسم هو لفظ المتمكن ، فإنَّ لفظ المتمكن مشتقٌ من التمكّن ، وليس التمكّن هو كان الشيء ذا عرض هو مكان لشيءٍ ، ويجوز أن يكون في الشيء عرض ويشتق منه الاسم لغيره كالولادة ؛ فهي في الوالد ، والعلم فهو في العالم ، ويشتق منه للمعلوم الاسم وليس العلم فيه . فيجوز أنْ يشتق من المكان إسم المتمكن ولا يكون المكان فيه ؛ بل هو في المكان . ولكن كون الجسم محيطاً بجسم آخر حتى يكون سطحه الباطن مكاناً له هو معنى معقول ، يجوز أنْ يشتق منه إسم لذلك المحيط لو كان اُشتق له منه مصدر ، والمكان ليس بمصدر ، ولم يتفق أنْ يُشتق منه على هذه الجهة مصدر ؛ فليس يجب من هذا أنْ لا يكون المكان عرضاً .

(5) The response to the second skeptical puzzle[4] is that place is neither a body nor what coincides with body; rather, it is what surrounds in the sense that it primarily applies to its extremity. Our saying [that], "place is coextensive with the placed thing" is just a figure of speech, by which I intended that place is unique to the placed thing. So it is imagined to be really coextensive with it when that is not the case, and it is, in fact, coextensive only with its extremity. It is unique since, in the innermost containing extremity, there cannot be a body other than the body whose outermost extremity is coextensive with that extremity. When what was said about place's coinciding and being coextensive with the placed thing does not have to be accepted as literal, and neither is it a first principle evident in itself nor is it something that we need to prove, then the skeptical doubt does not necessarily follow.

(6) The third skeptical doubt[5] would follow only were we to say that *every* instance of locomotion (however it might be, whether essential or accidental) requires affirming a place. We never said that; rather, we only said that what must be affirmed as having a place is the thing essentially subject to locomotion. That is, it essentially leaves what encompasses and surrounds it as a result of itself, not because it follows upon [something else]. Now, the surface, line, and point follow upon the body that they accompany, and they simply do not leave it, although perhaps the body leaves behind all that accompanies it and all that it encircles, such that the line would leave a line and the surface a surface. So, [only] if the surface, line, and point were such that they could leave by themselves and by their very own motion [and, again, they are not], then the outcome would be what was said. (Their claim that the point is a privation[6] deserves consideration, but this is not the proper place; nor does the resolution of the doubt depend upon it, since it could be resolved without it.)

4. See 2.5.3.
5. See 2.5.4.
6. See 2.5.5.

(٥) وأمّا التشكيك الثاني فالجواب عنه أنَّ المكان ليس بجسم ولا مطابقاً للجسم، بل محيط به؛ بمعنى أنّه منطبقٌ على نهايته انطباقاً أولياً. وقولنا إنَّ المكان مساوٍ للمتمكن قولٌ مجازي أُريد به كون المكان مخصوصاً بالمتمكن فيُخيّل أنّه مساوٍ له بالحقيقة وليس كذلك، بل هو مساوٍ لنهايته بالحقيقة، وهو مخصوص به بالحقيقة. إذ لا يجوز أنْ يكون في باطن النهاية الحاوية جسم غير الجسم الذي تساوي نهايته الظاهرة تلك النهاية، وإذا لم يكن ما قيل حقاً من مطابقة المكان ومساواته للمتمكن واجباً تسليمه ولا أولياً بيّناً بنفسه؛ لا يحتاج إلى أنْ ندل عليه، لم يكن التشكيك لازماً.

(٦) وأمّا التشكيك الثالث؛ فإنّما كان يلزم لو قلنا: إنَّ كل انتقالٍ – كيف كان بالذات أو بالعرَض – يوجب أن يثبت المكان؛ ونحن لا نقول ذلك؛ بل نقول إنَّ انتقال الشيء بالذات؛ وهو أنْ يفارق كل ما يحصره ويحيط به مفارقة عن ذاته لا بسببٍ ملزوم، هو مفارقٌ بذاته، هو الذي يجب أنْ يكون مثبتاً للمكان. وأمّا السطح والخط والنقطة فإنّها تلزم ما هي معه من الجسم ولا تفارقه البتة، لكن الجسم قد يفارق كل ما معه وكل ما يطيف به. فيلزم أن يكون الخط قد فارق خطّاً والسطح سطحاً. فلو كان السطح والخط والنقطة ممّا يجوز أنْ تفارق بذاتها، وبحركةٍ بنفسها، لكان الحكم ما قيل. وأمّا قولهم إنَّ النقطة عدمٌ، ففيه نظر، وموضعه الخاص به غير هذا الموضع ولا تعلّق له بحل الشك، فقد ينحل دونه.

(7) The fourth skeptical doubt[7] would follow only if it were true that whatever is indispensable is a cause. That is not the case, however, for the effects and necessary concomitants of the effects are indispensable for the cause, while they are not causes. Similarly, the effect cannot dispense with the cause as well as the necessary concomitants of the cause, which are not [themselves] causes, nor do they have anything to do with causing the cause. The fact is that the cause that is indispensable is essential, and nothing else is prior to it. So place is something that is inevitable for motion, but it is not something that is causally prior to motion. Instead, it is perhaps prior by nature, such that whenever there is locomotion there is a place, while it is not the case that whenever there is a place there is locomotion. This priority, however, is not causal priority; and there must instead be something together with the existence of this that imparts existence to the effect in order that there be a cause. (This will be proved for you only in another discipline).[8] So place might be something more general than motion that is necessary for the motion, while not being a cause. Moreover, motion's existing in the mobile does not prevent place from also being a material cause of [motion], for a lot of people think that many things depend upon two subjects. Now, motion is a certain type of departure, and so it is quite likely that it depends upon something that departs and something that is departed from, both of which would be like subjects, in which case the motion would exist with respect to the mobile and the place. If this is false, then it is so by some proof other than the simple truth that motion exists in what is undergoing motion. In summary, place is something necessary on account of the subject of the motion, for the subject of motion is inevitably in place—inasmuch as it is something that may actually undergo motion, not simply inasmuch as motion actually exists in it—and its being in place is not its cause. So place is necessary because of motion's material cause.

7. See 2.5.6.
8. Cf. *Ilāhīyāt* 6.1.

(٧) وأمّا التشكيك الرابع؛ فإنّما كان يلزم لو كان صحيحاً أنَّ كل ما لا بُدّ منه فهو عِلّة؛ وليس كذلك. فإنّه لا بُدَّ أيضاً للعلة من المعلول ومن لوازم المعلول و‹هي› ليست عِللاً. كما لا بُدّ للمعلول من العِلّة ومن لوازم العِلّة التي ليست ‹هي› بعللٍ، وليس شيء منها بعلّةٍ للعلّة، بل العِلّة هي التي لا بُدّ منها، وهو لذاته لا لغيره أقدم. فالمكان من الأمور التي لا بُدّ منها للحركة وليس أقدم من الحركة بالعلّية، بل عساه أنْ يكون أقدم ‹منها› بالطبع، حتى أنّه إنْ كانت نقلة كان مكان، وليس إذا كان مكان كانت نقلة. لكن هذا التقدم غير تقدّم العِلّية، بل يجب أنْ يكون الشيء مع وجود هذا، مفيداً لوجود المعلول حتى تكون علّة. وهذا إنّما يتحقّق لك في صناعةٍ أخرى. فيجوز أن يكون المكان أمراً أعمّ من الحركة لازماً للحركة وليس بعلّة. وأيضاً فإنَّ كون الحركة موجودة في المتحرّك ممّا لا يمنع أنْ يكون المكان أيضاً علّة عنصرية لها، فكثيرٌ من الأمور تتعلّق بموضوعين عند كثير من الناس. والحركة مفارقة ما، فلا يبعد أنْ تتعلّق بالمفارِق والمفارَق؛ على أنهما كلاهما موضوعان. فتكون الحركة موجودة في المتحرّك وفي المكان. فإنْ بطل هذا بطل ببيانٍ آخر لا لنفس صحة وجود الحركة في المتحرّك. وبالجملة المكان أمرٌ لازمٌ لموضوع الحركة، فإنَّ موضوع الحركةّ – من حيث هو بالفعلّ – جائز عليه التحرّك لا من حيث هو بالفعل موجودٌ فيه الحركة فقط، هو في مكان لا محالة، وإنَّ كونه في مكان ليس بعلّةٍ له، فالمكان لازمٌ لعلّة الحركة العنصرية.

(8) The fifth skeptical doubt[9] turns out to be true only if the growing thing that is in place must remain permanently in a single place, whereas when it is always exchanging one place for another, like the exchange of one quantity for another, then what was said is not necessary.

(9) Let us now refute the arguments of those who err about [place's] essence. As for the syllogism of those who said that place is subject to replacement and that the material is subject to replacement,[10] [the syllogism] is well known to be inconclusive, unless it is added that whatever is subject to replacement is place; and this we do not concede. [That] is because [only] some of what is subject to replacement is place; namely, it is that which bodies replace by coming to be in it. The same also holds for the claim that place is the first delimiting container, and so is form.[11] In other words, place is not every first container, but only that which contains something separate. Moreover, the form does not contain anything, because what is contained is separate from what contains, while the material is not separate from the form. Again, if by *delimiting* [in the statement "Place is the first delimiting container"] one means the limit by which something becomes delimited, then it is not commonly accepted that place has this description; and, in fact, it has been shown to be not true. If what is intended by *delimiting* is a container, [*delimiting*] is a synonym for *container,* and the meaning of the one is the meaning of the other. Furthermore, place contains and delimits the placed thing, where the placed thing is a body, whereas the form contains the matter, not a body in it.

(10) As for the argument of those advocating the interval that was based on the changing simple [surface], while the place of the placed thing does not change where nothing remains fixed but the interval,[12] our response is not to concede that the placed thing's place is not changing.

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9. See 2.5.6.
10. See 2.6.3.
11. Ibid.
12. See 2.6.4.

(٨) وأمّا التشكيك الخامس، فإنّما يصح لو كان النامي الذي في المكان يجب أنْ يلزم مكاناً واحداً. وأمّا إذا كان دائماً يستبدل مكاناً بعد مكان، كما يستبدل كمّاً بعد كمّ، فليس ما قيل بواجب.

(٩) فلنبطل الآن حجج المخطئين في ماهيته. فأمّا قياس من قال إنَّ المكان يتعاقب عليه، والهيولى تتعاقب عليه، فقد عُلم أنّه غير منتج؛ اللّهم إلاّ أنْ يقال: فكل ما يتعاقب عليه مكانٌ، فلا نسلّم حينئذ، لأنَّ المكان هو بعض ما يتعاقب عليه، وهو الذي تتعاقب فيه الأجسام بالحصول فيه. وكذلك ما قيل إنَّ المكان أوّل حاوٍ محدّدٍ؛ فهو الصورة، وذلك أنّه ليس المكان كل أول حاوٍ، بل الذي يحوي شيئاً مفارقاً. وأيضاً الصورة لا تحوي شيئاً، لأنَّ المحوي منفصل عن الحاوي، والهيولى لا تنفصل عن الصورة. وأيضاً فإنَّ المحدّد إنْ عُني به الطرف الذي به يتحدّد الشيء فليس بمشهورٍ أنَّ المكان بهذه الصفة، وأمّا أنّه غير حق فقد بانَ، وأمّا المحدّد الذي يراد به الحاوي فيو إسم مرادف للحاوي ومعناه معناه. وأيضاً المكان حاوٍ للمتمكن ومحدّده، والمتمكن جسم والصورة تحوي المادة لا جسماً فيها.

(١٠) وأمّا الحجة التي لأصحاب البُعْد؛ المبنية على وجود البسيط متبدلاً، والمتمكن غير مستبدلٍ مكانه، وليس هناك شيء يبقى ثابتاً إلاّ البُعْد؛ فنقول: إنّا لا نسلّم

The fact is that it is changing its place, except that it is neither undergoing motion nor remaining at rest. It is not something at rest because, in our opinion, it is not at a single place for a period of time. If by *something at rest* we did not mean this, but instead [meant] that whose relation to certain fixed things does not change, then, in this sense, it would be at rest; or if[13] its place were that which [as a result of its own action] it vacates, departs, and leaves, it would have preserved that place and would not have been changed as a result of itself and so would preserve a single place. At present, we do not mean by *something at rest* either the first or this one, for if we did so, it would be at rest. It is not undergoing motion because the principle of change does not belong to it, whereas the principle of change does belong to what undergoes motion—namely, that which is the first perfection belonging to what is in potency of itself such that, even if everything else were to remain the same vis-à-vis it, its state would change. I mean that if the things that surround and are joined with it were to remain just as they are with nothing happening to them, its relation with respect to them would still happen to change. This case is not like that one. So[14] the body need not necessarily be at rest or undergoing motion, for there are certain conditions belonging to body with respect to which it would neither be at rest nor undergoing motion in place. One of these is that it has no place.[15] Another is that it has a place, but there is a time when it does not have that same place, and it does not [have] the principle that causes it to leave.[16] Again, another is that it has a place that is the same for a period of time; however, we have not considered it during the period of time, but at an instant, in which case the body is neither resting nor being moved.[17]

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13. Reading *lau* with **Z**, **T**, and the Latin (*si*), which is omitted in **Y**.

14. Reading *fa* with **Z**, **T**, and the Latin (*quia*) for **Y**'s *wa* (and).

15. For instance, according to Avicenna, the body of the universe as a whole has no place, and so it cannot be said to be moved or be at rest with respect to place, albeit it does change with respect to position (see 2.3, pars. 13–16).

16. The present example of change of the containing surface, while the contained body is not *of itself* changed, would be such an instance.

17. It should be noted that Avicenna is not denying that there might be motion at an instant, but only that there will not be motion (or rest) with respect to place at an instant, understood as a change of place at an instant. This claim is compatible with his earlier claim in 2.1 that there is motion at some posited point for only an instant.

أنَّ المتمكن غير مستبدلٍ مكانه، بل هو يستبدل مكانه إلاّ أنّه ليس بمتحرّكٍ ولا ساكن. أمّا أنّه ليس بساكنٍ فلأنّه ليس عندنا في مكان واحد زمان، اللّهم إلاّ أنْ نعني بالساكن لا هذا؛ بل الذي لا تتبدل نسبته من أمور ثابتة؛ فيكون ساكناً بهذا المعنى، أو الذي لو خُلي وحاله وترك على مكانه، حفظ ذلك المكان ولم يستبدل له من نفسه؛ فكان حافظاً لمكانٍ واحد. ونحن لا نريد الآن بالساكن لا الأول ولا هذا، فإنْ أردنا أحد المعنيين كان ساكناً. وأمّا أنّه ليس بمتحركٍ فلأنّه ليس مبدأ الاستبدال منه، والمتحرّك بالحقيقة هو الذي مبدأ الاستبدال منه؛ وهو الذي الكمال الأول لما بالقوة فيه من نفسه، حتى أنّه لو كان سائر الأشياء عنده بحالها لكان حاله يتغيّر؛ أعنى لو كانت الأمور المحيطة به والمقارنة إياه ثابتة كما هي لا يعرض لها عارض، كان الذي عرض له تبدّل نسبته فيها، وأمّا هذا فليس كذلك. فليس بواجب أنْ يكون الجسم لا محالة ساكناً أو متحركاً، فإنَّ للجسم أحوالاً لا يكون فيها ساكناً ولا متحركاً في المكان؛ من ذلك أنْ لا يكون له مكان، ومن ذلك أنْ يكون له مكان، ولكن ليس له ذلك المكان بعينه في زمان ولا هو المبدأ في مفارقته، ومن ذلك أنْ يكون له مكان وهو له بعينه زماناً، ولكن أخذناه فيه لا في زمان؛ بل من حيث هو في آن، فيكون الجسم حينئذ لا ساكناً ولا متحرّكاً.

(11) As for what they mentioned about analysis,[18] analysis is not as they said, but, rather, involves isolating one thing after another of the parts existing in some thing. So analysis indicates the material in that it demonstrates that there is a certain form and that, by itself, [the form] does not subsist but belongs to a certain matter. So it is demonstrated that there is now a certain form and matter in this thing, whereas their alleged interval is not affirmed in this way at all. That is because the interval is affirmed only in the estimative faculty when the placed thing is removed and eliminated. So, perhaps when the placed thing is removed and eliminated, a certain interval is affirmed in the estimative faculty, whereas it is only the affirmation of the form that makes the matter necessary, not [the fact] that the estimative faculty imagined its removal—that is, unless something else is meant by *removal,* in which case the fallacy of equivocation is being committed. That is because, by *removal,* we mean that the estimative faculty imagines something as nonexistent. Now, this act of the estimative faculty with respect to the form would, in reality, make the matter necessarily cease to be, not affirm it; while, with respect to the placed thing, it would neither necessarily make it cease to be nor affirm it. We can dispense with [showing] that it does not necessarily make the interval cease to be, since the opposing party does not maintain as much. [It does not necessarily] affirm it because simply making the placed thing cease to be does not alone entail that, as long as it is not further added that the bodies encircling it are preserved as they are. If there is only a single body that is imagined not to exist, then, from imagining its elimination, there is no need to maintain an interval. Were it not for the estimative faculty's imagining its elimination, there would be no argument;

18. See 2.6.5.

(١١) وأمّـا ذكروا من حديث التحليل؛ فإنَّ التحليل ليس على الوجه الذي ذكروا، بل التحليل هو إفراد واحدٍ واحدٍ من أجزاء الشـيء الموجود فيه، فإنَّ التحليل يدلّ على الهيولـى بأنّه يبرهن أنَّ هناك صورة وأنّها لا تقـوم بذاتها؛ بل لها مادة، فيبرهن أنَّ في هذا الشـيء الآن صورة ومادة. وأمّـا البُعْد الذي يدّعونه، فهو شـيء ليس ثبوته على هذا القبيل، وذلك لأنَّ البُعْد إنّما يثبت في الوهم عند رفع المتمكن وإعدامه، فعسـى إذا رُفع المتمكـن وأُعدم وَجَبَ أنْ يثبت في الوهـم بُعْد. وأمّا المادة فإنّما يوجبها إثبات الصورة لا توهّم رفعها، اللّهم إلاّ أنْ يعني بالرفع معنىً آخر، فتكون المغالطة واقعة باشـتراك الإسم؛ وذلك لأنَّ الرفع نعني به توهّم الشـيء معدوماً. وهذا التوهم في الصورة يوجب بالحقيقة إبطال المادة لا إثباتها، وفي المتمكن لا يوجب لا إبطال البُعْد ولا إثباته. أمّا أنّه لا يوجب إبطال البُعْد فقد استغنينا عنه إذ الخصم لا يقول به، وأمّا إثباته فلأنَّ نفس إبطال المتمكن وحده لا يوجب ذلك ما لم يضف إليه حفظ الأجسام المطيفة به، موجودة على أحوالها. وأمّا إنْ كان جسـم واحد فقط، وتوهم معدوماً، فليس يجب من توهّم عدمه القول بِبُعْدٍ لـولا توهـم عدمه لما قيل به؛ بل التوهّم يتبع التخيّل في إثبات فضاء غير متناهٍ دائماً؛ كان

but, as it is, the act of the estimative faculty always follows that of the imaginative faculty in affirming some infinite empty space, whether you remove a body or not. The existence of a certain interval that determines the measurement follows in the estimative faculty only owing to an elimination of some body with the condition that the bodies encircling it, which had measured the delimited interval, be preserved. Were it not for the measurement, there would be no need to eliminate some body in order that the imaginative faculty picture the interval. Despite all of this, let us grant that this interval is assumed in the estimative faculty, when a certain body or bodies are eliminated. How does one know that this act of the estimative faculty is not false, such that what follows upon it is absurd, and whether this assumption is, in fact, even possible, such that what follows upon it is necessary? Perhaps this advocate sets down as a premise that the estimative faculty judges it to be so, and whatever the estimative faculty demands is necessary. The case is not like that, for many existing situations are different from what the estimative faculty imagines. In summary, we should return to the beginning of the argument and say: Analysis distinguishes things whose existence truly is in the combination, but they are mixed in the intellect, in which case some are different from others in their potency and definition. Alternatively, some [of those things that truly exist but are mixed in the intellect] indicate the existence of something else, and so, when one selectively attends to the state of one of them it is carried from it to the other. In this case, *to remove* means *to set to one side and not to consider,* not *to eliminate.*

(12) The response to the argument after this one[19] is their own claim that the body requires place not on account of its surface, but on account of its corporeality—that is, if by [their claim] they mean that the body is in place not on account of its surface alone, but only on account of its

19. See 2.6.6.

جسم فرفعته أو لم ترفعه. وأمّا وجود بُعْدٍ مّا معيّن التقدير فإنّما يكون في الوهم تبعاً لعدم جسم، بشرط حفظ الأجسام المطيفة به التي كانت تقدّر البُعْد المحدود، ولولا التقدير لما احتيج إلى إعدام جسم في تخيّل البُعْد. ومع هذا كلّه، لنسلّم أنَّ هذا البُعْد يُفترض عند الوهم إذا أُعدم جسم أو أجسام، فما يدريه أنَّ هذا التوهم ليس فاسداً حتى لا يكون تابعه محالاً، وهل صحيح أنَّ هذا الفرض ممكن حتى يكون ما يتبعه غير محال؟ . . فعسى أنْ يقضي هذا القائل بأنَّ الوهم يحكم عليه، وأنَّ كل ما يوجبه الوهم واجب، وليس الأمر كذلك، فكثير من الأحوال الموجودة مخالفٌ للموهوم، وبالجملة يجب أنْ نرجع إلى ابتداء الكلام فنقول: إنَّ التحليل تمييز أشياء صحّ وجودها في المجتمع ولكنها مختلطة عند العقل، فيفصل بعضها عن بعض بقوته وبحدّه، أو يكون بعضها يدل على وجود الآخر. فإذا تأمّل حال بعضها انتقل منه إلى الآخر، ويكون الرفع حينئذ بمعنى الترْك له والإعراض عنه إلى آخر لا بمعنى الإعدام.

(١٢) وأمّا الحجة التي بعد هذا فجوابها أنَّ قول هذا القائل: إنَّ الجسم يقتضي المكان لا بسطحه بل بجسميته، إنْ عنى به الجسم بسطحه وحده لا يكون في مكان، بل إنّما

corporeality, or if they mean that because[20] it is a body it can be in place. In this case the claim is true; and it does not necessarily follow from it that [a body's] place is a body,[21] for, when something requires a certain status or relation to something because of some description it has, the required thing need not have that description as well. So it is not the case that when the body needs certain principles (not inasmuch as it exists, but inasmuch as it is a body), its principles also have to be bodies. When the accident needs a subject inasmuch as it is an accident, its subject [does not have to be] an accident. If they mean by ["body requires place on account of its corporeality"] that every corporeal interval requires an interval in which it exists, then it just begs the original question. In summary, when [the body] requires place on account of its corporeality, it does not necessarily follow that it completely encounters the place in all of its corporeality. It is just as if it required a container on account of its corporeality; it would not necessarily follow that it completely encounters the container in all of its corporeality. In general, it is accepted that the body requires a place on account of its corporeality only to the extent that we accept that it requires a container on account of its corporeality. The sense of both claims is that the whole body is taken as a single thing that is described as being either in a place or in a container, where something's being *in* another in its entirety is not that it completely encounters it in its entirety. We certainly say that *all* of this water and the *whole* of it is in the jar, where we do not mean that the whole of it completely encounters the jar. The response to the argument after this that is based upon place's exactly equaling the placed thing[22] is also now completed.

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20. Reading *li-anna* with two MSS consulted by **Y**, **Z**, **T**, and the Latin (*ex hoc quod*), which **Y** secludes.

21. The sense of *body* here is probably whatever is three-dimensional (see 1.2.1). So the sense is that the place of a body needs not be three-dimensional simply because the body is three-dimensional.

22. See 2.6.6.

يكون في المكان بجسميته، أو عنى به أنّه لأنه جسم يصلح أنْ يكون في مكانٍ فالقول حقٌ. وليس يلزم منه أنْ يكون مكانه جسماً، فإنّه ليس يجب إذا كان أمر يقتضي حكماً مّا أو إضافة إلى شيء مّا بسبب وصف له أنْ يكون المقتضى بذلك الوصف. فليس إذا كان الجسم يحتاج إلى مبادئ – لكونه جسماً لا لكونه موجوداً – يجب أنْ تكون مبادئه أيضاً أجساماً، إذ كان العرض يحتاج إلى موضوع لكونه عرضاً أنْ يكون موضوعه عرضاً. وأمّا إنْ عنى به أنَّ كل بُعْدٍ من جسميته يقتضي بُعْداً يكون فيه، فهو مصادرة على المطلوب الأول. وبالجملة أنّه ليس إذا كان بجسميته يقتضي المكان يلزم أنْ يلاقي بجميع جسميته المكان، كما أنّه لو كان بجسميته يقتضي الحاوي، فليس يلزم أنْ يكون بجميع جسميته يلاقي الحاوي. وبالجملة فإنّه غير مسلّم أنَّ الجسم يقتضي بجسميته مكاناً، إلاّ بمقدار ما نسلّم أنّه بجسميته يقتضي حاوياً؛ ومعنى القولين جميعاً أنَّ جملة الجسم المأخوذ كشيءٍ واحدٍ يوصف بأنّه في مكانٍ أو في حاوٍ. وليس كون الشيء بكليته في شيء، هو كونه ملاقياً له بكليته. فإنّا نقول: إنَّ جميع هذا الماء وجملته في هذه الجرّة؛ ولا نعني أنَّ جملته ملاقية للجرّة. أمّا الحجة التي بعد هذه، المبنية على مساواة المكان والمتمكن، فقد فُرِغ عن جوابها.

(13) The one after that was based upon on the fact that place does not undergo motion.[23] Now, it is conceded that place does not essentially undergo motion, whereas it is not conceded—nor is it even commonly accepted—that it does not undergo accidental motion. Indeed, [just ask] anyone, and they won't deny that a thing's place might move (since they believe that the jar is a place), while inevitably allowing [what is placed in the jar] to move [with it].

(14) As for the next argument,[24] in the first place, it is based upon the biases of the masses, and that is no argument in things intellectual. Second, just as the man in the street does not disallow you from saying that the naturally disposed interval in the jar is empty and full, so likewise he does not disallow us from saying that the concave simple [i.e., the interior containing surface] in the jar is empty and full, provided that the man in the street understands both meanings (for he has no considered opinion about some expression when custom has not decidedly issued for him how to understand its meaning). Now, it seems that he would more readily apply that to the concave simple [surface] than he would to the other. That is because, on his understanding, what is full is that which surrounds something solid on its inside such that it meets it on every side. Don't you see that, in common parlance, he says that the *jar* is full and the *cask* is full? He does not give a thought to the alleged interval in the jar, but, rather, describes the container in this way, and the container is more like the simple [surface] than it is like the interval. In fact, the interval does not surround anything; but, rather, perhaps, should it exist, it is surrounded by the filled thing. Thus, we find that the common man is not averse to saying that the jar is full, while he might give pause to saying that the interior interval is full. Now, *jar* is

23. See 2.6.7.
24. See 2.6.8.

(١٤) وأمّا الحجة التي بعد هذه، فهي أول شيءٍ مبنية على عادات الجمهور، وذلك ليس بحجةٍ في الأمور العقلية. وثانياً أنّه كما لا يمنع العامة أنْ تقول إنَّ البُعْد المفطور في الجرّة، فارغٌ ومملوءٌ، كذلك لا يمنع أنْ تقول أنَّ البسيط المقعّر الذي في الجرّة؛ فارغٌ ومملوءٌ، على أنْ تفهم العامة المعنيين جميعاً. فإنّهم لا فتوى لهم في لفظٍ لم تجرِ لهم العادة بفهم معناه محصلاً، ويشبه أنْ يكونوا إلى أنْ يطلقوا ذلك في البسيط المقعّر أسرع منهم إلى غير ذلك. وذلك أنَّ المملوء في عرفهم هو الذي يحيط بشيء مصمت في ضمنه حتى يلاقيه من كل جهة. ألا ترى أنّهم يقولون، فيما بينهم، إنَّ الجرّة مملوءة والزّق مملوء، ولا يعرفون حال البُعْد الذي يدعونه في داخل الجرّة، بل يصفون الحاوي بهذه الصفة، والحاوي أشبه بالبسيط منه بالبُعْد. فإنَّ البُعْد لا يحيط بشيء، بل ربّما أحاط به ما يملؤه إنْ كان موجوداً. فلذلك نجد العامة لا يتحاشون أنْ يقولوا إنَّ الجرّة مملوءة، وربّما توقفوا عن أنْ

just a name for the earthenware substance made according to the shape of the interior, surrounding simple [surface]; and, if the simple [surface] were to subsist on its own, it would stand in for this jar, and what he says about the jar he would say about the simple [surface]. So it has become clear that, when he says that the jar is empty and full and deems that to be like saying [that] a certain place is empty and full, he has been led to what surrounds. The fact of the matter is that he disallows saying that the absolute simple [surface] is empty and full only because the absolute simple [surface] is not place; rather, place is a simple [surface] on the condition that it contain, and when a simple [surface] having this description is permitted to replace the absolute simple [surface], then he is not averse to that.

(15) The basis of the argument after this one is that place becomes an interval that provides every body with a place. That is, it is something properly necessary.[25] One of the things eagerly desired, however, is to show that this is *properly* [*necessary*], for if [the idea that] every body is in a place is not necessary in itself, then our attempt to make it necessary would be a fool's errand. Perhaps there is a greater necessity for one of the bodies not to be in a place. Also, if it is necessary, then there would be no need on our part to lay anything out. Now, if this premise were true—namely, that every body is in a place—*and* it were impossible for a container or anything the estimative faculty images to be a place other than the naturally disposed interval, *and* the naturally disposed interval were to exist, then [these] conditions would require us to hold that the interval be place. None of that, however, is necessary. (Oh, how great the twists and turns we undertake in order to contrive some clever way so that we can make all bodies be in place!) Let us even concede

25. See 2.6.9. The argument at 2.6 was that the interval ensures that every body has a place, while the doctrine of the containing surface would preclude certain bodies from having a place. The body in question is almost certainly the universe itself, because there is nothing outside to contain it. The implicit premise in the argument is that every body *necessarily* has a place, and so any account of place must ensure that every body has a place. Avicenna's move here is (1) to undermine the necessity of that premise and (2) to show that, even given the premise, the inferred conclusion that the interval is place does not necessarily follow.

يقولوا إنَّ البُعْد الباطن مملوء ، والجرّة إسم لجوهر الخزف المعمول على شكل البسيط الباطن المحيط . ولو كان البسيط يقوم بنفسه لكان مقام هذه الجرّة ، ولكانوا يقولون في البسيط ما يقولونه في الجرّة . فقد بانّ أنهم إذا قالوا إنَّ الجرّة فارغة ومملوءة ، وجعلوا ذلك كقولهم مكانٌ مّا فارغ أو مملوء ذهبوا إلى المحيط . نعم ، إنّما يمتنعون أنْ يقولوا في البسيط المطلق أنّه فارغ ومملوء ، لأنَّ البسيط المطلق ليس هو المكان ، بل المكان بسيط بشرط الإحاطة ، وإذا جعل بدل البسيط المطلق بسيط بهذه الصفة ، لم يتحاشوا عن ذلك .

(١٥) وأمّا الحجّة التي بعد هذه ، فمبناها على أنْ يصير المكان بُعْداً يجعل لكل جسم مكاناً ، وهو أمر صواب واجب ، وهذا التصويب شهوة من الشهوات . فإنّه إنْ لم يكن واجباً أنْ يكون كل جسم في مكانٍ وجوباً في نفسه ، كان سعينا في إيجابه سعياً باطلاً ، وعسى أنْ يكون الأوجب لبعض الأجسام أنْ لا يكون في مكان ، وإنْ كان واجباً لم يحتج إلى تدبيرٍ منا . ولو كانت هذه المقدمة صحيحة ؛ وهي أنَّ كل جسم في مكان ولم يمكن أنْ يوجد لكل جسم حاوٍ أو شيء من الأشياء المتوهمة مكاناً غير البُعْد المفطورّ – وكان البُعْد المفطور موجوداً – كانت الحاجة تمسّنا إلى أنْ نقول بأنَّ البُعْدَ مكانٌ ، وليس شيء من ذلك واجباً . فما أشد تحريفنا في أنْ نتمحل حيلة فيكون لنا أنْ نجعل كل جسمٍ في

that all bodies are in place. It is not necessary that the interval be that place. [That] is because this thing might not be place, but a concomitant of the placed thing and common to every body [owing to] the commonality of place. If this claim is meant to be similar to the common man's belief that every body is in a place, then that is not an argument. Indeed, ascribing this belief to the common and average man—not inasmuch as he adopts some school of thought, but instead, as he speaks and acts according to the imagining of the estimative faculty and what is commonly accepted—is like ascribing another belief to him; namely, that whatever exists is in a place and can be pointed to. Both of these beliefs are alike in that the average man would give them up once [he sets] aside instinct and the imaginations of the estimative faculty, and consideration and thought prevail upon him. We have already explained the states of these premises in our discussion on logic[26] and made clear that they are products of the estimative faculty that fall short of those produced by the intellect, and it is not necessary to consider them. Even then, [the common man's] judgment that every body is in place comes with less assurance than his judgment that whatever exists can be pointed to and occupies space; and his understanding of the placed thing is no different from our understanding of position. Once again, even if this [premise that every body has a place] were true, what they say would not necessarily be true, from what we have explained. Place might be something different from the interval, and both of them belong to every body. So the interval's encountering all of a body is no indication that it is its place, since two things might belong to every body, and one of them, to the exclusion of the other, is place.

26. For Avicenna's exhaustive classification of the various types of premises, see *Kitāb al-burhān* 1.4.

مكان؟ ولنسلّم أيضاً أنَّ كل جسم في مكان، فليس يجب أنْ يكون ذلك المكان هو البُعْد؛ فإنَّه يجوز أنْ يكون هذا المعنى ليس بمكان، لكنه لازم للمكان وعام لكل جسم عموم المكان. فإنَّ عنى بهذا القول أنْ يكون أشبه برأي الجمهور أنَّ كل جسم في مكان، فليس ذلك حجّه. فإنَّ نسبة هذا الرأي إلى الجمهورّ – والذين هم العامّة – من حيث لا يعتقدون مذهباً يذهبون إليه، بل يعملون ويقولون على ما في المشهور أو الوهم، كنسبة رأي آخر إليهم، وهو أنَّ كل موجود في مكان، وأنّه يشار إليه. وهذان الرأيان يتساويان في أنَّ العامة تنصرف عنهما بتبصيرٍ وتعريفٍ يرد عليهم بعد الفطرة العقلية والوهمية. وقد عرفنا أحوال هذه المقدمات حيث تكلمنا في المنطق، وبيّنا أنّها وهميات دون عقلية، ولا يجب أن يلتفت إليها. على أنَّ حكمهم في أنَّ كل جسمٍ في مكان ليس في تأكّد حكمهم في أنَّ كل موجود إليه إشارة وله حيّز، ولا هم يفهمون من التمكّن غير ما نفهم من الوضع. ثم لو كان هذا أيضاً حقاً لما وجب، على ما بينا أن يكون ما قالوه حقاً، وكان يجوز أنْ يكون المكان أمراً غير البُعْد، وكل واحدٍ منهما ممّا يوجد لكل جسم. فلا يكون وجود البُعْد ملاقياً لكل جسم دليلاً على أنّه مكانٌ له، إذ كان يجوز شيئان موجودان لكل جسم، وأحدهما دون الآخر مكانٌ.

(16) As for the argument that is after this one,[27] let it be known that there are two ways that seeking the extremity [can be understood]: one that is possible, the other that is not. The impossible way is for something that possesses volume to seek entry into a surface or extremity of a body with its volume. The possible way is that it seeks to encounter completely [the surface or extremity] so that it is surrounded by what surrounds, and this sense can be realized together with the supposition that the extremity is a place. Moreover, it is not the case that, when it seeks the extremity, it necessarily seeks some order among ordered intervals. On the contrary, it might seek only a certain order in the position without every position needing to be in an interval; and, instead, every position is just a certain relation between one body and another that is next to it in some direction, where there are no intervals but those of successive bodies.

(17) As for the arguments of those advocating the void, the response to the one based upon rarefaction and condensation[28] is that condensation might be [understood] in two ways. On the one hand, condensation might be by the coming together of the parts that are spread throughout the intervening air by forcing out the intervening air such that the parts come to replace it without there being some predisposed void. Just the opposite would hold in the case of rarefaction. On the other hand, condensation might not be in that the separate parts come together, but in that the matter itself receives a smaller volume at one time and a larger one at another, since both [volumes] are accidental to it, neither one of which is more fitting than the other. So, when it receives a smaller volume, it is said that there is condensation. Just the opposite would hold in the case of rarefaction. This is something that will be explained in another discipline;[29] and even if it is not explained here, there is no real harm, since at the most this option is false, while the earlier option that I gave as a response remains.

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27. See 2.6.10.

28. See 2.6.12.

29. The discipline in question is that associated with the tradition surrounding Aristotle's *On Generation and Corruption* and which Avicenna treats in his *Kitāb fī al-kawn wa-l-fasād*. Discussions of condensation and rarefaction are dispersed throughout it, but see especially chapter 9, although he also summarizes many of the important details below in pars. 20–21.

(١٦) وأمّا الحجّة التي بعد هذا، فليعلم أنَّ طلب النهاية على وجهين: طلبٌ ممكن، وطلبٌ محال. فأمّا الطلب المحال فهو أنْ يكون ذو الحجم يطلب أنْ يدخل بحجمه سطحاً ونهايــة جســم، والطلب الممكن يطلب أنْ يلاقيه ملاقاة محــاطٍ به بمحيط، وهذا المعنى يتحقّق مع وضع النهاية مكاناً. ثم ليس إذا لم يطلب النهاية وجب أنْ يطلب ترتيباً في أبعاد مرتّبــة، بل ربّما طلــب ترتيباً في الوضع فقط من غير حاجةٍ أنْ يكون كل وضعٍ في بُعْدٍ، بل على أنْ يكون كل وضعٍ هو نسبة ما بين جسمٍ وجسمٍ آخر يليه في جهة، ولا أبعاد إلاّ أبعاد الأجسام المتتالية.

(١٧) فأمّــا حجــج أصحاب الخلاء، فالجــواب على المبني منها علــى التخلْخل والتكاثــف إنَّ التكاثف على وجهين: تكاثف باجتماع الأجزاء المنبثة في هواء يتخللها، بــأنْ يخرج الهواء عــن الخلل؛ فتقوم الأجزاء مقامه من غيــر أن يكون هناك خلاء معدّ، ويقابله تخلْخل وتكاثف يكون لا بأنَّ الأجزاء المتفرقة اجتمعت، بل بأنَّ المادة نفسها تقبل حجماً أصغر تارة، وحجماً أكبر أخرى، إذ كان كلاهما أمرين عارضين له ليس أحدهما أولــى بــه من الآخر. فإذا قبل حجماً أصغر قيل إنّه تكاثــف ولمقابله تخلخل. وهذا أمرٌ يتبيّن في صناعةٍ أخرى، وإنْ لم يبيَّن في هذا الموضع لم يضر، إذ تكون غاية ذلك أن هذا القسم يبطل، ويبقى ذلك القسم الذي أجيب عنه.

(18) The report about the container of ash[30] is pure fiction. Even if it were true, it would be the whole of the container that is void, not some ash in it. Concerning the wineskin and wine,[31] it might be that the difference in the holding capacity of the wineskin in relation to the cask is not obvious to the senses. Also, the wine might be squeezed such that some vapor or air is expelled from it, and so it becomes smaller. It also might become smaller by a certain natural or forced condensation, as you [just] learned.

(19) As for the report about what grows,[32] the nutrition has the potential to extend between two contiguous parts of the organs and cause them to move apart and so settle between them, and so the volume expands. Now, were the nutrition to extend only into a void, then the volume at the time [the nutrition] is incorporated would be the same as it was before [the nutrition was incorporated], there being no increase.

(20) The response to the account concerning the phial[33] is based upon what was just mentioned about rarefaction and condensation—namely, that the body might be provided with a smaller or larger volume, sometimes occurring naturally and sometimes by force. So, just as there might be both natural and forced heating and cooling, the same situation holds for becoming large and small. Now, if this is possible, then not every decrease in some part of a body requires that the rest [of the parts] retain their original volume such that, when some part of the air filling the phial is taken away, the volume of [the air] must remain the same as it was, such that a void would be left behind. Now, if this is not necessary, then neither is that argument; whereas, if its contrary is possible, then it is possible that an increase in volume is proper to the air by its nature.

30. See 2.6.13.
31. Ibid.
32. See 2.6.14.
33. Ibid.

(١٨) وأمّا حديث إناء الرماد فهو كذب صرف، ولو كان ذلك صحيحاً كان الإناء كله خالياً لا رماد فيه أصلاً. وأما حديث الزّق والشراب، فيجوز أنْ يكون المقدار الذي للزّق لا يظهر تفاوته في الجُبّ حسّاً، ويجوز أنْ يكون الشراب ينعصر فيُخرج منه بخاراً أو هواء فيصير أصغر، ويجوز أنْ يصغر بتكاثفٍ طبيعي أو قسري على ما تعلمه.

(١٩) وأمّا حديث النامي فإنَّ الغذاء ينفذ بقوّة بين متماسين من أجزاء الأعضاء ويحركهما بالتبعيد فيسكن بينهما، فينفسح الحجم. ولو كان الغذاء إنّما ينفذ في الخلاء لكان الحجم في حال دخوله وقبله حجماً واحداً لا زائداً.

(٢٠) وأمّا حديث القارورة. فإنَّ الجواب عن ذلك مبني على المذكور في التخلْخل والتكاثف، وهو أنّه من الجائز أنْ يكون الجسم يستفيد حجماً أصغر وحجماً أكبر، وأنْ يكون من ذلك ما هو طبيعي ومنه ما هو قسري، فكما أنّه يجوز أنْ يسخن ويبرد، ويكون منه ما هو طبيعي ومنه ما هو قسري، فكذلك الحال في العِظم والصغر. وإذا كان هذا جائزاً؛ لم يكن كل انتقاص جزء من جسم يوجب أنْ يبقى الباقي على حجمه الأول حتى يكون إذا أُخذ جزء من هواءٍ ماليءٍ لقارورةٍ، يجب أنْ يبقى على حجمه فيكون ما وراءه خلاء. وإذا لم يجب هذا؛ لم تجب تلك الحجّة، وإذا كان خلافه جائزاً، فجائز أنْ يكون

Moreover, in a certain case it will have to become larger in that some part is forcibly removed from it without providing any way for a body comparable in volume to what was removed to replace it. Now, if the removal of that part is impossible unless a certain expansion[34] is possible (such that what remains becomes the original volume and fills it in order to prevent the occurrence of a void), and the agent acting by force has the power needed to bring this possibility into actuality by its attracting [what remains] to one side, while [what remains] clings to the surface adjoining it on the other side (in other words, by forcibly expanding and enlarging it), then it yields to that agent and so expands as to become larger. [Given that], then part of what expanded will come to be outside the phial—namely, what was sucked out—and the rest will remain filling the phial, after having expanded owing to the necessary attraction through the length of the phial caused by the suction. When that suction ceases and it can return to its original state (in that either the water or air is attracted so as to occupy the place from which it moved when there was the decrease), it reverts to its normal state.

(21) Also, when we ourselves blew into the phial and then inverted it into water, a considerable amount of vapor came out of it and bubbled up in the water before the water came back and entered the [phial]. In this case, we know that it was we ourselves who necessarily forced something into [the phial], and, when the force ceases, it comes out. In other words, what we forced in enters either by extending into a void or by the condensation of what was already in it, so that what is being forced in will have a place, where that condensation will occur in the way that we ourselves maintain. We also see that what is acted on by force reverts to the natural state once the force ceases. So, if it is by extending into

34. **Y** has the perfect *inbasaṭa,* while **Z**, **T**, and the Latin (*nisi si ut dispergatur*) have the subjunctive *yanbasiṭa,* which is adopted here. Neither editor mentions the other's alternative reading in the critical apparatus; but the structure of the argument seems to require an *aw* subjective, and so the verb should be in the subjunctive.

الهـواء بطبعه يقتضي تحجّماً . ثم أنه يضطر ، في حـالٍ ، إلى أنْ يصير أعظم ؛ بأنْ يُقتطع منه جزءٌ بالقسر من غير أن يجعل له إلى استخلاف جسم بدل ما يقتطع منه وفي حجمه سـبيل . فإذا كان اقتطاع ذلك الجزء منه لا يمكن ، أو ينبسـط انبسـاطاً يصيّر الباقي في حجم الأول لامتناع وقوع الخلاء ووجود الملاء ، وكان هذا الانبساط ممكناً ، وكان للقاسر قـوة تحوج إلى خـروج هذا الممكن إلى الفعل بجذبه إياه في جهة ، ولزوم سـطحه لما يليه في جهة ، وذلك ببسـطٍ منه وتعظيم إياه بالقسر ، أطاع القاسر فانبسط انبساطاً عظيماً ، وصار بعض ما انبسـط واقعاً خارج القارورة وهو الممصوص ، وبقي الباقي ملء القارورة قد ملأها منبسطاً ، لضرورة الجذْب الماصّ بقدر القارورة . فإذا زال ذلك المصّ ، وجاز أنْ يرجع إلى قوامه الأول ؛ بأنْ يجذب ماء وهواء إلى شـغل المكان الذي يتحرّك عنه متقلصاً عاد إلى قوامه .

(٢١) ونحـن إذا نفخنا في القارورة ثم اكبناها علـى الماء خرجت منها ريحٌ كثيرة يبقْبق منه الماء ، ثم عاد الماء فدخل فيها ، فنعلم أنّا قد أدخلنا فيها بالقسر شيئاً لا محالة ، ولمّا زال القسر خرج . وذلك لا يخلو إمّا أنْ يكون دخول ما أدخلناه بالقسر هو بنفوذه في الخلاء ، أو يكون على سـبيل التكاثف من الموجود الـذي كان فيه حتى حصل للمُدخَل بالقسـر مكانٌ ، ويكون ذلك التكاثف على سـبيل التكاثف الذي نقوله نحن . ونرى أنَّ للقسري منه أنْ يعود إلى الطبيعي عند زوال القاسر . فإنْ كان على سبيل نفوذٍ في الخلاء ،

a void until it reaches that place belonging to it, and that place neither belongs to it by force nor does [that place] abhor some airy body filling it such that it would reject it and push it out, and it does not belong to the nature of air to descend downward away from some void that it is in so as to be pushed into the water, then there should be no need for the air to leave and escape from it. If [the air] abhors the void, then why doesn't the other air follow suit? If the water abhors it, then why is it that, when the suction is very strong and stops [only] at the point where all the air that can be drawn out has been and then [the phial] is quickly inverted over the water, the water enters into it? If the void abhors the air's occupying it and pushes it out, it would more aptly abhor attracting water. Perhaps the void by its nature abhors air while attracting water; but, then, why does it let water puffed up in the air [in the form of clouds], which occupies the spaces between the existing air, fall? If its heaviness overcomes the attraction of that void, then why doesn't the heaviness of the inverted water of the phial overcome the void? Quite to the contrary, it is attracted! Is it more difficult to hold onto something heavy that is already possessed than to lift something heavy that is not possessed? So, once it is clear that this option [namely, that what we forcibly blew into the phial enters by extending into a void] is impossible, it remains that the cause of it is that the air seeks refuge in a smaller volume owing to compression and then, when [the compression] ceases, it expands to its [original] volume. Now, because there is another cause that requires an increase in volume and attenuation—namely, heating—if,[35] owing to the forced inflation, [the heat] is prevented from what it demands because the condensing pressure is stronger than the attenuation, then, when the obstacle is removed, the accidental heat will make the air have

35. Following **Z** and **T** which have the conditional *in,* which is omitted in **Y**. The Latin has *ideo* (therefore), which suggests that the Arabic exemplar for the text there may have been *fa.*

حتى حصل في ذلك المكان منه، وليس ذلك المكان له بقسري ولا مُبغضاً لجسم هوائي يملؤه فينفيه عنه أو يدفعه، ولا من طبيعة الهواء أنْ ينزل متسفلاً عن خلاء يحصل فيه نزولاً مندفعاً في الماء، فينبغي أنْ لا يحتاج الهواء إلى أنْ يفارقه ويتخلص عنه. فإنْ كان الخلاء هو الذي يأباه؛ فلِمَ لا يأتي الهواء الآخر؟ وإنْ كان الماء يأباه، فلِمَ إذا أحكم المصّ ثم تُرك حتى يخرج من الهواء ما من شأنه أنْ يخرج، وكُبّ سريعاً على الماء دخله الماء؟ فإنْ كان الخلاء بأبى أنْ يشغله الهواء ويدفعه، فلأنْ يأبى جذب الماء أولى. فلعل الخلاء يبغض الهواء بطبيعته ويجذب الماء؛ فلِمَ يترك الماء المنفوش في الهواء الشاغل لخَلل الهواء الحالي ينزل؟ وإنْ كان ثقله يغلب جذب ذلك الخلاء، فلِمَ ثقُل. الماء المكبّ ‹على› القارورة لا يغلب الخلاء، بل ينجذب وإمساك الثقيل المشتمل عليه أصعب من إشالة الثقيل المباين؟ فإذا استبانت استحالة هذا القسم، بقي أنَّ السبب فيه إلتجاء الهواء إلى حجم أصغر للانضغاط فإذا زال انبسط إلى حجمه. ولأجل أنَّ هناك سبباً آخر يقتضي حجماً أكبر وهو التسخّن والتلطف، بقسر تحريك النفخ، إنْ كان ممنوعاً عن مقتضاه بالضغط الذي يكثّفه، أشدّ من تلطيف هذا، وقد زال العائق فاقتضى السخونة العارضة أنْ يصير الهواء

a larger volume than it had before the inflation. Because that heating is accidental to this, when it ceases, the air contracts to the volume that its nature requires should there have been no heat, and so the water comes back and enters, owing to the impossibility of a void's occurring. It is because of this that we experience the air emerging from what was vigorously inflated as first bubbling up and then beginning to attract the water into itself, just as if a finger unplugged the mouth of the phial. Also, [when] it is heated with a hot fire that does not shatter it and then is inverted over the water, it first happens to bubble, and then the water is sucked into it.

(22) The response to the argument that is after this one[36] is related to this response. That is because what is moved pushes the air that is immediately in front of it, and that continues to wherever it is that the preceding air no longer yields to the push, and the surge [of air] becomes compressed between what is being pushed and what is not and is forced to receive a smaller volume. Just the opposite happens to what is behind [the compressed air], for some of it is attracted along with [the surging air], and some of it resists and so is not attracted, in which case what is between the two rarefies, and there is a larger volume. From that there comes to be an ongoing and balanced normal state.

(23) So let us be content to this extent with the discussion about place, and let us now talk about time.

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36. See 2.6.15.

أعظـم حجماً من الحجم الذي كان قبل النفخ. ومن أجل أنْ تلك السـخونة عرضية بهذا وتزول، ينقبض الهواء إلى الحجم الذي اقتضته طبيعته، لو لم تكن تلك السـخونة، فيعود الماء فيدخل لا ستحالة وقوع الخلاء. فلهذا ما نشاهد من أنَّ المنفوخ بالقوة أولاً يتبقبق منه هواء يخرج، ثم يأخذ في جذْب الماء إلى نفسه؛ كما لو سُدّ فم القارورة بأصبع، وسخنت بنار حادةٍ لا تكسرها، ثم أُكبت على الماء، عَرَض أولاً تبقبقٌ ثم امتصاص منها للماء.

(٢٢) وأمَّـا الجواب عن الحجّة التي بعد هذه، فمناسـب لهذا الجواب، وذلك لأنَّ المتحرّك يدفع ما يليه من قدام من الهواء، ويمتد ذلك حيث لا يطيع فيه الهواء المتقدم للدفع، فيتلبّـد الموج بين المندفع وغير المندفع، ويضطر إلـى قبول حجم أصغر، وما خلفه يكون بالعكس؛ فيكون بعضه ينجذب معه، وبعضه يعصي فلا ينجذبٍ، فيتخلْخل ما بينهما إلى حجمٍ أكبر، يحدث من ذلك وقوفٌ معتدل عند قوام معتدل.

(٢٣) فليكفنا هذا القدر من الكلام في المكانٍ، فلنتكلم الآن في الزمان.

Chapter Ten

Beginning the discussion about time,
the disagreement of people concerning it, and
the refutation of those erring about it

(1) The inquiry about time is akin to the one about place in that it is one of the things that is inseparable from every motion, and the disagreement among people about its existence and essence is just like that about place. Some people have denied that time has any existence, while others believed that it has an existence, but not at all as [existence] occurs in external concrete particulars, 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). So it was said that time is the collection of moments, where the *moment* is some event that happens, which is taken by supposition, [and that event] is simultaneous with some other event[1] and so it is a moment for the other, whatever accidental occurrence it 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.

1. **T** additionally has the example of Zayd's arriving with the sunrise, but this is almost certainly a later interpolation.

<الفصل العاشر>

فصل في ابتداء القول في الزمان
واختلاف الناس فيه ومناقضة المخطئين فيه

(١) إنَّ النظــر في أمر الزمان مناســب للنظر في أمر المــكان، لأنَّه من الأمور التي تلــزم كل حركة، والحال في اختلاف الناس في وجــوده وماهيته كالحال في المكان. فمن الناس مَنْ نفى أنْ يكون للزمان وجود، ومنهم مَنْ جعل له وجوداً، لا على أنَّه في الأعيان الخارجة البتة بوجهٍ من الوجوه، بل على أنَّه أمرٌ متوهم. ومنهم مَنْ جعل له وجوداً لا على أنَّه أمرٌ واحدٌ في نفســه؛ بل على أنَّه نسبة مّا على جهةٍ ما لأمورٍ أيّها كانت إلى أمورٍ أيّها كانــت، فقال: إنَّ الزمان هو مجموع أوقاتٍ، والوقت عرض حادث يفرض وجود عرضٍ آخــر مع وجوده، فهو وقت الآخر، أي عرض حادث كان ومنهم مَنْ جعل للزمان وجوداً وحقيقة قائمة، <و> منهم منْ جعله جوهراً قائماً بذاته.

(2) Those who have denied the existence of time have relied on certain skeptical puzzles.[2] One of them is that if time exists, it is either divisible or indivisible. On the one hand, if it is indivisible, then it would be impossible for years, months, days, and hours, as well as past and future, to belong to it. If, on the other hand, it it is divisible, then it exists with either all of its parts or some of them. If it exists with all of its parts, the past and future parts of it must exist together simultaneously. If some of its parts exist, while others do not, then whichever part we consider must occur as present, future, and past, or as days, hours, and the like. Those who affirm time in general agree that both the past and the future are nonexistent, whereas, if the present is divisible, the same question necessarily arises about it, while, if it is indivisible, it is what they call the *present instant*[3] and is not a time. Moreover, [the present instant] cannot exist in actuality. Were it to do so, it would either endure or cease to be. If it were to endure, then part of it would be earlier and another part later, and the whole of it would not be the present instant, and also the past and future would simultaneously be in a single present instant; which is absurd. If it ceases to be, then it does so either in some immediately adjacent instant where between the two there is no time, or in some instant where between the two there is some time. If it ceases to be in some instant where between it and [the present instant that is ceasing] there is some time, then it must endure for some time, which we have already refuted. If it ceases to be in some immediately adjacent instant, then the present instant would be immediately adjacent to the instant on the continuum without any period of time being interposed between the two; but this is something that those who affirm time deny.

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2. Most of the following puzzles, or at least variations on them, are mentioned by Aristotle in *Physics* 4.10.

3. The Arabic *ān,* like the Greek *to nun,* can mean both *an instant* and *now;* hence the slight overtranslation *present instant* here. This argument and the subsequent one, which are taken from the list of temporal puzzles found in Aristotle's *Physics* 4.10, draw on this double sense of *al-āna.*

(٢) فأمّا مَنْ نفى وجود الزمان، فقد تعلّق بشكوكٍ منها أنَّ الزمان، إنْ كان موجوداً، فإمّا أنْ يكون شيئاً منقسماً، أو يكون شيئاً غير منقسم. فإنْ كان غير منقسم فمستحيل أن يكون منه سنون وشهور وأيام وساعات وماض ومستقبل. وإنْ كان منقسماً؛ فإمّا أنْ يكون موجوداً بجميع أقسامه أو ببعضها. فإنْ كان موجوداً بجميع أقسامه؛ وَجَبَ أنْ يكون الماضي والمستقبل منه موجودين معاً، وإنْ كان بعض أقسامه موجوداً وبعضها معدوماً، ‹ف› لا يخلو إما أنْ تكون القسمة التي إياها نعتبر واقعة على سبيل الحاضر والمستقبل والماضي، أو واقعة على سبيل الأيام والساعات، وما أشبه ذلك. فأمّا الماضي والمستقبل فكل واحدٍ منهماّ – باتفاقٍ من مثبتي الزمانّ – معدومٌ، وأمّا الحاضر فإنْ كان منقسماً وجبت المسألة بعينها، وإنْ كان غير منقسم، كان الأمر الذي يسمونه آناً وليس بزمان. ومع ذلك فإنّه لا يجوز أنْ يوجد بالفعل، ولو وجد بالفعل لم يخل إمّا أنْ يبقى وإمّا أنْ يُعدم، فإنْ بقي كان منه شيء متقدماً وشيء متأخراً، ولم يكن كله آناً، وكان الماضي والمستقبل معاً في آنٍ واحدٍ وهذا محال. وإنْ عُدم لم يخلُ إمّا أنْ يُعدم في آنٍ يليه لا زمان بينهما، وإمّا أنْ يُعدم في آنٍ بينه وبينه زمان. فإنْ عُدم في آنٍ بينه وبينه زمان، لزم أنْ يبقى زماناً، وقد أبطلنا ذلك. وإنْ عُدم في آنٍ يليه، كان الآن يلي الآن على الاتصال من غير تخلل زمان بينهما، وهذا ممّا يمنعه مثبتو الزمان.

(3) Furthermore, how could time in general exist? Any time we care to take might be delimited by two given instants assigned to it by us: one past instant and another instant that, relative to the past, is future. No matter what the situation, the two will not be able to exist together, and, instead, one will not exist. Now, if one does not exist, then how can that which needs a certain limit—that does not exist—in fact exist (for how can something have a nonexistent limit)? In short, how could there be a certain continuous thing [namely, time] between something that does not exist and something that does? This is a powerful sophism upon which those who deny time rely.

(4) They also give an argument [that assumes the following]: A certain amount of time inevitably belongs to motion in that it is a motion. In that it is motion, this motion does not need some other body different from its body also to be moved. (The fact is that it might need that [other body] in some cases, not in that it is a motion, but because, in order to produce the motion, the one bringing about [the motion's] existence needs [another body] to undergo motion; but this is neither a condition of motion *qua* motion nor one of its concomitants.) So, given the above [assumptions], any motion that you posit as existing necessarily entails that a certain time belong to it inasmuch as there is a motion; but [the motion], inasmuch as it is a motion, does not necessarily entail that there is another motion. If that is the case, then consequent upon each motion is a certain private time that applies to no other motion, just as a private place is consequent upon it. Also, there would be one time for [the different motions] only in the way that there is one place for them. That is, *one* [is predicated] by way of being a universal, but our discussion is not about that. So, when motions are together, their times must also be together, where they will be together either with respect to place, subject, rank, nature, or anything else except being

(٣) ثم بالجملة كيف يكون للزمان وجود، وكل زمان نفرضه فقد يتحدّد عند فارضه بآنين؛ آنٍ ماض وآنٍ هو بالقياس إلى الماضي مستقبل. وعلى كل حال، لا يصح أنْ يوجدا معاً، بل يكون أحدهما معدوماً؟ وإذا كان معدوماً فكيف يصح وجود ما يحتاج إلى طرف هو معدوم؛ فكيف يكون للشيء طرف معدوم وبالجملة كيف يكون شيء واصلاً بين معدوم وموجود؟ فهذه هي الشبهة القوية التي يتعلق بها مَنْ ينفي الزمان.

(٤) ويقولون أيضاً إنّه إنْ كان لا بُدَّ للحركة في أنْ تكون حركة، من أنْ يكون لها زمان، وليس تحتاج هذه الحركة في أنْ تكون حركة إلى أن يكون جسم آخر يتحرك أيضا غير جسمها، بل ربما احتيج إلى ذلك في بعض الأمور، لا أن تكون حركة بل لأنَّ موجدها يحتاج في أنْ يحرّك إلى أنْ يتحرّك؛ وهذا ليس شيئاً من شرط الحركة بما هي حركة ولا من لوازمها. فإذا كان كذلك، فأيّة حركةٍ فرضتها موجودة يلزمها، من حيث هي حركة، أنْ يكون لها زمان، ولا يلزمها من حيث هي حركة أنْ تكون هناك حركة أخرى. وإذا كان كذلك، كان كل حركة مستتبعة زماناً على حِدة، غير موقوف على حركةٍ أخرى، كما يستتبع مكاناً على حِدة، ولا يكون لها زمان واحد إلاّ على نحو ما يكون لها مكان واحد، أي الواحد بالعموم، وليس كلامنا في ذلك. فإذا كانت الحركات معاً؛ كانت أزمنتها لا محالة معاً، ولا يخلو إما أن تكون معيتها في المكان أو في الموضوع أو في الشرف أو في الطبع، أو في شيء آخر غير المعيّة في الزمان. لكن جميع وجوه معاً لا يمنع

together in time. None of the ways of being together, however, precludes some being before and some being after—that is, some existing while others do not. So it remains that their being together is [a case] of simultaneity, where *simultaneity* [means] that many things occur at a single time, or a single instant, or a single limit of time. From that it necessarily follows that many times would have a single time; but the discussion concerning the sum of that [single] time together with [the many times] is, in this sense, just like the discussion about those that were joined together in [that single time], in which case there would necessarily be an infinite number of simultaneous times. Also, in the opinion of you [Aristotelians], times follow upon motions, and so there would necessarily be an infinite number of simultaneous motions. This is something impossible, whose existence you yourselves reject and deny.

(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 in the activity of the estimative faculty. Now, the things that characteristically exist in the act of the estimative faculty are those things that are concomitant with the connotational attributes that, when they are grasped by the intellect and correlated with one another, produce there certain forms of relations whose existence is only in the estimative faculty. So this group made time something that is impressed on the mind as a result of a certain relation of what is undergoing motion to the two limits in the spatial magnitude it [is traversing], where [the mobile] is in actual proximity to one of them while not being in actual proximity to the other, since, in concrete particulars, it cannot occur *here* simultaneously with its occurring *there,* but it can in the soul. [That is] because, in the soul, the conceptualization of the two and the conceptualization of what connects them exist simultaneously, but nothing in concrete particulars exists that

أنْ يكـون بعضها قبل، وبعضها بعد؛ أي بعضها يكون موجوداً وبعض معدوماً. فبقي أنْ تكون معيتها المعيّة التي بالزمان، والمعيّة التي بالزمان هي أنْ تكون أشـياء كثيرة في زمانٍ واحد، أو في آنٍ واحد هو ظرف زمانٍ واحد. فيجب من ذلك أنْ يكون للأزمنة الكثيرة زمـانٌ واحد، ويكون الكلام فـي جميع ذلك الزمان معها في هذا المعنى كالكلام في التي هي مجموعة فيه. فيلزم أنْ تكون أزمنة بلا نهاية معاً، وعندكم أنَّ الأزمنة تتبع الحركات، فيلزم أنْ تكون حركات لا نهاية لها معاً، وهذا من المستحيل الذي تدفعونه وتمنعون وجوده.

(٥) فمن جهة هذه الشـكوك، ووجوب أنْ يكـون للزمان وجود، اضطر كثير من النـاس إلى أنْ جعل للزمان نحـواً من الوجود آخر، وهو الوجود الذي يكون في التوهّم. والأمور التي من شـأنها أنْ توجـد في التوهّم هي الأمور التي تلحـق المعاني إذا عُقلت ونوسـب بينها، فتحدث هناك صور نسبٍ، إنّما وجودها في الوهم فقط. فجعلوا الزمان شـيئاً ينطبع في الذهن، من نسـبةٍ للمتحرّك إلى طرفي مسـافته الذي هو بقرب أحدهما بالفعل وليس بقرب الآخر بالفعل، إذ حصوله هناك لا يصح مع حصوله هاهنا في الأعيان لكـن يصح في النفس. فإنّه يوجد في النفس تصورهما وتصوّر الواسـطة بينهما معاً فلا يكون في الأعيات أمر موجود يصل بينهما، ويكون في التوهم أمر ينطبع في الذهن، وأنَّ

connects the two.[4] In the act of the estimative faculty, however, something is impressed on the mind—namely, that, between its existence *here* and its existence *there,* there is a certain thing during the equivalent of which the distance is traversed at this speed belonging to either those motions or the number of combined motions and rests. In this case, this is a certain measurement of that motion that has no [external] existence but is [something that,] in itself, the mind brings about as a result of motion's limits actually occurring in [the mind] simultaneously. Other examples [of products of the estimative faculty] include the predicate, logical subject, premise, and analogous things that the mind requires for intelligible matters and the relations among [such matters], none of which are in [concrete] existing things.

(6) The group that we mentioned at the beginning said that time is nothing but a collection of moments; for when you order successive moments and collect them together, you do not doubt that their collection is time.[5] Consequently, once we define the moments, we define time. Now, the moment is nothing more than what the one fixing the moment needs—namely, he designates a certain starting point of some given event that will happen. So, for instance, we say that such-and-such will occur after two days, meaning that it will occur with the sunrise following two sunrises; and so the sunrise is the moment. If it were replaced with the coming of Zayd, that would be just as fine as the sunrise. So, then, the sunrise becomes a moment only by the speaker's designating it so. Had he wanted, he could have made something else a moment, except that the sunrise is more prevalent, better known, and more commonly accepted. Hence, that and similar things have been chosen to set the moment. So time is the sum of things that either sets moments or can be stipulated as certain fixed moments. They also claim that time has no existence other than in this way, which is recognized from the previously mentioned skeptical puzzles.

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4. **Y** has (inadvertently) omitted the text *maᶜan fa-lā yakūna fī al-aᶜyān amr mawjūd yaṣilu baynhumā* (simultaneously, but nothing in concrete particulars exists that connects the two), which is found in **Z**, **T**, and the Latin ([*simul*]; *non habet autem esse in sensibilibus aliquid existens inter illos*).

5. This view was the common one taken by most *mutakallimūn,* or Islamic speculative theologians. See Jon McGinnis, "The Topology of Time: An Analysis of Medieval Islamic Accounts of Discrete and Continuous Time," *The Modern Schoolman* 81 (2003): 5–25.

بين وجوده ها هنا وبين وجوده هناك شيئاً في مثله تُقطع هذه المسافة بهذه السرعة والبطء اللذين لهذه الحركات أو لهذا العدد من الحركات والسكونات المتركبة. فيكون هذا تقديراً لتلك الحركة لا وجود له، لكن الذهن يوقعه في نفسه بحصول أطراف الحركة فيه بالفعل معاً؛ مثل ما انَّ الحمل والوضع والمقدمة وما يجري هذا المجرى، أشياء يقضي بها الذهن على الأمور المعقولة ومناسبات بينها، ولا يكون في الأمور الموجودة شيءٌ منها.

(٦) وقالت الطائفة التي ذكرناها ‹بَدْءاً› إنَّ الزمان ليس إلاّ مجموع أوقاتٍ. فإنك إذا رتبت أوقاتاً متتالية وجمعتها لم تشك أنَّ مجموعها الزمان، وإذا كان كذلك، فإذا عرفنا الأوقات عرفنا الزمان. وليس الوقت إلاّ ما يوجبه الموقت، وهو أنْ يعيّن مبدأ عارضٍ يعرض؛ فنقول مثلاً يكون كذا بعد يومين، معناه أنَّه يكون مع طلوع الشمس بعد طلوعين، فيكون الوقت طلوع الشمس، ولو جُعل بدله قدوم زيدٍ لصلح في ذلك صلوح طلوع الشمس. فاذن إنّما صار طلوع الشمس وقتاً بتعيين القائل إياه، ولو شاء لجعل غيره وقتاً، إلاّ أنَّ طلوع الشمس قد كان أعمّ وأعرف وأشهر، ولذلك اختير ذلك وما يجري مجراه للتوقيت. فالزمان هو جملة أمور هي أوقات موقّتة، أو من شأنها أنْ تُجعل أوقاتاً موقته. وقالوا إنَّ الزمان على غير هذا الوجه لا وجود له، يُعرف ذلك من الشكوك المذكورة.

(7) Another group said that time is an eternal substance, and how could it not be a substance [they argued,] when it is something whose existence is necessary?[6] Indeed, the necessity of its existence is such that it does not need to be established by proof. In fact, whenever you try to eliminate time, you necessarily establish it. [That] is because you eliminate it either before or after something; but when you do that, a certain before-ness or after-ness shows up together with its elimination, in which case you have established time together with its elimination, since there is no before-ness and after-ness that have this form unless they either belong to time or are a result of time. So time exists necessarily. Now, whatever necessarily exists cannot have its existence eliminated, and whatever cannot have its existence eliminated is not an accident, whereas whatever exists and is not an accident is a substance. When it is a substance that exists necessarily, then it is an eternal substance. They said: Now, when it is a substance that exists necessarily, it would have been impossible that its existence depend upon motion, and so time sometimes exists even when motion does not. So, in their opinion, sometimes time exists together with motion and so measures motion; but at other times it is separate, in which case it is called *everlasting*. These are the skeptical doubts raised concerning time. It would be best if we first indicate the way time exists and [identify] its essence, and only then come back and attack these sophistries and resolve them.

(8) We say that those who affirm the existence of time as some single thing have also had differences of opinions.[7] Some of them made motion time, while others made time the motion of the celestial sphere, to the exclusion of all other motions. Still others made time the celestial sphere's return (that is, a single rotation), and yet others made the celestial sphere itself time. Those who made motion itself time said

6. This position is certainly that of Abū Bakr Muḥammad al-Rāzī, who distinguished between relative and absolute time, making the latter a self-subsistent entity, which is sometimes identified in the sources as *dahr* (everlasting). See al-Rāzī, *Opera philosophica fragmentaque quae supersunt*, ed. Paul Kraus (Cairo: Fuʾad I University, 1939), 195–215.

7. For the source of the following (erroneous) opinions about the nature of time, see Aristotle, *Physics* 4.10.218a31–b10.

(٧) وقالت طائفة إنَّ الزمان جوهر أزلي؛ وكيف لا يكون جوهراً وهو واجب الوجود؟ فإنَّ وجوب وجوده بحيث لا يحتاج فيه إلى إثباتٍ بدليل، بل كلما حاولت أنْ ترفع الزمان وجَبَ أنْ تثبت الزمان، لأنك ترفعه قبل شيء أو بعد شيء، ومهما فعلت ذلك فقد أوجدت مع رفعه قبْليةً أو بَعْديةً، فتكون قد أثبتَ الزمان مع رفعه. إذ القبْلية والبَعْدية، التي تكون على هذه الصورة، لا تكون إلاّ للزمان أو بزمان. فالزمان واجب الوجود، وما كان واجب الوجود فلا يجوز أنْ يُرفع وجوده، وما لا يجوز أنْ يُرفع وجوده فليس بعرض، وما كان موجوداً وليس بعرضٍ فهو جوهر، وإذا كان جوهراً واجب الوجود؛ فهو جوهر أزلي. قالوا وإذا كان جوهراً واجب الوجود فقد استحال أن يتعلق وجوده بالحركة، فجائز أنْ يوجد الزمان وإنْ لم توجد الحركة. فالزمان عندهم تارة يوجد مع الحركة فيقدّر الحركة، وتارة مجرّداً فحينئذ يسمى دهراً. فهذه هي الشكوك المذكورة في أمر الزمان. والأولى بنا أنْ ندل أولاً على نحو وجود الزمان وعلى ماهيته، ثم نكرّ على هذه الشُبه فنحلها،

(٨) ونقول: إنَّ الذين أثبتوا وجود الزمان معنى واحداً، فقد اختلفوا أيضاً، فمنهم مَنْ جعل الحركة زماناً، ومنهم مَنْ جعل حركة الفلك زماناً دون سائر الحركات، ومنهم مَنْ جعل عودة الفلك زماناً، أي دورة واحدة، ومنهم مَنْ جعل نفس الفلك زماناً. فأمّا الذين جعلوا الحركة نفسها زماناً فقالوا إنَّ الحركة، من بين ما نشاهده من الموجودات، هي التي

that from among the existing things that we experience, motion is that which includes past and future things, and it is in its nature always to have two parts[8] with this description, and whatever has this description is time. They also said that we believe that there has been time only when we sense motion, such that the sick and afflicted will find a given period of time long that one engrossed in wanton pleasure would find short, because the motions used to measure [the time] are firmly fixed in the memory of the former two, while they vanish from the memory of the one savoring wanton pleasure and rapture. Whoever is not aware of motion is not aware of time, just like the Companions of the Cave;[9] for, since they were unaware of the motions between the instant that they first settled down for a nap and the instant that they awoke, they did not realize that they had slept more than a day. The First Teacher [i.e., Aristotle] also related that something like that happened to a group of godlike men,[10] and history reveals that they were before the Companions of the Cave. These are the early views about time before the maturity of philosophy, but all of them are incorrect.

(9) Motion is not time because, while motion is sometimes fast and at other times slow, no time is faster and slower than another, but, rather, shorter and longer. Also, two motions might be simultaneous,[11] while two times are not. Also, you know that two different motions might occur simultaneously at a single time, while their time does not differ. Also, motion's specific differences are not time's, and the things related to time—as, for example, *now, suddenly,* the *present instant,* and *previously*—have nothing to do with the motion itself in something. Again, while it is proper to take time in the definition of *fast motion* as a part of the specific difference, it is not proper to take motion in the same way, but,

8. Reading *juzʾāni* with **Z**, **T**, and the Latin (*duas partes*) for **Y**'s (inadvertent) *juzʾ ān* ("a part of an instant," or perhaps "a present part"?).
9. See Quʾrān 18:1–23.
10. See *Physics* 4.11.218b23–27.
11. Reading *maʿan* with **Z**, **T**, and the Latin (*simul*), which is omitted in **Y**.

تشـــتمل على شيء ماضٍ وشيء مســـتقبل، وفي طبيعتها أنْ يكون لها دائماً جزءان بهذه الصفة، وما كان بهذه الصفة فهو الزمان. قالوا، ونحن إنّما نظنّ أنّه كان زمان إذا أحسسنا بحركة، حتى أنَّ المريض والمغتم يســـتطيلان زماناً يســـتقصره المتمادي في البطر، لرسوخ الحركات ‹المقاســـة› في ذكر هذين، وانمحائها عن ذكر الملتهي عنها بالبطر والغبطة. ومَنْ لا يشـــعر بالحركة لا يشـــعر بالزمان كأصحاب الكهف؛ فإنّهم لمّا لم يشعروا بالحركات التي بين آن ابتداء إلقائهم أنفســـهم للاســـتراحة بالنوم، وآن انتباههم، لم يعلموا أنّهم زادوا على يوم واحد. فقد حكى المعلم الأول أيضاً أنَّ قوماً من المتألهين عرض لهم شبيهٌ بذلك، ودل التاريخ على أنّهم كانوا قبل أصحاب الكهف. فهذه هي الأقوال الســـالفة قبل نضج الحكمة في أمر الزمان، وكلها غير صحيحة.

(٩) أما أنَّ الحركة ليســـت زماناً، فلأنّه قد تكون حركة أســـرع وحركة أبطأ، ولا يكون زمانٌ أســـرع من زمانٍ وأبطأ، بل أقصر وأطول. وقد تكون حركتان معاً ولا يكون زمانـــان معاً، وأنت تعلم أنّه قد تحصل حركتان مختلفتـــان معاً في زمانٍ واحد وزمانهما لا يختلـــف. والحركة فصولها غير فصول الزمان، والأمور المنســـوبة إلى الزمان مثل هوذا وبغتة والآن وآنفاً ليس هي من ذات الحركة في شـــيء. والزمان يصلح أنْ يؤخذ في حدّ الحركة الســـريعة جزءاً من الفصل، والحركة لا تصلح أنْ تؤخذ كذلك، بل تؤخذ على أنّها

instead, it is taken as a premised part. So it is fine to say that *fast* is that which covers a longer distance in a shorter *time,* whereas it is not okay to say in a shorter *motion.* The case of the motion of the first celestial sphere is the same as this one, for it can be said about it that it is the fastest of motions because, simultaneously with another motion, it covers a larger [distance], although this is something that we will discuss later.[12] Now, this *simultaneity* indicates something different from the two motions and, rather, indicates a certain thing to which both of them are related and with respect to which the two are equal, while differing with respect to the distance [covered]. That thing is not itself either one of the two, because the second is not common to the other in itself, while it is common to it in the thing with which they are simultaneous.

(10) From this vantage point, it becomes obvious what is wrong with the claim of those who made moments certain events that set the moment for other events. That is because they do not make that passing event itself a moment *qua* motion, generation, black, white, or whatever, but are forced both to say that it becomes a moment by setting a moment, and that setting a moment involves the concurrence of some other thing simultaneous with its existence. Now, concerning this *concurrence* and *simultaneity,* one must understand something different from either one of the two events, when both concurrences concur with respect to something and both instances of simultaneity are simultaneous with respect to a certain thing. When both exist simultaneously (or one of them exists as that which sets the moment in that it is simultaneous with the existence of the other), then what is understood about the simultaneity cannot be what is understood about either one of [those events]. In fact, this simultaneity would have been the opposite of what was meant had either one of the two been earlier or later. It is this thing with respect to which

12. See 4.5.1–4.

جزء متقدم، فإنّه يصلح أنْ يقال إنَّ السريع هو الذي يقطع مسافةً أطول في زمانٍ أقصر، ولا يصح أنْ يقال في حركةٍ أقصر. وحكم الحركة الأولى الفلكية هذا الحكم بعينه؛ فإنَّه يصحُّ أنْ يقال فيها إنّها أسرع الحركات، لأنّها تقطعّ - مع قطع الحركة الأخرىّ - أعظم مع ما في هذا، ممّا نتكلم فيه بعد. وهذه المعيّة تدل على أمر غير الحركتين، بل تدل على معنى تنسبان كلتاهما إليه ويتساويان فيه ويختلفان في المسافة. وذلك المعنى ليس ذات أحدهما، لأنّ الثاني لا يشارك الآخر في ذاته ويشاركه في الأمر الذي هما معاً فيه.

(١٠) ويمكن من هذا الموضع أنْ يظهر فساد قول مَنْ جعل الأوقات أعراضاً توقّت لأعراض، وذلك لأنّهم لا يجعلون نفس ذلك العرض الحادث من حيث هو حركة أو كون أو سواد أو بياض أو غير ذلكّ - وقتاً. ولكن يضطرون إلى أنْ يقولوا إنّه يصير وقتاً بالتوقيت، ويضطرون إلى أنْ يكون التوقيت يُقرن وجود شيء آخر مع وجوده. وهذا الاقتران وهذه المعيّة يفهم منها ضرورة معنى غير معنى كل واحدٍ من العرضين. وكل مقترنين يقترنان في شيء وكلّ معيّن، فهما في أمرٍ مّا معاً. فإذا كان وجودهما معاً، أو وجود واحدٍ منهما موقّتاً بأنّه مع وجود الآخر، فالمفهوم من المعيّة هو أمرٌ لا محالة ليس هو مفهوم أحدهما. وهذه المعيّة مقابلة لمعنى أنْ لو تقدّم أحدهما أو تأخّر، وهذا الشيء

there is the simultaneity that is the moment that accounts for the two states of affairs being together, and so it can be made to indicate either one of the two, just as if [that state of affairs] were something else occurring at that moment. Now, were that state of affairs in itself a moment, then, when it persisted for some duration and was one and the same, the duration of the persistence and the start of [the duration] would be one and the same moment. Now, you know that the moment that sets the moment is a certain limiting point between what is earlier and later, and that what is earlier and what is later do not differ [as such], while, *qua* motion, rest, and the like, they do differ. So its being a certain event (for example, a motion or rest) is not like its being earlier, later, or simultaneous; rather, the true nature of earlier, later, and simultaneous is something else—namely, a state of time.

(11) The argument upon which those who make time a motion rely is based on an unacceptable premise—namely, their claim that time is, in its nature, whatever requires something past and something future. This is certainly unacceptable, for many things that are not time are past and future, such as the Flood and the Resurrection. In fact, there must be another condition together with this [premise]—namely, that [time] is essentially what is such that it belongs to it to be the thing that is the very past or the very future so that the nature of [time][13] is the thing that when compared with something else, there is, in that case, essentially something past and future. When motion is past, its very existence as a motion is not that it is past, but that it is linked with the past; and, because of that, it can be said that some motion is in some past period of time, whereas it cannot be said that some motion is in some past motion (that is, unless it is meant that it is in a group of past motions; but that it is not our intention, but, rather, that the thing corresponds with that thing in which it is).

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13. Reading *ṭabīʿatuhu al-amr* with **Z** and **T** for **Y**'s *ṭabīʿat al-amr* and the Latin's *natura rei* (the nature of the thing)

الــذي فيــه المعيّة هو الوقت الذي يجمع الأمرين، فكل واحــدٍ منهما يمكن أنْ يجعل دالاً عليه كما لو كان غير ذلك الأمر، ممّا يقع في ذلك الوقت. ولو كان ذلك الأمر في نفســه وقتــاً، لكانّ – إذا بقي مدة وهو واحد بعينهّ – وجــب أنْ تكون مدة البقاء وابتداؤها وقتــاً واحداً بعينه، ونحن نعلم أنَّ الوقت الموقّت هو حدٌّ بين متقدّم ومتأخر، وأنَّ المتقدّم والمتأخر لا يختلف، وبما هو حركة أو ســكون أو غير ذلك يختلف. فليس كونه عرضاً ككونه حركة أو سكوناً وكونه متقدماً أو متأخراً أو معاً، بل حقيقة التقدّم والتأخر والمعيّة أمرٌ آخر هو حال الزمان.

(١١) وأمّــا الحجّة التــي اعتمدها جاعلو الزمان حركة؛ فهــي مبنية على مقدمةٍ غير مســلّمة، وذلك قولهم: إنّ كل ما يقتضي أنْ يكون في طبيعته شــيء ماض وشيء مستقبل فهو زمانّ – فإنَّ هذا غير مسلَّم، فإنَّ كثيراً ممّا ليس بزمانٍ هو ماض ومستقبل كالطوفــان والقيامة، بل يجب أنْ يكون مع هذا شــرط آخــر وهو أنْ يكون لذاته ما هو؛ بحيث منه الشيء الذي هو نفس الماضي أو نفس المستقبل، حتى تكون طبيعته الأمر، الذي إذا قيس إلى أمرٍ آخر، كان لذاته حينئذ ماضياً أو مســتقبلاً. ولاحركة إذا مضتْ لم يكن نفس وجودها حركة هي أنّها ماضية، بل تكون قد قارنت الماضي. ولذلك يصح أنْ يقــال حركــة في زمانٍ ماضٍ، ولا يجوز أنْ يقال حركة فــي حركة ماضية؛ اللّهم إلاّ أنْ نعني في جملة الحركات الماضية وليس قصدنا هذا، بل أنْ يكون الشــيء مطابقاً لوجود ذلك الذي هو فيه.

(12) As for those who maintain that time is a single rotation of the celestial sphere, its absurdity is evident in that any part of time is a time, whereas a part of a rotation is not a rotation. Even more far-fetched than all of this is the opinion of those who think that time is the celestial sphere by reasoning from two affirmative propositions in figure two.[14] Even then, one of the two premises in it is false—namely, the claim that every body is in the celestial sphere, for that is not the case; and, instead, the truth is that every body *that is not the celestial sphere* is in the celestial sphere, whereas perhaps every[15] body absolutely is in time, in which case the celestial sphere itself would also be in time in just the way that bodies are in time.

(13) Since we have pointed out the false schools of thought concerning time's essence, it is fitting that we point out the essence of time; and then, from there, its existence will become clear, as well as the solution to the sophisms mentioned about its existence.

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14. Syllogisms in figure two are those whose middle term is the predicate term of both the major and minor premises. Formally, figure two has this form:

(major premise) PM,
(minor premise) SM;
therefore (conclusion) SP.

An example would be (major premise) "no stone is an animal"; (minor premise) "every human is an animal"; therefore (conclusion): "no human is a stone." The only valid forms of syllogism in figure two have one negative proposition.

15. Reading *kull* with **Z**, **T**, and the Latin (*omne*), which is (inadvertently) omitted in **Y**.

(١٢) وأمّـا القائلـون بأنَّ الزمان هو دورة واحدة من الفلـك، فتتبيّن إحالته بأنَّ كل جـزء زمان زمان، وجزء الدورة ليس بدورة. وأبعد مـن هذا كله ظنّ مَنْ ظنَّ أنَّ الزمان هو الفلك بقياسٍ من موجبتين في الشكل الثاني، على أنَّ إحدى المقدمتين فيه كاذبة وهي قوله: «كل جسـم في فلك» فإنّه ليس كذلك، بل الحق أنَّ كل جسـم ليس بفلكٍ فهو في فلك. وأمّا الذي في الزمان؛ فلعله هو كلّ جسم مطلقاً، فإنَّ الفلك نفسه أيضاً في زمانٍ، على النحو الذي تكون الأجسام في الزمان عليه.

(١٣) وإذ قد أشرنا إلى المذاهب الباطلة في ماهيّة الزمان، فحقيق بنا أنْ نشير إلى ماهية الزمان، فيتضح لنا من هناك وجوده، ويتضح حلّ الشُبه المذكورة في وجوده.

Chapter Eleven

Identifying and affirming the essence of time

(1) It is plainly clear that two moving things might begin and end moving together, of which one will cover a lesser distance and the other more, either because of differences in speed or, as some people think,[1] because of a dissimilarity in the number of intervening rests. Also, two [mobiles] might begin [together] and cover two equal distances, but one of them reaches the end of the distance, while the other has not yet finished and that again because of the aforementioned differences. Now, in every case, there is, from any motion's starting point to its end point, a certain possibility to cover that same distance by that motion that has the same speed (or the same composition of rest); there is also a possibility to cover more than that distance by one faster than [that motion] (or having fewer rests mixed in); and, again, a certain possibility to cover less than it by one slower than it (or having more rests mixed in). Indeed, that simply cannot be disputed. So it has been established that, between the starting point and ending point, there is a certain definite possibility relative to the motion and the speed. Now, when we posit half of that distance, while positing the same speed, there is another

1. The "some people" is certainly the Atomists, who did, in fact, explain differences in velocity in terms of differences in the number of intervallic rests.

<الفصل الحادي عشر>

في تحقيق ماهية الزمان وإثباتها

(١) فنقول إنَّ من البيّن الواضح أنّه قد يجوز أنْ يبتدىء متحركان بالحركة وينتهيا معاً، وأحدهما يقطع مسافة أقل والآخر يقطع مسافة أكثر، إمّا لاختلاف البطْء والسرعة، وإمّا لتفاوت عدد السكونات المتخلّلة، كما يراه قوم. ويجوز أنْ يبتدىء إثنان ويقطعا مسافتين متساويتين، لكن أحدهما ينتهي إلى آخر المسافة، والآخر بعد لم ينته؛ وذلك للاختلاف المذكور. ويكون، في كل حالٍ من الأحوال، من مبتدأ كل حركةٍ إلى منتهاها إمكان قطع تلك المسافة بعينها بتلك الحركة المعيّنة السرعة والبطء، أو المعيّنة التركيب مع السكون، وإمكان قطع أعظم من تلك المسافة بالأسرع منها أو الأقل مخالطة سكونات، وإمكان قطع أقل منها بالأبطأ من تلك أو الأكثر مخالطة سكوناتٍ، وأنْ ذلك لا يجوز أنْ يختلف البتة. فقد ثبت بين المُبتَدأ والمنتهى إمكان محدود بالقياس إلى الحركة وإلى السرعة، وإذا فرضنا نصف تلك المسافة، وفرضنا السرعة بعينها والبطء بعينه؛ كان إمكان آخر بين ابتداء

possibility between the start of that distance and the end of half of it in which, at that speed, only half can be covered; and the same holds for [the distance] between that halfway endpoint that was now posited and the original endpoint. In this case, the possibility up to the halfway point and from the halfway point are equal, and each one of them is half of the initially posited possibility, and so the initially posited possibility is divisible. (Do not worry for now[2] whether you make this mobile something really undergoing motion with respect to [the category] of place or some part you posit as undergoing motion with respect to position, which is similar to being moved with respect to place. [That] is because [the mobile] will either leave one state of contiguity for another through continuous states of contiguity, or leave one state of juxtaposition for another through continuous states of juxtaposition. What is traversed is called *distance,* however it might be, and so no conclusion in the course of what we'll say is going to change because of that.)[3]

(2) So we claim that it has turned out that the possibility is divisible, and whatever is divisible is a certain magnitude or has a magnitude, and so this possibility is never stripped of a magnitude. In that case, its magnitude must be either the magnitude of the distance or some other magnitude. On the one hand, if it were the magnitude of the distance, then two things that are equal in the distance [they cover] would be equal in this possibility; but that is not the case, and so it is some other magnitude. In that case, either it is the magnitude of the mobile or not. However, it is not the magnitude of the mobile. Otherwise, the larger the mobile is, the larger it would be in this magnitude; and, again, that

2. Reading *al-āna* with **Z**, **T**, and the Latin (*nunc*) for **Y**'s *illā anna* (except that).

3. It should again be recalled that, unlike others in the Aristotelian tradition, Avicenna takes local motion and positional motion to be distinct kinds of motion involving different categories: the former involves moving from one place to another, which here is explained in terms of being contiguous and then leaving some place along the distance (*masāfah*), while the latter involves moving from one position to another, which here is explained in terms of the juxtaposition of certain positions on the spatial magnitude (*masāfah*) of the rotating object.

تلك المسافة ومنتهى نصفها ، إنما يمكن فيه قطع النصف بتلك السرعة والبطء ، وكذلك بين هذا المنتهى المنصّف المفروض الآن وبين المنتهى الأول ، فيكون الإمكان إلى النصف ومن النصف متساويين ، وكل واحد منهما نصف الإمكان المفروض أولاً . فيكون الإمكان المفروض أولاً منقسماً . ولا عليك الآن أنْ تجعل هذا المتحرّك شيئاً متحركاً بالحقيقة في المكان ، أو جزءاً تفرضه لمتحرّكٍ بالوضع يشبه المتحرّك في المكان ، فإنّه يفارق مماسّة إلى مماسّةٍ بمماسّاتٍ متصلة ، أو موازاةٍ إلى موازاةٍ بموازياتٍ متصلة ، وإنْ يسمى ما يقطعه مسافة كيف كان ، فليس يختلف لذلك حكمٌ فيما نحن بسبيله .

(٢) فنقول : إنَّ هذا الإمكان قد صحّ أنّه منقسم ، وكل منقسم فمقدار أو ذو مقدار ، فهذا الإمكان لا يعرّى عن مقدارٍ ، فلا يخلو إمّا أنْ يكون مقداره مقدار المسافة أو مقدار آخر ، ولو كان مقدار المسافة لكانت المتساويات في المسافة متساوية في هذا الإمكان ، لكن ليس كذلك ، فهو إذن مقدار آخر . فإمّا أنْ يكون مقدار المتحرّك أو لا يكون ، لكنه ليس مقدار المتحرّك وإلاّ لكان المتحرّك الأعظم أعظم في هذا المقدار وليس كذلك . فهو

is not the case, and so it is a magnitude other than that of the distance and the mobile. Now, it is known that motion itself is not this very magnitude itself, nor is that the speed, since motions *qua* motions are the same in being motion[4] and also [might] be going the same speed, while differing in this magnitude. Also, sometimes the motion varies in speed, while being the same with respect to this magnitude. So it has been established that a certain magnitude exists that is some possibility involving motions between what is earlier and later, occurring in such a way as to require certain definite distances; and [this possibility] is not[5] the magnitude of the mobile, distance, or motion itself. Now, this magnitude cannot be something subsisting in itself. How could it be something subsisting in itself when it comes to an end together with that which it measures? Whatever comes to an end is subject to corruption and so is in a subject or what has a subject, in which case this magnitude is something dependent upon a subject. Now, its first subject cannot be the mobile's matter because of what we explained; for, if it were a magnitude of some matter without intermediary, the matter would become larger and smaller as a result of it. So, then, it is in the subject by means of some other disposition. It cannot be by means of some fixed disposition, like white or black; otherwise, the magnitude of that disposition in the matter would occur in the matter as a firmly fixed magnitude. So it remains that it is a magnitude of an unfixed disposition—namely, motion from place to place or from one position to another between which there is some distance through which the positional motion circulates. This is what we call *time*.

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4. "Being motion" translates the *nisba* adjective *ḥarakīyah* (literally "motion-ness"). Avicenna is probably using it in the sense of motion's very definition. Thus, every motion agrees in being "a first perfection belonging to what is in potency from the perspective of what is in potency" (2.1. 3); and so, if this magnitude in question were identified with motion-ness itself, this magnitude could not vary from motion to motion, which it does.

5. Reading *laysa* with **Z**, **T**, and the Latin (sing. *non est*) for **Y**'s *laysat*, ("are not," which apparently would be referring back to "definite distances").

إذن مقدار غير مقدار المسافة، وغير مقدار المتحرّك. ومن المعلوم أنَّ الحركة ليست نفسها ذات هذا المقدار نفسه، ولا السرعة والبُطْ ‹كَ› ذلك، إذ الحركاتّ – في أنّها حركاتّ – تتفق في الحركية، وتتفق في السرعة والبطء، وتختلف في هذا المقدار، وربّما اختلفت الحركة في السرعة والبطء، واتفقت في هذا المقدار. فقد ثبت وجود مقدار لإمكان وقوع الحركات بين المتقدّم والمتأخر وقوعاً يقتضي مسافات محدودة، ليس مقدار المتحرّك ولا المسافة ولا نفس الحركة. وهذا المقدار ليس يجوز أنْ يكون قائماً بنفسه، وكيف يكون قائماً بنفسه وهو مُنْقَضٍ مع مقدّره؟ وكل مُنْقَضٍ فاسد، فهو في موضوع أو ذو موضوع، فهذا المقدار هو متعلق بموضوع، ولا يجوز أن يكون موضوعه الأول مادة المتحرّك لما بيّناه. فإنّه لو كان مقدار مادة بلا واسطة، لكانت المادة تصير به أعظم أو أصغر. فإذن هو في الموضوع بوساطة هيئة أخرى ولا يجوز أنْ يكون بوساطة هيئة قارّة كالبياض والسواد، وإلاّ لكان مقدار تلك الهيئة في المادة يحصل في المادة مقداراً ثابتاً قارّاً. فبقي أنْ يكون مقدار هيئة غير قارّة؛ وهي الحركة من مكانٍ إلى مكان، أو من وضعٍ إلى وضعٍ بينهما مسافة تجري عليها الحركة الوضعية، وهذا هو الذي نسميه الزمان.

(3) Now, you know that being divisible into earlier and later parts is a necessary concomitant of motion, and the earlier and later parts are found in it only as a result of [motion's] relation to the earlier and later parts in the distance. Be that as it may, there also comes with that the fact that the earlier part of the motion will *not* exist together with its later part in the way that the earlier and later parts in distance exist together. Also, what corresponds with the earlier part of the motion in the distance cannot become the later part, nor can that which corresponds with its later part become earlier, in the way that it can in distance. So there is some property that belongs to being earlier and later in motion—which necessarily follows the two [states] because they belong to motion—[but] which is not due to their belonging to distance. Also, the two are numbered by motion. [That] is because motion, through its parts, numbers what is earlier and later; and so the motion has a number inasmuch as being earlier and later belong to it with respect to distance. Moreover, it has a certain magnitude by paralleling the magnitude of the distance. Time is this number or magnitude. So time is the number of motion when it is differentiated into earlier and later parts—not by time, but, instead, with respect to distance; otherwise, the definition would be circular. (This is what one of the logicians believed—namely, that a circle occurred in this explanation—but he believed wrongly, since he did not understand this).[6]

(4) Moreover, this time is that which is essentially a magnitude owing to what it is in itself, possessing [the states] of being earlier and later, the later part of which does not exist together with what is earlier, as might be found in other types of [things that might] be earlier and later. This

6. Unfortunately, it is not clear who the logician is to whom Avicenna refers, although it is most likely one of the Baghdad Peripatetics. Among these, the writings of al-Fārābī, Yaḥyá ibn ʿAdī, Ibn al-Samḥ, and al-Sijistānī give no indication that any of them found fault with the Aristotelian definition of time as the number of motion with respect to before and after. Others who commented on Aristotle's *Physics* 4 and thus might have criticized Aristotle's definition of time were Abū Karnīb and his student Abū Bishr Mattá. Abū Bishr Mattá was the teacher of both al-Fārābī and Yaḥyá ibn ʿAdī, and neither suggests that Abū Bishr questioned the Aristotelian definition of time, although this is far from definitive proof that he did not.

(٣) وأنت تعلم أن الحركة يلحقها أنْ تنقسم إلى متقدم ومتأخرٍ، وإنّما يوجد فيها المتقدم ما يكون منها في المتقدّم من المسافة، والمتأخر ما يكون منها في المتأخر من المسافة، لكنه يتبع ذلك أنَّ المتقدم من الحركة لا يوجد مع المتأخر منها، كما يوجد المتقدم والمتأخر في المسافة معاً. ولا يجوز أنْ يصير ما هو منها مطابق المتقدم من الحركة في المسافة متأخراً، ولا الذي هو مطابق المتأخر منها متقدماً كما يجوز في المسافة، فيكون للتقدم والتأخر في الحركة خاصية تلحقهما من جهة ما هما للحركة، ليس من جهة ما هما للمسافة ويكونان معدودين بالحركة، فإنَّ الحركة بأجزائها تعدّ المتقدم والمتأخر؛ فتكون الحركة لها عددٌ من حيث لها في المسافة تقدّم وتأخّر، ولها مقدار أيضاً بإزاء مقدار المسافة، والزمان هو هذا العدد أو المقدار. فالزمان عدد الحركة؛ إذا انفصلت إلى متقدّم ومتأخّر لا بالزمان، بل في المسافة، وإلاّ لكان البيان تحديداً بالدور، والذي ظنّ بعض المنطقيين أنّه قد وقع في هذا البيان دورٌ إذ لم يفهم هذا، فقد ظنَّ غلطاً.

(٤) وهذا الزمان هو أيضاً – الذي هو لذاته – مقدارٌ لما هو في ذاته، ذو تقدّم وتأخر، لا يوجد المتأخر منه مع المتقدم، كما قد يوجد في سائر أنحاء التقدم والتأخر.

is something part of which is essentially before some part and part of which is essentially after some part, whereas everything else will either be before or after on account of it. [That] is because the things in which there is a *before* and an *after*—in the sense that their *before* has passed away, while the *after* does not exist together with the *before*—are not such essentially, but have their existence together with one of the divisions of this magnitude. So it is said of that part that corresponds with a *before* part that it is before, while it is said of that part that corresponds with an *after* part that it is after. Now, it is known that these things undergo change, because there is no passing away or ensuing in what does not change. Also, this thing [that is, time] cannot be before and after on account of some other thing, because, if that were the case, then its *before* would become a *before* only because it existed in some other thing's *before*. In that case, that thing (or something else at which the regress eventually ends) possesses a *before* and an *after* essentially. In other words, it essentially admits of the relation by which there is before and after. That thing is known to be that in which the possibility of changes (in the manner mentioned above)[7] primarily occurs and on account of which [that possibility] occurs in others. So that thing is the magnitude that, in itself, measures the aforementioned possibility and about which we are solely concerned.

(5) We ourselves have made *time* only a name for the possibility noted above and in which that possibility primarily occurs. Clearly, from this, then, the noted magnitude is the same thing that admits of the relation of before and after, or, more precisely, it itself is divisible into before and after. By this I do not mean that time's being before is not through the relation,[8] but, rather, that this relation is inseparable from time and, because of time, it is inseparable from other things. So,

7. See par. 1.

8. The Latin reads *Et non dico quod tempus est prius relative* (I am not saying that time is before relatively), and thus drops the second negation in our phrase "*not* through the relation." It is not clear whether the Latin text reproduces an omission of the second negation in the exemplar underlying the Latin and so is a variant reading, or—as is more likely—is an omission on the part of the Latin translator.

وهذا هو لذاته يكون شيء منه قبل شيء ، وشيء منه بعد شيء ، وتكون سائر الأشياء لأجله ، بعضها قبل ، وبعضها بعد هذا ؛ لأنَّ الأشـياء التي يكون فيها قبل وبَعد ، بمعنى أن القبـل منها فائـت والبَعد غير موجود مع القبل ، إنّما تكون كذلك لا لذواتها ، بل لوجودها مع قسـم من أقسـام هذا المقدار ، فما طابق منها جزءاً هو قبل قيل له إنّه قبل ، وما طابق جزءاً هو بَعد قيل له إنّه بَعد ، ومعلومٌ أنَّ هذه الأشياء هي ذوات التغيّر ؛ لأنَّ ما لا تغيّر فيه فلا فائت فيه ولا لاحق . وهذا الشيء ليس يكون قبل وبَعد لأجل شيءٍ آخر ، لأنّه لو كان كذلك لكان القبل منه إنّما صار قبلاً لوجوده في قبل شيء آخر ، فيكون ذلك الشيءّ – أو شيء آخر ينتهي إليه التدريج آخر الأمرّ – هو لذاته ذو قبل وبَعد ، أي لذاته يقبل الإضافة التي بها يكون قبل وبَعد . ومعلومٌ أنَّ ذلك الشـيء هو الذي يقع فيه إمكان التغييرات على النحو المذكور ؛ وقوعاً أولياً ، ويقع في غيره لأجله ، فيكون ذلك الشيء هو المقدار المقدّر للإمكان المذكور تقديراً بذاته ، ويكون ما نحن فيه لا غيره .

(٥) فنحـن إنّما كنّـا جعلنا الزمان إسـماً للمعنى الذي هو لذاتـه مقدار للإمكان المذكور ، ويقع فيه الإمكان المذكون وقوعاً أولياً ، فبيّن من هذا أنَّ المقدار المذكور هو بعينه الشيء الذي هو لذاته يقبل إضافة قبل وبَعد ، بل هو نفسه منقسم إلى قبل وبَعد ، ولست أعني بهذا أنَّ الزمان يكون قبل لا بالإضافة ، بل أعني أنَّ الزمان تلزمه هذه الإضافة ، وتلزم

when something is said to be before and that thing is not time (but, for example, is motion, humans, and the like), [its being before] means that it exists together with a certain thing that is in some state such that when that state is compared with the state of something later, it is inseparable from [that state] if the thing in [the former state] is essentially before. That is, this inseparability belongs to it essentially. So the [state of] being earlier of some earlier thing [*x*] is that it has a certain existence simultaneous with the nonexistence of some later thing [*y*] that has not existed when [*x*] exists. So [*x*] is earlier than [*y*] when [*y*'s] nonexistence is taken, whereas [*x*] is simultaneous with [*y*] only when [*y*'s] existence is taken and is in a given state that is simultaneous with [*x*]. Now, the determinate thing [that is, *x*] occurs in both states, whereas a given state that it has when it is *earlier* is not a state of *being simultaneous;* and so, inevitably, something belonging to it when it was earlier ceases to belong to it when it is simultaneous. So being earlier and before-ness do not belong essentially to this determinate thing, nor do they persist simultaneously with the persistence of that determinate thing. It is simply and essentially impossible that being earlier and before-ness should persist simultaneously with [the determinate thing's] other state, when it is impossible that they become simultaneous and it is known that this existence does not persistently belong to it, since it is after the existence of the other. That is not impossible for the [determinate] thing that has these [states of being earlier, before-ness, and simultaneity], since it sometimes exists and is before. At other times it exists and is simultaneous with, and at still other times it exists and is after, while being one and the same thing. As for the very thing that is essentially[9] before and after, even if by comparison, it cannot persist the same as it is such that it will be after, after it was before. [That] is because that thing by which it was

9. Reading *li-dhātihi*, which is (inadvertently) omitted in **Y** but appears in **Z**, **T**, and the Latin (*per seipsam*).

سائر الأشياء بسبب الزمان. فإنَّ الشيء إذا قيل له قبل، وكان ذلك الشيء غير الزمان، وكان مثل الحركة والإنسان وغير ذلك، كان معناه أنّه موجود مع شيءٍ هو بحال؛ تلك الحال تلزمهاّ – إذا قيست إلى حال الآخر إنْ كان الشيء بها قبل لذاته، أي يكون هذا اللزوم له لذاتهّ – فالمتقدّم تقدّمه أنّه له وجودٌ مع عدم شيء آخر لم يكن موجوداً – وهو موجود، فهو متقدمٌ عليه إذا اعتُبر عدمه، وهو معه إذا اعتُبر وجوده فقط. وفي حال ما هو معه فليس متقدماً عليه وذاته حاصلة في الحالين، وليس حال ما هو له متقدّم هو حال ما هو مع، فقد يبطل منه لا محالة أمرٌ كان له من التقدّم عندما هو مع. فالتقدّم والقَبْلية معنى لهذا الذات ليس لذاته، ولا ثابتاً مع ثبات ذاته، وذلك المعنى مستحيلٌ فيه أنْ يبقى مع حاله الأُخرى البتة استحالة لذاته، ومستحيلٌ فيه أنْ يصير مع، ومعلومٌ أنَّ هذا الوجود لا يثبت له، فإنّه بعد وجود الآخر. وأمّا الشيء، الذي له هذا المعنى والأمر، فلا يستحيل ذلك فيه؛ فإنّه تارة يوجد وهو قبل، وتارة يوجد وهو مع، وتارة يوجد وهو بَعد، وهو واحدٌ بعينه. وأمّا نفس الشيء الذي هو قبل وبعد لذاتهّ – وإنْ كان بالقياسّ – فلا يجوز أنْ يبقى هو بعينه فيكون بَعد، بَعد ما كان قبل؛ فإنّه ما جاء

something after arrived only when that by which it is before ceased, while it is the thing that has this [*after*] factor that persists together with the cessation of the *before* factor. Now, this factor cannot merely be some relation to nonexistence (or existence), since the existing thing's relation to the nonexisting thing might be one of being later just as easily as being earlier (and the same holds with regard to existence). The fact is that its relation to nonexistence is associated with some other factor [with respect to] which, when associated with it, there is the [state of] being earlier, and, if associated with something else, there is the [state of] being later, whereas the nonexistence in both states is simply nonexistence (and the same holds for existence). Likewise [this factor] is associated *mutatis mutandis* with the related thing, because the related thing is equally—[albeit] conversely—related to it and has that status. This factor either is time or [is] some relation to time. So, if it is time, then that is what we claim. If it is some relation to time, then its[10] before-ness is on account of time, and the factor reduces to the before-ness and afterness whose subject primarily is time.[11] So time turns out essentially to have a *before* and an *after;* and so that which turns out essentially to have a *before* and an *after* we call *time,* since we explained that it is the magnitude of the previously indicated possibility.

(6) Since it has turned out that time is not something subsisting in itself (and how could it be something subsisting in itself when it has no fully determinate being, but is coming to be and passing away?), and the existence of whatever is like that depends upon matter, time is material. Now, although it is material, it exists in matter through the intermediacy of motion; and so, if there is neither a motion nor a change, there is no time. Indeed, how could there be time without *before* and *after,* and how could there be *before* and *after* when one thing does not come to be after

10. Reading *hā* with **Z** and the Latin (sing. *eius*) for **Y**'s *humā* ("their," dual); **T** is sufficiently unclear that it might be either *hā* or *humā*.

11. There seems to be some confusion in **Y**'s text in which there is a repetition of this phrase, which reads "and the factor reduces to the before-ness and afterness whose subject primarily is on account of the time." This reading is not found in **Z**, **T**, or the Latin and almost certainly is a result of dittography in **Y**'s text.

المعنى الذي به الشئ بَعد إلاّ <و> بطل ما هو به قبل، والشيء ذو هذا الأمر هو باقٍ، مع بطلان الأمر القبل. وهذا الأمر لا يجوز أنْ يكون نسبة إلى عدم فقط، أو إلى وجودٍ فقط فإنَّ نسبة وجود الشيء إلى عدم الشيء قد يكون تأخراً مّا، كما يكون تقدّماً، وكذلك في جانب الوجود، بل هو نسبته إلى عدم مقارنٍ أمر آخر إذا قارنه كان تقدماً، وإنْ قارن غيره كان تأخّراً، والعدم في الحالين عدمٌ، وكذلك الوجود، وكذلك نظيره يقارن المنسوب؛ لأنَّ المنسوب أيضاً منسوب إليه بالعكس وله ذلك الحكم، وهذا الأمر هو زمانٌ أو نسبة إلى زمان، فإنْ كان زماناً فذلك ما نقوله، وإنْ كان نسبة إلى الزمان فتكون قبليتها لأجل الزمان، ويرجع الأمر إلى أنَّ هذه القَبْلية والبَعدية أول موضوعهما لأجل الزمان، فالزمان لذاته يعرض له قبل وبعد، فالذي يعرض له قبل وبعد لذاته؛ نسميه الزمان، إذ قد بيّنا أنّه لذاته هو مقدار الإمكان المشار إليه.

(٦) ولّما صحَّ أنَّ الزمان ليس ممّا يقوم بذاته، وكيف يكون مما يقوم بذاته وليس له ذات حاصلة وهو حادث وفاسد؟ وكل ما يكون مثل هذا فوجوده متعلق بالمادة، فيكون الزمان مادياً. ومع أنّه مادي موجود في المادة بتوسط الحركة، فإنْ لم تكن حركة ولا تغيّر لم يكن زمان، فإنّه كيف يكون زمان ولا يكون قبل وبعد، وكيف يكون قبل وبَعد إذا لم

another? Certainly, *before* and *after* do not exist simultaneously; but, rather, something that was *before* ceases inasmuch as it was *before* because something that is *after* inasmuch as it is *after* comes to be. So, if there is no variation or change inasmuch as something ceases or something comes to be—nothing being *after* (since there was no *before*) or nothing being *before* (since there is no *after*)—time will not exist. [In other words, time exists] only together with the existence of the renewal of some state, where that renewal must also be continuous; otherwise, again, there will be no time. [That] is because, when something is all at once and then there is nothing at all until something else is all at once, there must be, between the two, either the possibility for the renewal of some things or not. On the one hand, if there is a certain possibility for the renewal of some things between them, then there is a *before* and *after* with respect to what is between them, but the *before* and *after* are realized only by a renewal of things, whereas we are assuming that there is no renewal of things, which is a contradiction. On the other hand, if this possibility does not exist between them, the two are adjacent, in which case that adjacency must be uninterrupted or not. If it is uninterrupted, then what we supposed results; however, it is an absurdity whose impossibility will be explained later.[12] If it is interrupted, then the argument returns to the beginning. So, if there is time, there must necessarily be a renewal of certain states, either by way of contiguity or continuity. So, if there is no motion, there is no time. Because time, as we said, is a certain magnitude—namely, something continuous that parallels motions and distances—it inevitably has a division that is the product of the estimative faculty, which is called the *present instant*.

12. See 3.4.3.

يحدث أمرٌ فأمر؟ فإنّه لا يكون قبْل وبَعد معاً ، بل يبطل الشيء الذي هو قبلّ – من حيث هــو قبلّ – لأنَّه يحدث الشــيء الذي هو بَعد من حيث هــو بَعد ، فإنْ لم يكن اختلاف وتغيّر مّا ؛ بأنْ يبطل شيءٌ أو يحدث شيءٌ ، لا يكون أمرٌ هو بَعد إذ لم يكن قبْل ، أو أمرٌ هو قبل إذ ليس بَعد . فإذن الزمان لا يوجد إلاّ مع وجود تجدّد حالٍ ، ويجب أنْ يســتمر ذلك التجدّد وإلاّ لم يكن زمان أيضاً ؛ لأنّه إذا كان أمر دفعة ، ثم لم يكن شيء البتة حتى كان شــيء آخر دفعة ، لم يخــل إمّا أنْ يكون بينهما إمكان تجــدّد أُمورٍ أو لم يكن ؛ فإنْ كان بينهمــا إمكان تجدّد أمورٍ ، فيكون فيما بينهما قبْل وبَعــد ، والقَبْل والبَعد إنّما يتحقّق بتجــدّد أمور ، وفرضنا أنّه ليس هناك تجدّد أُمــورٍ ، هذا خُلْف . وإنْ لم يكن بينهما هذا الإمكان فهما ملتصقان ، فلا يخلو إمّا أنْ يكون ذلك الالتصاق مســتمراً أو لا يكون ، فإنْ كان مستمراً فقد حصل ما فرضناهّ – على أنّه محالٌ ستتضح استحالته بَعدّ – وإن كان منقطعاً عاد الكلام من رأس . فيجب ضرورة ، إنْ كان زمان ، أنْ يكون تجدّد أحوال ، إمّا علــى التلاحق وإمّا على الاتصال ؛ فإنْ لم تكن حركة لم يكن زمان ، ولأنَّ الزمانّ – كما قلناّ – مقدارٌ وهو متصلٌ محاذٍ لاتصال الحركات والمســافات ، فله لا محالة فصل متوهم وهو الذي يُسمى الآن .

Chapter Twelve

Explaining the instant

(1) We maintain that we know the instant from knowing time. [That] is because, since time is continuous, it inevitably has a certain division, which is a product of the estimative faculty and is called the *instant*.[1] Now, the instant does not at all exist as actual in relation to time itself; otherwise the continuity of time would be severed. Instead, its existence is only as the estimative faculty imagines it—namely, as a certain connection in a linear extension. The connection does not exist as actual in the linear extension inasmuch as it is a connection; otherwise, there would be infinitely many connections (as we shall explain later).[2] It would be actual only if time were, in some way, severed; but it is absurd that the continuity of time should be severed. That is because, if one concedes that time is severed, that severance must be either at the beginning of time or at its end. If it is at the beginning of time, it necessarily follows that that time has no *before*. Now, if it had no *before*, it could not have been nonexistent and then existed. [That] is because, when it is nonexistent and then exists, it exists after not existing, and so its nonexistence is before its existence. In that case, it must have a *before*,

1. The Arabic *ān* might mean *instant*, *present instant*, and *now*. No single translation covers all the senses in which Avicenna uses *ān* in this chapter; and so, to facilitate philosophical clarity, all three translations are used in this chapter as context requires.

2. See 3.3–4.

<الفصل الثاني عشر>

في بيان أمر الآن

(١) نقــول إنَّ الآن يُعلــم من جهــة العلم بالزمان، فإنَّ الزمان لمّــا كان متصلاً فله لا محالة فصل متوهم وهو الذي يُســمى الآن. وهذا الآن ليس موجوداً البتة بالفعل بالقياس إلــى نفس الزمان، وإلاّ لقطع اتصــال الزمان؛ بل إنّما وجوده على أنْ يتوهمه الوهم واصلاً في مســتقيم امتداداً، والواصل ليس موجوداً بالفعل في <مســتقيم> الامتداد من حيث هــو واصل، وإلاّ لكانتّ – كما نبيّن بعدّ – واصــلات بلا نهاية. بل إنّما يكون بالفعل لو قُطــع الزمان ضرباً من القطع، ومحــالٌ أنْ يقطع اتصال الزمان، وذلك لأنّه إنْ جُعل للزمان قطعٌ؛ لم يخل إمّا أنْ يكون ذلك القطع في ابتداء الزمان أو في انتهائه، فإنْ كان في ابتداء الزمان، وَجَبَ من ذلك أنْ يكون ذلك الزمان لا قبْل له، وإنْ كان لا قبْل له؛ فيجب أنْ لا يكون معدوماً ثم وجد، فإنّه إذا كان معدوماً ثم وجد، يكون وجوده بعد عدمه، فيكون

and that *before* is something different from the nonexistence describing it, according to what we stated elsewhere.[3] So the thing of which this species of before-ness is predicated would be some existing thing, while not being *this* time. So before *this* time, there would be a time that is continuous with it—that [time] before, this [time] after—where this division would be what unites the two; but it was posited as what divides [the two]. This is a contradiction. Likewise, if it is posited as what divides in the way of an endpoint, then something's existing after it is either possible or not. On the one hand, if it is not possible that something exists after it—not even what exists necessarily, such that it would be impossible for something to exist with the nonexistence that is reached at the endpoint—then necessary existence and absolute[4] possibility would have been eliminated. Necessary existence and absolute possibility, however, are not eliminated. If, on the other hand, there is [the possibility of something's existing] after that, then it has an *after,* and so there is a *before,* in which case the instant is something connecting, not dividing. So time does not have an instant existing as something actual in relation to [time] itself, but only as potential (I mean the potential proximate to actuality). In other words, time is so disposed that the instant can always be posited in it, whether by someone's simply positing [it as such] or the motion's arriving at some common indivisible limiting point—as, for example, the beginning of sunrise or sunset or the like. That does not really create a division in the very being of time itself, but only in its relation to motions, just as it is created from the relational divisions in other magnitudes. For example, one part of a body is divided from another by being juxtaposed against or contiguous with [something else], or by someone's simply positing [it as such], without an actual division occurring in it in itself, but only a certain division having occurred in it relative to something else.

3. See 2.11.5.

4. Reading *al-muṭlaq* with **Z**, **T**, and two MSS consulted by **Y**, which **Y** secludes; like **Y**, the Latin omits *absoluta.*

عدمــه قبل وجوده، فيكون له قبْل ضرورة، ويكون ذلك القبْل معنى غير العدم الموصوف بــه، على النحو الذي قلنا في غير هذا الموضع. فيكون الشــيء الذي به يقال هذا النوع من القبْلية حاصلاً، ولا هذا الزمان، فيكون هذا الزمان قبله زمان يكون متصلاً به، ذلك قبْــل وهذا بَعد، وهــذا الفصل يجمعهما، وقد فرض فاصلاً، وهــذا خُلْف. وكذلك إنْ فُرض فاصلاً على أنّه نهاية؛ لم يخلُ إمّا أنْ يكون بعده إمكان وجود شــيء أو لا يكون، فإنْ كان لا يمكن بعده أنْ يوجد شــيء، ولا واجب الوجود، حتى يســتحيل أنْ يوجد شيء، مع عدم ما انتهى إليه من النهاية؛ فقد ارتفع أنْ يكون وجود واجب وارتفع الإمكان المطلــقّ – والوجود الواجب والإمكان المطلق لا يرتفعانّ – وإن كان بعده ذلك؛ فله بَعدٌ فهو قبل فالآن واصلٌ لا فاصل. فالزمان لا يكون له آنٌ بالفعل موجوداً بالقياس إلى نفسه، بــل بالقوة، أعني القوة القريبة من الفعل، وهو أنَّ الزمان يتهيأ أن يُفرض فيه الآن دائماً؛ إمّا آنٌ بفرض الفارض، وإمّا بموافاة الحركة، حدّاً مشتركاً غير منقسم كمبدأ طلوع أو غروب، أو غير ذلك. وذلك بالحقيقة ليس إحداث فصل في ذات الزمان نفسه، بل في إضافته إلى الحركات؛ كما يحدث من الفصول الإضافية في المقادير الأُخر، كما ينفصل جزء جسم من جزء آخر بموازاةٍ أو مماسّــةٍ أو بفرض فارضٍ من غير أنْ يكون قد حصل فيه بالفعل فَصلٌ في نفسه، بل حصل فيه فصلٌ مقيساً إلى غيره.

(2) When this present instant occurs through this relation, then its nonexistence is only in all of the time that is after it. Now, one can say that [the present instant] must cease to exist either in an immediately adjacent instant or an instant that is not immediately adjacent [only] after it is conceded that [the present instant] can begin ceasing to exist at some instant and, in fact, [conceding] that there is a beginning of its cessation—namely, at the limit of all the time during which it does not exist. The fact is that, by *cessation*, nothing more is understood than that something does not exist after existing. Now, the existence of [the present instant] in this situation is that it is the limit of the time that is nonexistent at it (as if you said that [the present instant] exists at the limit of the time that is nonexistent at it), and its cessation does not have a beginning when it ceases that is a first instant at which it ceased to exist. Instead, between [the time's] existing and not existing, there is a certain division that is nothing but the existence of [the present instant]. (You will learn that the things undergoing motion, rest, generation, and corruption also do not have a first instance in which they undergo motion, rest, generation, and corruption, since the time is potentially divisible infinitely.)[5]

(3) It might erroneously be thought that, against this, one can argue either that the present instant ceases to exist gradually (in which case it takes a period of time to reach its end, at which it ceases to exist) or it ceases to exist all at once (in which case its nonexistence is at an instant).[6] The falsity of this argument needs to be explained. So we say that what either exists or does not exist all at once (in the sense that it happens at a single instant) is not necessarily the opposite of that which exists or does not exist gradually; but, instead, it is more specific than that

5. See par. 4 and 3.6.3–6.
6. Cf. Aristotle, *Physics* 4.10.218a11–21.

(٢) وهذا الآن ، إذا حصل بهذه النسبة ، فليس يكون عدمه إلاّ في جميع الزمان بعده . وقول القائل إنّه إمّا أنْ يفسد في آنٍ يليه أو آنٍ لا يليه ؛ هو بعد أنْ يتسلّم أنَّ له فساداً مبتدأ في آنٍ ، بل ابتداء فسادّ – وهو في طرف الزمانّ – الذي هو في جميعه يعدم . فإنّه لا يفهم من الفساد غير أنْ يكون الشيء معدوماً بعد وجوده ، ووجوده في هذا الموضع هو أنّه طرف الزمان الذي هو فيه معدوم ؛ كأنك قلت إنّه في طرف الزمان الذي هو معدومٌ فيه موجودٌ ، وليس لفساده مبدأ فسادٍ هو أول آنٍ فسد فيه ، بل بين وجوده وعدمه فصلٌ هو وجوده لا غير . وأنت ستعلم أنّه ليس للمتحرّك والساكن والمتكوّن والفاسد أول آنٍ هو فيه متحرك أو ساكن أو متكوّن أو فاسد ، إذ الزمان منقسم بالقوة إلى غير نهاية .

(٣) والذي يظنّ ، من أنّه يمكن أن يقال على هذا ، إنّ الآن إمّا أنْ يُعدم قليلا قليلا فيمتد آخره آخذا إلى العدم مدة ، أو يعدم دفعة فيكون عدمه في آنٍ ، هو قولٌ يحتاج أنْ يبيّن فساده ، فنقول : إنَّ المعدوم ، أو الموجود . دفعة ، بمعنى الذي يحصل في آنٍ واحدٍ ، ليس لازماً لمقابل الذي يُعدم قليلاً قليلاً ، أو الذي يوجد قليلاً قليلاً ، بل هو أخص من

opposite. That [proper] opposite is *that which does* not *proceed gradually toward existence, nonexistence, alteration, and the like.* This is true of (1) what occurs all at once, but it is also true of either (2a) the thing that does not exist during an entire period of time, while existing at its limit (which is not time), or (2b) the thing that does exist during an entire period of time, while not existing at its limit (which is not time). Indeed, neither of these latter two exists or does not exist gradually, and the same equally holds for the first (namely, that whose existence or nonexistence is at an instant). The latter sense is distinct from the former first sense because, on the one hand, in the first sense, the status for the instant of time, which is essentially its extremity, is assumed to be the same as that for all of time. In the latter sense, on the other hand, the status for the instant is assumed to be different from that for time—namely, that one instant is not placed after a different one, unless an intervening state occurs between the two instants and that instant is essentially the limit. Now, our discussion of this second sense is not whether it in fact exists or not, for we are not discussing it with an eye to affirming its existence, but with an eye to a certain negation's being predicated of it. Again, that negation is that *it exists or does not exist gradually;* and, with respect to that, it has a certain subclass, and that subclass is more specific than that negation. Now, the more specific does not necessarily entail the more general. Also, it is not the case that, from our conceptualization of something as a subject or predicate, its existence must either be affirmed or not. (This is something learned in the discipline of logic.)[7] So, when our claim "It is not the case that it exists or does not exist gradually," is more general than our claim "It exists or does not exist all at once" (in other words, that state of it is at some beginning instant), then one's claiming that it is either gradual or all at once in this sense

7. See *Kitāb al-madkhal* 1.3.

ذلك المقابل، وذلك المقابل هو الذي ليس يذهب إلى الوجود أو إلى العدم أو الاستحالة أو غير ذلك قليلاً قليلاً. وهذا يصدق على ما يقع عليه دفعة، ويصدق على الأمر الذي يكون في جميع زمانٍ مّا معدوماً، وفي طرفه الذي ليس بزمانٍ موجوداً، أو الأمر الذي يكون في جميع زمانٍ مّا موجوداً، وفي طرفه الذي ليس بزمانٍ معدوماً، فإنَّ هذين ليسا موجودان أو يعدمان قليلاً قليلاً. والأول أيضاً كذلك، وهو الذي يكون وجوده أو عدمه في آنٍ. لكن هذا الوجه يباين ذلك الوجه الأول، لأنَّ الوجه الأول قد فرض فيه الحكم في آن الزمانّ – الذي هو نهايته بالذاتّ – كالحكم في جميع الزمان، وفي هذا الوجه قد فرض الحكم في الآن مخالفاً للحكم في الزمان من غير أنْ يُوضع آنٌ بعد الآن المخالف؛ وإلاّ لوقعت مشافعةٌ بين آناتٍ، ولكان ذلك الآن هو الطرف بالذات. وليس كلامنا في أنَّ هذا الوجه الثاني يصح وجوده أو لا يصحّ، فإنّا لا نتكلم فيه من حيث يصدق بوجوده، بل نتكلم فيه من حيث هو محمول عليه سَلْبٌ مّا؛ وذلك السلّب هو أنّه ليس يوجد أو يعدم قليلاً قليلاً، وله في ذلك شريك، فذلك الشريك أخصّ من هذا السلّب، والأخصّ لا يلزم الأعم، وليس يجب أنْ يكون الشيء؛ من حيث نتصوره موضوعاً أو محمولاً، بحيث يصدق بوجوده أو لا يصدق، ‹و› قد عُلم هذا في صناعة المنطق. فإذا كان قولنا ليس يوجد أو يعدم قليلاً قليلاً، أعم من قولنا يوجد دفعة أو يعدم دفعة، بمعنى أنّه يكون حاله ذلك في آنٍ مبتدأ، فليس قول القائل إنّه إمّا أنْ يكون قليلاً قليلاً، أو يكون

is not affirmed in the same way as a disjunctive [proposition] whose scope includes two contradictory disjuncts or one contradictory disjunct and what its contradictory disjunct necessarily entails. Likewise, the opposite of what exists all at once is what does not exist all at once—that is, it does not exist in some beginning instant, and it does not necessarily follow that it exists or does not exist gradually, and, in fact, that which corresponds with the previously noted sense [i.e., 2] might be affirmed together with it. [That is so] unless, by *that which exists all at once*, one means that whose existence is not an instant, but when it is at it, the existence is fully realized and there is no instant in which it is still in procession; and, accordingly, the same holds true for that which does not exist all at once. So, if this is meant, then this is necessarily the opposite, and the premise turns out true; but why should its beginning existence or nonexistence be all at once?

(4) There is something here, and even if this is not its proper place, we should mention it in order that there be a way to confirm what we said. Also, being familiar with it is worthwhile for learning [the answer to the following question, namely]: In the instant common to two periods of time, in one of which something is in one state and in the other of which it is in another state, is the thing altogether lacking both states, or does it have one of the states to the exclusion of the other? If the two situations are potentially contradictory, such as being contiguous and not being contiguous, existing and not existing, or the like, it would be absurd that at the assumed instant the thing would be altogether lacking both. So it must inevitably have one of the two [states], and I wish I knew which one! We argue that some thing undoubtedly opposes the exiting thing so as to render it nonexistent, in which case either one of two situations must be the case. That opposing thing might, in fact, do so at an instant.

دفعــة، بهذا الوجه، صادقاً صدق المنفصل المحيط بطرفي النقيض، أو المحيط بنقيضٍ وما يلــزم نقيضه. وأيضاً فإنّ مقابل ما يوجــد دفعة هو ما لا يوجد دفعة، أي لا يوجد في آنٍ مبتدأ، وليس يلزمهّ – لا محالّة – أنّه يوجد أو يُعدم قليلاً قليلاً، بل قد يصدق معه الذي بحســب الوجه المذكور. اللّهم إلاّ أنْ يعني بالموجود دفعة؛ الذي لا يوجد آنٌ إلاّ وهو فيه حاصل الوجود، ولا يوجد آنٌ هو فيه بعد في السلوك وكذلك في المعدوم دفعة بحسبه، فــإنْ كان عني هذا؛ كان هذا لازم المقابل وصحت القضيــة. ولكن، لِمَ يجب أنْ يكون وجوده المبتدأ دفعة، أو عدمه؟

(٤) وهــا هنا شــيءٌ – وإنْ كان لا يليق بهذا الموضــعّ – فينبغي أنْ نذكره ليكون ســبيلاً إلى تحقّق ما قلنــاه؛ وهو: أنّه بالحــرى أنْ يتعرّف ليعرف هل الآن المشــترك بين زمانــين، في أحدهما الأمر بحالٍ وفي الاخر بحــال أخرى، ‹و› قد يخلو الأمر فيه عن الحالــين جميعاً، أو يكــون فيه على إحدى الحالين دون الأخرى؟ فإنْ كان الأمران في قوة المتناقضــين، كالمماس وغير المماس، والموجود والمعدوم، وغيــر ذلك، فمحالٌ أنْ يخلو الشــيء في الآن المفروض عنهما جميعاً، فيجب أنْ يكون على أحدهما لا محالة، فليتَ شــعري على أيّهما يكون؟ فنقول: إنَّ الأمر الموجود لا محالة يرد عليه أمرٌ فيعدمه، فلا يخلو إمّا أنْ يكون ذلك الشــيء الوارد ممّا يصح وروده في آنٍ، وهو الشــيء الذي يتشابه

In other words, it is something whose state remains the same during any instant you take during the time that it exists, and it does not need some [other] instant in such a way as to correspond with a period of time in order to exist. As long as that is the case, the thing in the common division is described by [such a state]—as, for example, being contiguous, being square, and the other fixed dispositions whose existence remains the same during every instant of the time that they exist.[8] Alternatively, the thing might be contrary to this description, and so its existence would occur during a period of time, while not occurring at an instant. In that case, its existence would be in the second period of time alone and would not be predicated of the instant dividing the two such that there would be a certain opposition at it. Examples are *to depart* and *to cease being contiguous* or *moving.* The state of some of the latter [types] can remain the same at certain instants during their time, setting aside the instants that they begin to occur, whereas the state of others can in no way remain the same. Those that can are like *not being contiguous,* which is to be separate, since it occurs only by motion and a variation of some state; however, it can remain not contiguous and, in fact, be separate for a period of time, during which it remains the same; and, even if its states do vary from other perspectives, that will not be from the perspective that the two are separate and not contiguous. Those for which that is impossible are like motion, for its state does not remain the same at some instant or other, but, rather, at every instant there is a renewal of a new proximity and remoteness, both of which result from the motion. So, when the thing that is not undergoing motion is moved and what is contiguous stops being such, there will be the instant that divides the two times; [and], since at it there is no beginning separation and motion, there will be contact and an absence of motion at it. Even if this takes us beyond our immediate goal, it does provide some help here, as well as for other questions.

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8. Adding the phrase *fī kull ān zamān wujūdihā* (during every instance of the time that they exist) with **Z**, **T**, and the Latin, which is (inadvertently) omitted in **Y**.

حالــه فــي أي آنٍ أخذتَ في زمان وجوده، ولا يحتاج فــي أنْ يكون إلى آنٍ يطابق مدة، وما كان هكذا، فالشــيء في الفصل المشترك موصوف به، كالمماسّة والتربيع وغير ذلك من الهيئات القارّة التي يتشــابه وجودها في كلّ آن زمان وجودها. وإمّا أنْ يكون الشيء بخلاف هذه الصفة، فيقع وجوده في زمانٍ ولا يقع في آن، فيكون وجوده في الزمان الثاني وحــده، والآن الفاصل بينهما لا يحتمله؛ فتكون فيه مقابلة؛ مثل المفارقة وترك المماسّــة والحركة، فمن ذلك ما يجوز أنْ تتشابه حاله في آناتٍ من زمانه دون آنات الوقوع ابتداء، ومنه ما لا يجوز أنْ يتشــابه حاله البتة. أما الذي يجوز فمثل الامماسّة؛ التي هي المباينة، فإنّها لا تقع إلاّ بحركةٍ واختلاف حال، ولكنها تثبت لا مماسّــة بل مباينة، زماناً مّا تتشابه فيه وإنْ اختلفت أحوالهما من جهاتٍ أخرى، فليس ذلك من جهة إنهما مباينة ولا مماسّة. وأمّا الذي لا يجوز ذلك فيه فكالحركة، فإنّها لا تتشابه حالها في آنٍ من الآنات، بل يكون فــي كل آنٍ تجدد قربٍ وبعدٍ جديدٍ هما من أحوال الحركة. فالشــيء ‹غير› المتحرّك إذا تحــرّك والمماسّ إذا لم يماسّ، فالآن ‹هو› الفاصل بين زمانيه، إذ لا ابتداء مفارقةٍ فيه ولا حركــة، ففيه مماسّــة وعدم حركةٍ – وهذا وإنْ كان خارجاً عــن غرضنا، فإنّه نافعٌ فيه وفي مسائل أخرى.

(5) That which we have discussed is the instant that is bounded by the past and future, as if a certain period of time came to be and then, after its occurrence, it is delimited by this instant. The estimative faculty, however, imagines another instant with a different description. So, just as you assume that, through the motion and flow of the limit of the moving thing (and let it be some point), there is a certain spatial magnitude[9] or, rather, a certain line (as if it—I mean that limit—is what is moving), and then you assume that there are certain points in that line (not that they make up the line, but that they are only what the estimative faculty imagines to be its connections), so it would likewise seem that, in time and motion (in the sense of *traversing* [a distance]), there is something like that and something like the line's internal points, which do not make it up. In other words, the estimative faculty imagines something that is being borne along and a certain limiting point on the spatial magnitude and time. So what is being borne along some continuous spatial magnitude produces a certain continuous locomotion that corresponds with a period of time. So it is as if what is borne along—or, more exactly, its state that necessarily accompanies it during the motion—is a certain indivisible limit, corresponding with a point on the spatial magnitude and some present instant of time that produces a certain continuum through its flow. So, together with [that limit], there is neither a spatial line (for it followed behind it), nor motion in the sense of traversing [the distance] (for it came to an end), nor time (for it is past). Together with it, there is only an indivisible limit of each one [of these], which it divides. So, from time, the present instant is always with it; from traversing [the distance], there is the thing, which we explained, is in reality motion, as long as something is undergoing motion;[10] and from the spatial magnitude, there is the limiting point,

9. The Arabic *masāfah* also means "distance"; however, "spatial magnitude," which the Arabic can happily support, seems more fitting in the present context, since Avicenna's point here, following John Philoponus (*In Phys.* 727.21–29), will be that that just as the motion of a point produces a line (as, for example, when a pen's nib is drawn across a piece of paper), so the flow of a *now* produces time.

10. Meaning, motion at an instant. See 2.1.6.

(٥) فهذا الذي تكلمنا فيه هو الآن المحفوف بالماضي والمستقبل، كأنه حدث زمانٌ فحُدَّ بعد حصوله بهذا الآن. وقد يُتوهم أنّ آخر على صفةٍ أخرى، فكما أنَّ طرف المتحرّك، وليكن نقطة ما تفرض بحركته وسيلانه مسافة ما، بل خطاً ما؛ كأنّه – أعني ذلك الطرفّ – هو المنتقل، ثم ذلك الخط تفرض فيه نقطٌ، لا الفاعلة للخط بل المتوهمة، واصلة له، وكذلك يشبه أنْ يكون في الزمان وفي الحركةّ – بمعنى القطعّ – شيءٌ كذلك، وشيء كالنقط الداخلة في الخط الذي لم تفعله، وذلك أنّه يتوهم منتقلٌ وحدٌّ في المسافة وزمان، فالمنتقل يفعل نقلةً متصلةً على مسافة متصلة، يطابقه زمانٌ متصل. فكأن المنتقلّ – بل حالته التي تلزمه في الحركةّ – هو طرفٌ غير منقسم فعّالٌ بسيلانه اتصالاً، ويطابقه من المسافة نقطة، ومن الزمان آن، فإنّه لا يكون معه لا خط المسافةّ – فقد خلّفهّ – ولا الحركة بمعنى القطع فقد انقضت، ولا الزمان فقد سلف. إنّما يكون معه من كل واحدٍ طرفٌ له غير منقسم انقسامه، فيكون معه دائماً من الزمان الآن، ومن القطع الشيء الذي بيّنا أنه بالحقيقة هو الحركة ما دام الشيء يتحرك، ومن المسافة الحدّ، إمّا

whether a point or the like. Each one of these is an extremity, and even what is borne along is an extremity in its own right inasmuch as it was borne along. It is as if there is something extending from the beginning of the spatial magnitude up to where it has reached. [That] is because, inasmuch as it is something borne along, there is something extending from the beginning to the end, while it itself—the continuously existing present instant—is a certain limiting point and extremity inasmuch as it had been borne along to this limiting point.

(6) We should investigate whether, just as what is borne along is one and by its flow produced its limiting point and endpoint as well as the spatial magnitude, there is likewise in time something that is the *now* that flows.[11] In this case, [the now] would itself be something indivisible *qua* itself, and it itself would persist inasmuch as it is like that, while it would not persist inasmuch as it is a given present instant, because it is a present instant only when it is taken as something delimiting time, just as the former is what is borne along only when it delimits what it delimits, whether in itself a point or something else. Just as it happens that what is borne along *qua* being borne along cannot exist twice, but passes away when it is no longer being borne along, likewise the now *qua* a given present instant does not exist twice. Still, the thing that, owing to whatever condition, becomes a *now* perhaps does exist several times, just as what is borne along, *qua* a thing (which just so happened to be borne along), perhaps exists several times. So, if something like this exists, then it is rightly said that *the now produces time through its flow;* but this is not the instant that is posited between two periods of time that connects them, just as the point that the estimative faculty imagines producing a spatial magnitude by its motion is different from the point that it imagines in the spatial magnitude at [a connecting instant]. So, if

11. Avicenna's discussion of the "flowing now" relies heavily upon John Philoponus's own discussion from his *Physics* commentary; see especially *In Phys.* 727.21–29.

نقطة وَإما غير ذلك، وكل واحدٍ من هذه نهاية، والمنتقل أيضاً نهاية لنفسه من حيث انتقل، كأنه شـــيء ممتد من المبدأ في المســـافة إلى حيث وصل؛ فإنّه من حيث هو منتقل شيء ممتـــد من المبـــدأ إلى المنتهى، وذاته الموجودة المتصلة الآن حـــدٌّ ونهايةٌ لذاته من حيث قد انتقل إلى هذا الحدّ،

(٦) فحـــريٌ بنا أنْ ننظر، هـــل كما أنَّ المنتقل ذاته واحدة، وبســـيلانه فعل ما هو حدّه ونهايته؛ وفعل المســـافة أيضاً؟ كذلك في الزمان شـــيءٌ هو الآن يســـيل فيكون ذاتاً غير منقســـمة من حيث هي هو، وهو بعينه باقٍ، من حيث هو كذلك، وليس باقياً من حيـــث هو آن، لأنّه إنما يكون آناً إذا أُخذ محـــدّداً للزمان، كما أنَّ ذلك إنّما يكون منتقلاً إذا كان محدّداً لما يحدّده، ويكون في نفســـه نقطة أو شـــيئاً آخر. وكما أنَّ المنتقل يفرض لـــهّ – من حيث هو منتقلّ – أنّه لا يمكن أنْ يوجـــد مرتين؛ بل هو يفوت بفوات انتقاله، وكذلك الآن، من حيث هو آن، لا يوجد مرتين، لكن الشـــيء الذي، لأمرٍ مّا، صار آناً عســـى أنْ يوجد مراراً، كما أنَّ المنتقلّ – من حيث هو أمرٌ – عرض له الانتقال؛ عسى أنْ يوجـــد مراراً. فإنْ كان شـــيء مثل هذا موجوداً، فيكون حقـــاً ما يقال إنَّ الآن يفعل بسيلانه الزمان، ولا يكون هذا هو الآن الذي يفرض بين زمانين يصل بينهما، كما أنَّ النقطة المتوهمة فاعلة بحركتها مســـافة هي غير نقطة المسافة المتوهمة فيه. فإنْ كان لهذا الشيء

this thing exists, then its existence is joined to the thing that we previously identified with motion[12] without taking what is earlier and later nor coinciding with [the motion]. Now, just as its possessing a *where* when it continuously flows along the spatial magnitude produces motion, so its possessing that thing that we called the *now* when it continues along the earlier and later parts of motion produces time. So this thing's relation to what is earlier and later is in that it is an instant, while, in itself, it is something that makes time.

(7) [The instant] also numbers time by what is produced when we take some instant from among limiting points in [what is earlier and later]. In this case, numbered instances of being earlier and later are produced, just as points number the line through two relations in that each point is shared between two lines. Now, the one that truly numbers is that which, first, provides the thing with a unit, and, [second,] provides it with number and multiplicity by[13] repeating [the unit]. So the instant that has this description numbers time, for, as long as there is no instant, time is not numbered. Now, what is earlier and later numbers time in the second way. That is, it is part of it, whose being a part occurs through the existence of the instant. Because what is earlier and later are time's parts, and [because] each part of it can be divided, like the parts of a line, the instant is better suited to the unit, and the unit [is] better suited to do the numbering. So the instant numbers in the way that the point does, while not being divisible. Also, the motion numbers time in that it makes the earlier and later parts exist by reason of the distance, and so, through the motion's magnitude, there is the number of what is earlier and later. Thus, motion numbers the time in that it makes time's number to exist—that is, what is before and after—whereas time numbers motions in that it is itself a number belonging to [motion].

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12. Again, Avicenna is referring to his account of motion at an instant see 2.1.6.

13. **Y** (inadvertently) omits the *bi*, which occurs in **Z** and **T**; the Latin has the adverbial phrase *iterum et iterum* (repeatedly), which confirms the presence of *bi*.

وجودٌ ؛ فهو وجود الشـــيء مقروناً بالمعنى الذي حقّقنا فيما ســـلف ، إنّه حركةٌ من غير أخذ متقدم ولا متأخرٍ ولا تطبيق . وكما أنَّ كونه ذا أين ؛ إذا اســـتمر ســـائلاً في المسافة أحدث الحركة ، كذلك كونه ذا ذلك المعنى الذي ســـميناه الآن إذا استمر في متقدّم الحركة ومتأخرها ؛ أحدث الزمان . فنســـبة هذا الشيء إلى المتقدّم والمتأخر هي في كونه آناً وهو في نفسه شيء يفعل الزمان .

(٧) ويعـــدّ الزمان بما يحـــدث ، إذا أخذنا آناً من حـــدودٍ فيهما ، فتحدث تقدمات وتأخرات معدودة ؛ كالنقط تعدّ الخط بأنْ تكون كل نقطة مشـــتركة بين خطين بإضافتين ، والعادّ الحقيقي هو الذي هو أول معْطٍ للشـــيء وحدة ، ومعطٍ له الكثرة والعدد بالتكرير ، فالآن الذي بهذه الصفة يعدّ الزمان . فإنّه ما لم يكن آن لم يُعدّ الزمان ، والمتقدّم والمتأخر يعدّ الزمان على الوجه الثاني ؛ أي بأنّه جزؤه تحصل جزئيته بوجود الآن ، ولأنَّ المتقدّم والمتأخر أجزاء الزمان ، وكل جزءٍ منه من شـــأنه الانقســـام ، كأجزاء الخط ، فالآن أولى بالوحدة ، والوحـــدة أولى بالتعديد ، فالآن يعدّ على الجهة التي تعدّ النقطة ولا ينقســـم ، والحركة تعدّ الزمان بأنْ توجد المتقدّم والمتأخر بســـبب المســـافة . فبمقدار الحركـــة يكون عدد المتقدّم والمتآخـــرّ – فالحركة تعد الزمـــان ، على أنها توجد عدد الزمان وهـــو المتقدّم والمتأخر ، والزمان يعدّ الحركة بأنه عدد لها نفسها .

(8) An example of this is that people, owing to their existence, are the cause of their number, which is, for instance, ten. Because they exist, their being ten occurs, whereas being ten did not make the people to exist or be things, but only to be numbered—that is, to have a number. When the soul numbers the people, what is numbered is not the nature of the humans, but the ten-ness, which, for example, the spatially dislocated nature of the humans brings about. So, through the humans, the soul counts the ten-ness; and likewise, the motion numbers time in the aforementioned sense. Were it not for the motion, through the limiting points of earlier and later that it produces in the spatial magnitude, a number would not belong to time. As it is, however, time measures motion, and motion measures time. Time measures motion in two ways:[14] [the first] one is that it provides it with a determinate measure, while the second is that it indicates the quantity of its measure (where motion measures time as indicating its measure through the earlier and later parts that exist in it); and there is a difference between the two situations. As for indicating the measure, it is sometimes like the measure of wheat that indicates the holding capacity for the wheat, and at other times it is like the holding capacity for the wheat that indicates the measure of wheat [being held]. Similarly, sometimes the distance indicates the measure of motion, and at other times the motion indicates the measure of the distance, and so sometimes it is said that a trip is two parasangs [approximately seven miles] and sometimes it is said that a distance is a stone's throw; however, that which provides the magnitude for the other is just one of them—namely, the one that is in itself a measure.

14. Cf. John Philoponus, *In Phys.* 741.21–742.14.

(٨) مثال هذا ؛ أنَّ الناس لوجودهم هم أسباب وجود عددهم الذي هو مثلاً عشرة، ولوجودهم وجدت عشريتهم، والعشرية جعلت الناس لا موجودين وأشياء، بل معدودين أي ذوي عدد، والنفس إذا عدت الناس كان المعدود ليس هو طبيعة الإنسان، بل العشرية التي جعلها افتراق طبيعة الإنسان مثلاً، فالنفس بالإنسان تعدّ العشرية، فكذلك الحركة تعدّ الزمان على المعنى المذكور. ولولا الحركة – بما تفعل في المسافة من حدود التقدّم والتأخّر – لما وجد للزمان عددٌ، لكن الزمان يقدّر الحركة والحركة تقدّر الزمان، والزمان يقدّر الحركة على وجهين: أحدهما أنّه يجعلها ذات قدر، والثاني أنّه يدل على كميّة قدرها، والحركة تقدّر الزمان على أنّها تدل على قدره بما يوجد فيه من المتقدّم والمتأخر، وبين الأمرين فرقٌ. أمّا الدلالة على القدر؛ فتارة يكون مثل ما يدل المكيال على الكيل، وتارة يكون مثل ما يدل الكيل على المكيال، وكذلك تارة تدل المسافة على قدر الحركة، وتارة الحركة على قدر المسافة. فيقال تارة مسيرة فرسخين، وتارة مسافة رميةٍ، ولكن الذي يعطي المقدار للآخر هو أحدهما، وهو الذي هو بذاته قدر.

(9) Because time is something continuous in its substance, it is appropriately said to be *long* and *short;* and, because it is a number relative to what is earlier and later in the way explained, it is appropriately said to be *little* and *much.* The same holds for motion, for it accidentally has a certain continuity and discontinuity, and so the properties of what is continuous and of what is discontinuous are attributed to it, albeit it happens to have that from something other than itself, whereas that which is most proper to it is speed. So we have indicated the way [in which] the *now* exists as actual (if it exists as actual) and the way [in which] it exists potentially.

(٩) ولأنَّ الزمـــان متصلٌ في جوهره صلح أنْ يقال طويل وقصير، ولأنّه عدد القياس إلى المتقــدّم والمتأخرّ – على ما أوضحاهّ – صلح أنْ يقال قليل وكثير. وكذلك الحركة؛ فإنّها يعرض لها اتصالٌ وانفصال؛ فيقال عليها خواص المتصل وخواص المنفصل، لكن ذلك يعرض لها من غيرها، والذي هو أخص بها الســريع والبطيء. فقد دللّنا على نحو وجود الآن بالفعلّ – إنْ كان له وجودٌ بالفعلّ – وعلى نحو وجوده بالقوة.

Chapter Thirteen

The solution to the skeptical puzzles raised about time and the completion of the discussion of things temporal, such as being in time and not in time, everlasting, eternity, [and the expressions] suddenly, right away, just before, just after, *and* ancient

(1) Everything that was said to undermine the existence of time and about its not having any existence is based upon its not existing at an instant.[1] Now, there is a distinction between saying that it has no existence absolutely and that it has no existence that occurs at an instant. We ourselves wholeheartedly concede that time does not exist so as to occur according to the latter sense, save in the soul and estimative faculty, whereas it does, in fact, have the absolute existence that opposes absolute nonexistence. Indeed, if [its existence] were not a fact, its negation would be true; and so it would be true that it is *not* the case that between two spatially separated points there is some magnitude [corresponding with] a possibility of some motion to traverse [that distance] at some definite speed. Now, when this negation is false and, in fact, a certain magnitude does belong to the motion at which it is possible to traverse this distance at that definite speed and possible to traverse a different one

1. See 2.10.2–3.

<الفصل الثالث عشر>

في حل الشكوك المقولة في الزمان
وإتمام القول في مباحث زمانية مثل الكون
في الزمان والكون لا في الزمان وفي الدهر والسرمد
وبغتةً وهو ذا وقُبيل وبُعيد والقديم

(١) وأمّا الزمان؛ فإنَّ جميع ما قيل في أمر إعدامه وأنه لا وجود له، فهو مبني على أنْ لا وجـود لـه في الآن، وفرقٌ بين أنْ يقال لا وجود له مطلقاً، وبين أنْ يقال لا وجود له في آنٍ حاصلاً. ونحن نسلّم ونصحّح أنَّ الوجود المحصل على هذا النحو لا يكون للزمان إلاّ فـي النفس والتوهم، وأمّا الوجود المطلـق المقابل للعدم المطلق فذلك صحيح له. فإنّه إنْ لم يكن صحيحاً صدق سـلبه، فصدق أنْ نقول: إنّه ليس بين طرفي المسـافة مقدار إمكانٍ لحركةٍ على حدّ من السـرعة يقطعها. وإذا كان هذا السلب كاذباً، بل كان للحركة على ذلك الحدّ من السـرعة مقدارٌ فيه يمكن قطع هذه المسـافة، ويمكن قطع غيرها بأبطأ

by going slower or faster (as we explained before),[2] the affirmation that opposes [this negation] is true—namely, that there is the magnitude of this possibility. The affirmation indicates that something exists, even if it does not indicate that it does so as something occurring at an instant or in some other way. Also, it doesn't have this manner [of absolute existence simply] because of the activity of the estimative faculty, for, even if there were no activity of the estimative faculty, this manner of existence and truth would obtain. Still, it should be known that some existing things have a determinate and realized existence, while others have a more tenuous existence. Time seems to exist more tenuously than motion, akin to the existence of things that are relative to other things, even though time *qua* time is not relative, but relation necessarily accompanies it.[3] Since distance and the limiting points in it exist, whatever has some affiliation with [distance]—whether as mapping onto it or traversing it or a magnitude of its traversal—exists in some way such that it is simply false that [that thing] should not exist at all. If it is intended, however, that we provide time with an existence contrary to this way, such that it exists determinately, then it will occur only in the act of the estimative faculty. Thus, the premise used in affirming that time does not exist in the sense of not existing at a single instant is granted, and we ourselves do not deny its nonexistence at an instant. Its existence, rather, is in the way of generation in that, for any two instants that you care to take, there is something between them that is time, while not at all being at a single instant. In summary, we don't need to worry ourselves [about answering] their question, "If [time] exists, then does it exist at an instant or during a period of time? Otherwise, when does it exist?" The fact is that time does not exist at an instant or during a period of time, nor

2. See 2.11.1–2.

3. Following **Z**'s and **Y**'s suggestion to seclude the phrase *min ḥaythu kawnuhu miqdār al-shayʾ wa-kawnuhu zamānan ghayr kawnihi miqdāran* (inasmuch as it is the magnitude of something and its being time is different from its being a magnitude), which is also omitted in **T** and the Latin.

وأسـرعّ – على ما بيّنا قبلّ – فالإثبات الذي يقابلـه صادقٌ، وهو أنَّ هناك مقدار هذا الإمـكان والإثبات دلالة على وجود الأمر مطلقاً، وإنْ لم تكن دلالة على وجوده محصّلاً في آنٍ، أو على جهةٍ ما. وليس هذا الوجه له بسبب التوهم، فإنّه – إنْ لم يتوهمّ – كان هـذا النحو من الوجود وهذا النحو من الصدق حاصـلاً. ومع هذا، فيجب أنْ يُعلم أنَّ الموجـودات منها ما هي متحقّقة الوجود محصلّة، ومنهـا ما هي أضعف في الوجود، والزمان يشـبه أنْ يكون أضعف وجوداً من الحركة، ومجانسـاً لوجود أمورٍ بالقياس إلى أمور، وإنْ لم يكن الزمان، من حيث هو زمان مضافاً، بل قد تلزمه الإضافةً. ولّما كانت المسـافة موجودة وحدود المسـافة موجودة، صار الأمر الذي من شـأنه أنْ يكون عليها ومطابقاً لها أو ‹قاطعاً› لها أو مقدار قطع لها نحوا من الوجود، حتى إنْ قيل إنّه ليس له البتة وجود كذبَ. فإنْ أريد أنْ نجعل للزمان وجوداً لا على هذا السـبيل، بل على سبيل التحصيل؛ لم يكن إلاّ في التوهم. فإذن المقدمة المستعملة في أنَّ الزمان لا وجود له ثابتاً؛ معناه لا وجود في آنٍ واحدٍ مسـلّمةٌ، ونحن لا نمنـع أن يكون له وجود ليس في آن، بل وجوده على سبيل التكوّن، بأن يكونّ – أي آنين فرضتهماّ – كان بينهما الشيء الذي هو الزمان، وليس في آنٍ واحدٍ البتة. وبالجملة، طلبهم أنَّ الزمان إنْ كان موجوداً فهو موجود في آنٍ أو في زمان، أو طلبهم متى هو موجود، ممّا ليس يجب أنْ نشتغل به. فإنَّ الزمان

does it have a *when*. Instead, it exists absolutely and just *is* time, and so how could it exist in time? So [to begin with] their claim is incorrect that either time doesn't exist, or it exists at an instant or as something persisting during a period of time. Moreover, it does not oppose our claim that it does not exist either at an instant or as persisting during a period of time, and yet time exists, while not being one of these two types of existence. That is because it neither is at an instant nor persists during a period of time. This is just like the one who says that either place does not exist, or it exists in place or at some definite point of place. That is because it does not have to exist either in place or at some definite limiting point of place, or [otherwise] not exist. The fact is that some things simply do not exist in place, and some simply do not exist in time. Place falls within the first class, and time within the second (you will learn this later).[4]

(2) [Next is the argument] that maintains that, if time exists, then time necessarily follows every motion, in which case a [private] time is consequent upon each motion.[5] The response is to distinguish between saying that time is a certain magnitude of each motion and saying that its individual existence is dependent upon each motion. Furthermore, there is a distinction between saying that *the time itself* depends upon motion as one of its accidents and saying that time depends upon *the motion itself* such that time is an accident of [that very motion], because the first sense is that certain things accidentally belong to a given thing, while the second is that certain things are consequent upon a given thing. As for the first, it is not a condition of what measures that it be something accidental to *and* subsist with the thing; rather, it might measure something distinct [from itself] by being brought next to and

4. While Avicenna does discuss various "modes" of existence throughout his *Ilāhiyāt* (see especially 1.5), I have not been able to find a discussion corresponding with the one promised here.

5. See 2.10.4.

موجـــودٌ لا فـــي آنٍ ولا في زمانٍ ولا له متى ، بل هو موجـــودٌ مطلقاً ، وهو نفس الزمان ، فكيف يكون له وجودٌ في زمان؟ فليس إذن قولهم إنَّ الزمان إمّا أنْ لا يكون موجوداً ، أو يكون وجوده في آنٍ ، أو يكون وجوده باقياً في زمانٍ قولاً صحيحاً ، بل ليس مقابل قولنا إنَّـــه ليس بموجود ، هو أنَّـــه موجودٌ في آنٍ أو موجودٌ باقيا في زمان ، بل الزمان موجودٌ ؛ ولا واحـــد من الوجودين ، فإنَّه لا في آنٍ ولا باقٍ فـــي زمان . وما هذا إلاّ كمَنْ يقول ، إمّا أنْ يكـــون المكان غير موجود ، أو يكون موجوداً في مكانٍ أو في حدّ مكان . وذلك لأنّه ليـــس يجب أنْ يكون إمّا موجوداً في مكان أو في حدّ مكان ، وإمّا غير موجود ، بل من الأشياء ما ليس البتة موجودا في مكان ، ومن الأشياء ما ليس البتة موجودا في الزمان ؛ والمكان من جملة القسم الأول ، والزمان من جملة القسم الثاني وستعلم هذا بعد .

(٢) والذي قيل ، إنّه إنْ كان للزمان وجود ، وجب أنْ يتبع كل حركةٍ زمانٌ ، فتكون كل حركة تســـتتبع زماناً . فالجـــواب عن ذلك أنَّه فرقٌ بين أنْ يقـــال إنَّ الزمان مقدارٌ لكل حركـــة ، وبين أنْ يقال إنَّ إنّيتـــه متعلقة بكل حركة . وأيضاً فرقٌ بين أنْ يقال إنَّ ذات الزمان متعلقة بالحركة على ســـبيل العروض لها ، وبين أنْ يقـــال إنَّ ذات الحركة متعلقٌ بها الزمان ، على ســـبيل أنَّ الزمان يعرض لها ، لأنَّ الأول معناه أنَّ أشـــياء تعرض لشـــيءٍ ، والثاني أنّ أشـــياء تســـتتبع شيئاً . أمّا الأول فلأنَّه ليس من شـــرط ما يقدّر أنْ يكون الشيء عارضاً لـــه وقائماً به ، بـــل ربمّا قدّر المباين بالموافاة والموازاة لما هو مباين له . وأمّا الثاني فلأنه ليس

juxtaposed with what is distinct from it. As for the second, it is not the case that when *the thing itself* depends upon the nature of a given thing, the nature of the thing must not be devoid of it. Now, what was demonstrated for us concerning time is only that it depends upon motion and is a certain disposition of it, while, concerning motion, it is only that every motion is measured by time. It does not necessarily follow from these two [propositions] that a given time is dependent upon and peculiar to each motion, nor that whatever measures something is an accident of it, such that time is, essentially in itself, an accident belonging to each motion. The fact is that time is not dependent upon the motions that have a beginning and ending. How could time be dependent upon them? If time were to belong to them, then it would be divided by two instants, and we precluded that. Certainly, when time exists by a motion having a certain description upon which the existence of time is truly dependent (where this motion is continuous and does not have actual extreme limits that delimit it), the rest of the motions will be measured by it.

(3) One might ask: Do you think that if that motion did not exist, time would vanish such that the other motions different from it would be without an *earlier* and a *later,* or is it as you said in the skeptical puzzles[6]—namely, that the body, in order[7] to exist as undergoing motion, does not need a motion of another body such that it might undergo motion, whereas it cannot not have a time? The response to that (and, in fact, it will be explained [later])[8] is that, if a certain circular body did not have a circular motion, then you could not impose directions on rectilinear [motions], and so there would be no natural rectilinear [motion], and so no forced [motion]. So it might be that a motion of some one body alone without any other bodies is impossible, even though the impossibility is

6. See 2.10.4.

7. Reading *fī an* with **T** and the Latin (*ut*) for both **Z**'s and **Y**'s *fī ān* (at an instant). First, orthographically the two phrases are practically identical, and, again, both **T** and the Latin are in agreement with me; second, philosophical sense seems to require reading *fī an,* for, while Avicenna does countenance motion at an instant, it is not clear what it would mean for a body to be at an instant, which seems to be an obvious category mistake.

8. See 3.13 (all).

إذا تعلّقت ذات شـــيء بطبيعة شـــيء يجب أنْ لا تخلو طبيعة الشـــيء عنه. ونحن إنّما تبرهـــن لنـــا من أمر الزمان أنّه متعلّق بالحركة وهيئةٌ لها، ومن أمر الحركة أنَّ كل حركة تقدّر بزمانٍ. وليس يلزم من هذين أنْ تكون كل حركةٍ يتعلق بها زمانٌ يخصّها، ولا أنَّ كل ما قدّر شـــيئاً فهو عارضٌ له، حتى يكون لكل حركةٍ زمانٌ عارض لذاته بعينه، بل الحركات التي لهـــا ابتداء وانتهاء لا يتعلق بها الزمان، وكيف يتعلـــق بها الزمان؟ ولو كان لها زمانٌ لكان مفصولاً بآنين، وقد منعنا ذلك. نعم، إذا وجد الزمان بحركةٍ على صفةٍ، يصلح أنْ يتعلق بها وجود الزمان، تقدّر به سائر الحركات، وهذه الحركة حركة يصح عليها الاستمرار ولا يتحدّد لها بالفعل أطراف.

(٣) فإنْ قال قائل: أرأيتَ؛ إنْ لم توجد تلك الحركة، أكان الزمان يُفقَد، حتى تكون حركات أخرى غيرها بلا تقدم ولا تأخّر؟ أو قيل ما ذكرناه في الشكوك، إنَّ الجسم في أن يوجد متحركاً غير محتاجٍ إلى حركة جسمٍ آخر؛ فيجوز أنْ يتحرّك، ولا يجوز أنْ لا يكون له زمان؟ فالجواب عن ذلك أنّه سيتبين لكَ أنَّه إنْ لم تكن حركة مستديرة لجرمٍ مستدير لم تفترض للمســـتقيمة جهات، فلم تكن حركات مستقيمة طبيعية، فلم تكن قسريةً، فيجوز أنْ تكون حركة جسمٍ من الأجسام وحدهّ - ولا أجسام أخرىّ - مستحيلة؛ وإنْ لم يكن

not [self-]evident. It happens that not every absurdity wears its impossibility on its sleeve; but, rather, there are many absurdities that are not obvious, and their impossibility becomes clear only though proof and demonstration. If we rely on the activity of the estimative faculty, then, when by its act of imagining we eliminate circular [motion] and affirm in our estimative faculty that a finite rectilinear [motion] is possible, a finite time is affirmed without objection in the estimative faculty. Our concern is not with this, however, but with what really exists. 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 the two bodies. It might depend on only one of them, measuring it as well as the other one that it is not dependent upon. Now, the continuity of motion is only because of the continuity of distance; and, because of distance's continuity, there comes to be a cause for the motion's being earlier and later, by which [that is, being earlier and later] the motion is a cause of its having a number, which is time. So motion is continuous in two ways—owing to the distance and owing to the time—whereas it in itself is only a perfection of what is in potency. Moreover, neither some continuity nor [the fact] that it is a measure enters into the essence of this account; for it is not understood, concerning a perfection of what is in potency or a transition from one thing to another or a passage from potency to actuality, that there is a certain interval between the start

بيّن الاستحالة. وليس كل محال يعرض يكون بيّن عروض الاستحالة، بل كثير من المحالات لا يظهر ولا تستبين استحالتها إلاّ ببيانٍ وبرهان. وأمّا إنْ اعتمدنا التوهم، فإذا رفعنا المستديرة بالتوهم وأثبتنا المستقيمة المتناهية في الوهم أمكن وثبت في التوهم زمانٌ محدودٌ لا يستنكره التوهم، وليس نظرنا في هذا، بل فيما يصح في الوجود. فالزمان إذن وجوده متعلق بحركةٍ واحدة يقدّرها ويقدّر أيضاً سائر الحركات التي يستحيل أنْ توجد دون حركة الجسم الفاعل بحركته الزمانّ – إلاّ في التوهمّ – وذلك كالمقدار الموجود في جسم يقدّره ويقدّر ما يحاذيه ويوازيه. وليس يوجب تقديرهّ – وهو واحدٌ بعينه للجسمينّ – أنَّ يكون متعلقاً بالجسمين، بل يجوز أنْ يتعلق بأحدهما، ويقدّره ويقدّر أيضاً الآخر الذي لم يتعلق به. والحركة اتصالها ليس إلاّ لأنَّ لامسافة متصلة، ولأنَّ اتصال المسافة يصير عِلّة لوجود تقدّمٍ وتأخرٍ في الحركة، تكون الحركة بهما عِلّة لوجود عددٍ لها هو الزمان. فتكون الحركة متصلةً من جهتين، من جهة المسافة ومن جهة الزمان، وأمّا هي في ذاتها فليست إلاّ كمالٌ ما بالقوة. وليس يدخل في ماهية هذا المعنى أيضاً اتصال أو ‹تقدير›، فإنَّه لا يفهم، من كمالٍ ما بالقوة أو انتقالٍ من شيءٍ إلى شيء ومن خروجٍ من قوةٍ إلى فعل، أنَّ هناك بُعْداً ما

and end that is continuous and is susceptible to the division to which the continuous is susceptible. The fact is [that] this is something known by a kind of reflection by which you learn that this account applies solely to continuous magnitude. So, if our estimative faculty were to imagine three atoms and something undergoing motion while it was at the middle one, then, during its motion from the first to the third, there would be at [the middle atom] a perfection of what is in potency; and yet it would not apply to something continuous. So the very fact that it itself is a perfection of what is in potency does not require that it be divisible. Thus, as long as certain other things are not known, neither will we know the necessity of that—namely, that [motion] applies only to something continuous that is susceptible to such-and-such a division. So continuity is clearly something that accidentally accompanies motion owing to either distance or time, and is not included in its essence. In summary, if we do not consider distance or time, we do not find that motion is continuous. Hence, whenever we need to measure motion, we need to mention distance or time.

(4) The proximate cause of time's continuity is the continuity of the motion through the distance, not the continuity of the distance alone; for, as long as there is no motion, the continuity of the distance alone will not necessitate the continuity of time. Similarly, there may be a certain distance over which the mobile is moved, pauses, and then begins again from there and moves until it is done—in which case the distance's continuity exists, but the time is not continuous. The fact is that the cause of time's continuity must be the distance through the intermediacy of the motion, because the continuity of time is the continuity of the distance on the condition that there be no rest in it. So the cause of time's continuity is one of motion's two continuities *qua* motion's continuity and is nothing but the continuity of the distance relative to the

بين المبتدأ والمنتهى، متصلاً قابلاً للقسمة التي يقبلها المتصل، بل هذا يعلم بنوعٍ من النظر؛ تعلم به أنَّ هذا المعنى يكون به على المقدار المتصل لا غير. فلو أنّا توهمنا ثلاثة أجزاء لا تتجزأ، وكان المتحرّك، حين يتحرك في الأوسط منها، لكان فيه عند حركته من الأول إلى الثالث كمالٌ ما بالقوة ولم يكن على متصل. فنفس كونها حقيقة كمال ما بالقوة لا يوجب أنْ تكون منقسمة، ولذلك ما لم تعرف أشياء أخرى؛ لا نعرف وجوب ذلك، وأنّها لا تكون إلاّ على متصلٍ قابلٍ للقسمة كذا. فبيّنٌ أنَّ الاتصال أمرٌ عارض يلزم الحركة من جهة المسافة أو من جهة الزمان لا يدخل في ماهيتها، وبالجملة فإنا لو لم نلتفت إلى مسافة أو إلى زمان لم نجد للحركة اتصالاً، ولذلك متى احتجنا إلى تقدير الحركة، احتجنا إلى ذكر مسافةٍ أو زمان.

(٤) وأمّا اتصال الزمان؛ فعلّته القريبة اتصال الحركة بالمسافة لا اتصال المسافة وحدها. فإنَّ اتصال المسافة وحدها، ما لم تكن حركة موجودة، لا توجب اتصال الزمان وجدها، كما تكون مسافة يتحرك فيها المتحرّك ويقف، ثم يبتدىء من هناك ويتحرّك حتى يفنيها. فيكون هناك اتصال المسافة موجوداً؛ ولا يكون الزمان متصلاً، بل يجب أنْ تكون عِلّة اتصال الزمان اتصال المسافة بتوسط الحركة. ولأنَّ اتصال الزمان اتصال المسافةّ – بشرط أنْ لا يكون فيها سكونٌ، فعِلّة اتصال الزمان أحد اتصالي الحركة من جهة ما هو اتصال الحركة، وليس هذا إلاّ اتصال المسافة مضافة إلى الحركة، وهذا لا يكون وهناك

motion, where there will not be this [continuity relative to the motion] wherever there is rest. This continuity is not the cause of time's becoming continuous, but for making time exist. [That] is because time does not accidentally have the continuity proper to it, but it is itself that continuity. So, if there were something that gave time continuity (not meaning that time itself is one and the same as the continuity), then the continuity would be accidental to time and not its substance. Just as we say that a certain color was a cause of color or a certain heat was a cause of heat—by which we mean that they are a cause of a color or heat's existing, not of the quality's being [color or] heat—so, likewise, we say that a continuity is a cause of a continuity's existing, not that it is a cause of that thing's becoming a continuity. The fact is that it is essentially a continuity, just as the former is essentially heat.

(5) One should not say: We understand motion's having continuity only because of distance or time. Now, you yourselves denied that spatial continuity is a cause of time; and you cannot say that temporal continuity is a cause of time and then go on and say that the continuity of motion is a cause of time, when there is no continuity other than the former two. Our response is to say that we do, in fact, make spatial continuity a cause of time, but just not absolutely, but only inasmuch as there is some motion;[9] and so, by means of [the spatial continuity], the motion is continuous, where considering the continuity of the distance by itself is one thing and considering it joined to motion is another. So know now that distance's continuity inasmuch as it belongs to motion is a cause of time's existence that is itself something continuous or a continuity, not that it is

9. Reading *sāra li-ḥarakah* with **Z** and the Latin's dative of the possessor *motui* for **Y**'s *sāra bi-ḥarakah* (come to be through motion); it is not clear what if any preposition is used in **T**.

ســكون. وليس هذا الاتصال عِلّة لصيرورة الزمــان متصلاً؛ بل لإيجاد الزمان، فإنّه ليس الزمان شيئاً يعرض له الاتصال الخاص به، بل هو نفس ذلك الاتصال. فلو كان شيء يجعل للزمــان اتصالاً، لا على معنى اتحاد ذات الزمان المتصل، لكان الاتصال عارضاً للزمان لا جوهر الزمان. وكما أنّا نقول إنَّ لوناً كان سبب لونٍ، أو حرارة كانت سبب حرارة، ونعني بذلك أنّها كانت ســبباً لوجود اللون أو الحــرارة، لا لكون الكيفية حرارة، كذلك نقول إنَّ اتصالاً هو ســببٌ لوجود اتصال، لا أنّه سببٌ لصيرورة ذلك الشيء اتصالاً؛ فإنّه اتصال بذاته، كما أن تلك حرارة لذاتها.

(٥) وليس لقائلٍ أنْ يقول إنّا لا نفهم للحركة اتصالاً إلاّ بسبب المسافة أو الزمان، وأنتم أبيتم أنْ يكون الاتصال المســافي سبباً للزمان، ولا يجوز أنْ تقولوا إنَّ الاتصال الزماني هو سبب الزمان، ثم تقولون إنَّ اتصال الحركة سببٌ للزمان، وليس هناك اتصال غير هذين. فإنّا نجيبه ونقول: إنّا نجعل الاتصال المسافي سبباً للزمان ولكن لا مطلقاً بل من حيث صار لحركةٍ فصارت الحركة بها متصلة، واعتبار اتصال المســافة بنفسه شيء، واعتباره مقارناً للحركة شــيء. فافهم الآن أن اتصال المســافة من حيث هي للحركة عِلّة لوجود الزمان، الــذي هو بذاته متصل أو اتصال، لا أنّه عِلّة لكون ذات الزمان متصلاً، فذلك أمرٌ لا عِلّة

a cause of the time itself being something continuous (for that is something that has no cause). So, by this, it turns out that time is something accidental to motion and is not its genus or difference or one of its causes, and yet it is still something necessarily accompanying it that measures every single instance of it.

(6) Recognizing what it is *to be in time* also belongs to a discussion of things temporal. So we say: Something is in time precisely according to the preceding principles—namely, it is understood as having earlier and later[10] parts. Now, the whole of what is understood as having earlier and later parts is either motion or something that undergoes motion. As for motion, that [namely, being earlier and later] belongs to it on account of its substance, whereas that belongs to the mobile on account of motion. Because it may be said of the kinds, parts, and extremities that they are in something, the earlier, later, and present instant, as well as hours and years, are said to be in time. So the present instant is in time as the unit is in number, and the earlier and later are like the even and odd in number, while hours and days are like two, three, four, and ten in number. Motion is in time as things that happen to be ten are in ten-ness, while the mobile is in time like the subject of the ten things that are accidental with respect to the ten-ness. Also, because the estimative faculty might imagine rest either as something continuing to go on forever *or* inasmuch as it accidentally happens to have an earlier and later [aspect]—namely, because of two motions that are [as it were] on either end—[and] since rest is a privation of motion in that which is disposed to being moved, not the privation of motion absolutely, it is not unlikely that there be [a rest] between two motions, and so something like this latter [type] of rest has an *earlier* and a *later,* in a certain way, and so the two ends of the rest enter into time accidentally. Also, changes that resemble local motion in that they advance from one limit to [another] limit (like heating going from one limit to another) enter into time on account of the fact that they have an earlier and later [aspect]. So, when

10. Reading *al-muta'khkhir* with **Z**, **T**, and the Latin (*posterius*), which is (inadvertently) omitted in **Y**.

لـــه . فبهذا يصح أنَّ الزمان أمر عارض للحركة وليس بجنس ولا فصل لها ولا ســـبب من أسبابها ، بل أمر لازم لها يقدّر جميعها .

(٦) ومن المباحث في أمر الزمان ، أنْ نعرف كون الشيء في الزمان فنقول إنّما يكون الشـــيء في الزمان على الأصول التي سلفت ، بأنْ يكون له معنى المتقدّم والمتأخر ، و<كل ما> له في ذاته معنى المتقدّم والمتأخر ، فهو إمّا حركة وإما ذو حركة . أمّا الحركة فذلك لها من تلقاء جوهرها ، وأمّا المتحرّك فذلك له من تلقاء الحركة . ولأنّه قد يقال لأنواع الشـــيء ولأجزائه ولنهاياته إنّها شيء في الشيء ؛ فالمتقدّم والمتأخر والآن أيضاً والساعات والسنون يقال إنّها في الزمان . فالآن في الزمان كالوحدة في العدد ، والمتقدّم والمتأخر كالزوج والفرد في العدد ، والســـاعات والأيام كالإثنين والثلاثة والأربعة والعشـــرة في العدد ، والحركة في الزمان كالعشرة الأعراض في العشرية ، والمتحرك في الزمان مثل الموضوع للأعراض العشرة في العشـــرية . ولأنَّ السكون إمّا أنْ يتوهم مستمراً ثابتاً أبداً ؛ وإمّا أنْ يتوهم بحيث يعرض له تقدّمٌ وتأخرٌ بالعرض ؛ وذلك بســـبب الحركتين اللّتين تكتنفانه ، إذ الســـكون عدم حركةٍ فيمـــا من شـــأنه أنْ يتحرّك ، لا عدم الحركة مطلقاً ؛ فلا يبعـــد أنْ يكون بين حركتين . فمثل هذا السكون لهّ – بوجهٍ ماّ – تقدّم وتأخر فهو أدخل وجهي السكون في الزمان دخولاً بالعرض . والتغيّرات التي تشـــبه الحركة المكانية في أنّها تبتدىء من طرف إلى طرف ، كما يأخذ التسخّن من طرفٍ إلى طرف ، فهي داخلة في الزمان ، لأجل أنَّ لها تقدّماً وتأخّراً .

a certain change wholly and completely overtakes what undergoes the change and then progressively increases or decreases, the continuity it has is only temporal continuity, for it has an earlier and later in time only.[11] Thus,[12] it does not have what makes time, which is the continuity of motion along a distance or something similar to distance; nonetheless, it possesses earlier and later parts and so is dependent upon time. So it exists after the existence of time's cause (that is, the motion with respect to which there is a transition). So these changes and spatial motions share the common feature that they are measured by time, while not sharing in common as their effect that time depends upon them for its existence, for this belongs to spatial [motions] alone. Now you have learned our intention concerning the account of spatial motions.

(7) The things in which there is neither an *earlier* nor a *later* in some way are not in time, even if they are together with time—as, for example, the world, for it is together with a mustard seed but is not in the mustard seed.[13] If, from one perspective, something has an earlier and later [aspect] (as, for example, from a certain perspective it is undergoing motion), whereas it has another perspective that is not susceptible to *earlier* and *later* (for example, from a certain perspective it is a being and substance), then it is not in time from the perspective that it is not susceptible to an *earlier* and a *later*, while it is in time from the other. The thing existing together with time, but not in time, and so existing with the whole of uninterrupted time is the *everlasting*, and every one and the same uninterrupted existence is in the everlasting. I mean by *uninterrupted* that it exists the very same, just as it is, at every single moment continuously. So it is as if the everlasting is a comparison of the permanent to the impermanent, and the relation of this simultaneity to the everlasting is like the relation of that instant of time to time. The relation of some permanent

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11. Reading with **Z**, **T**, and the corresponding Latin *fa-inna lahu taqadduman wa-ta'khkhur fī al-zamān faqaṭ* (for it has an earlier and later in time only), which is (inadvertently) omitted in **Y**.

12. Reading *li-dhālika* with **Z**, **T**, and the Latin (*quia*) for **Y**'s *ka-dhālika* (likewise).

13. Cf. Aristotle, *Physics* 4.12.221a21–23 for a similar example.

فـإذا كان تغيّرٌ ما يأخذ المتغيّر كله جملة، فيذهب إلى الاشـتداد أو التنقّص؛ فإنَّ له من الاتصـال الاتصال الزمانـي فقط، فإن له تقدما وتأخرا في الزمـان فقط. ولذلك ليس له فاعل الزمان الذي هو اتصال الحركة في مسافةٍ أو شبه مسافة، وهو مع ذلك ذو متقدّم أو متأخّر فهو متعلّق بالزمان، فوجوده بعد وجود علّة الزمان، وهو الحركة التي فيها انتقال. فهذه التغيّرات تشارك الحركات المسافية في أنّها تتقدر بالزمان، ولا تشاركها في أنَّ الزمان متعلّق الوجود بها معلول لها، فإنَّ هذا للمسافيات وحدها، وقد علمت غرضنا في قولنا الحركات المسافية.

(٧) وأمّا الأمور التي لا تقدّم فيها ولا تأخر بوجهٍ، فإنّها ليست في زمان وإنْ كانت مـع الزمـان؛ كالعالم فإنّه مع الخردلة وليس في الخردلة. وإنْ كان شـيء له من جهةٍ تقدّم وتأخّـر، مثلاً من جهة ما هو متحـرّك، وله جهة أخرى لا تقبل التقدّم والتأخر، مثلاً من جهـة مـا هو ذات وجوهر، فهوّ – من جهةٍ ما – لا يقبل تقدّماً وتأخراً ليس في زمان، وهو من الجهة الأخرى في الزمان. والشيء الموجود مع الزمان وليس في الزمان، فوجوده مع اسـتمرار الزمان كله هو الدهر. وكل اسـتمرار وجودٍ واحدٍ فهو في الدهر، وأعني بالاسـتمرار وجوده بعينه، كما هو، مـع كل وقت بعد وقتٍ على الاتصال، فكأن الدهر هو قياس ثبات إلى غير ثبات. ونسبة هذه المعيّة إلى الدهر كنسبة تلك الفينة إلى الزمان،

things to others, and the simultaneity that belongs to them from this perspective, is a notion above the everlasting. It seems more worthy to be called *eternity.* So eternity is a whole uninterrupted existence in the sense of the absolute negation of change without a comparison of one moment after another. How odd is the claim of those who say that the everlasting is the duration of rest, or it is a time not numbered by motion,[14] when no *duration* or *time* is understood that does not, in itself, involve a *before* and an *after.* When there is a *before* and an *after* in it, there must be a renewal of some state (as we said),[15] and so it will not be devoid of a motion. Also, being earlier and later exist with respect to resting, although only in the way we mentioned previously.[16]

(8) Now, time is not a cause of anything; but, when something either comes to exist or ceases to exist with the passing of time and no obvious cause is seen for it,[17] the common man attributes that to time, since he either does not find or is not aware of any other conjoined thing except time. So, if the thing is praiseworthy, he praises time; and if it is blameworthy, he blames it. Still, things that come to exist have, for the most part, obvious causes, while ceasing to be and corruption have hidden causes; for the cause of the building is known, whereas the cause of its decline and dilapidation is, for the most part, unknown. The same will hold if you wish to examine many particular cases inductively. Therefore, it appears that most of what is attributed to time involves cases[18] of ceasing to be and corruption, like neglect, old age, decline, the exhaustion of the material, and the like. That is why the common man came to love blaming and speaking ill of time.

(9) Time has certain accidental properties and features indicated by certain expressions, which we ought to mention and enumerate. Among [the temporal expressions] is *now,* which is sometimes understood to be

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14. The position would seem to be that of Abū Bakr Muḥammad al-Rāzī, who does distinguish between "duration" (*muddah,* which is the same term that Avicenna uses here), which is eternal, and "time," (*zamān,* which again is the same term that Avicenna uses here), which is numbered motion and created; see al-Rāzī, *Opera philosophica fragmentaque quae supersunt,* 195–215.

15. See 2.1.6.

16. See par. 5.

17. Reading *lam yura lahu* with **T**, the Latin (*non apparet*) and most MSS consulted by **Y** for **Y**'s *tuzilhu* (to cause it to disappear); **Z** has *lam nara lahu* (we do not see it).

18. Secluding **Y**'s suggested *arbaᶜa* (four).

ونسبة الأمور الثابتة بعضها إلى بعض، والمعيّة التي لها من هذه الجهة هو معنى فوق الدهر. ويشبه أن يكون أحقّ ما سمي به السرمد. فكل استمرار وجودٍ، بمعنى سلب التغيّر مطلقاً من غير قياسٍ إلى وقتٍ فوقتٍ؛ فهو السرمد. والعجب من قول مَنْ يقول إنَّ الدهر مدّة السكون، أو زمان غير معدودٍ بحركةٍ، ولا تُعقل مدّة ولا زمان ليس في ذاته قبْل ولا بَعْد. وإذا كان فيه قبْل وبَعْد وجب تجدّد حالّ – على ما قلنا – فلم يخل من حركة، والسكون يوجد فيه التقدّم والتأخّر، على نحو ما قلنا سابقاً لا غير.

(٨) والزمان ليس بعلّةٍ لشيءٍ من الأشياء، لكنه إذا كان الشيء مع استمرار الزمان، يوجد أو يعدم، ولم يُر له علّة ظاهرة، نسبَ الناس ذلك إلى الزمان، إذ لم يجدوا هناك مقارناً غير الزمان، أو لم يشعروا به. فإنْ كان الأمر محموداً مدحوا الزمان، وإن كان مذموماً ذمّوه. لكن الأمور الوجودية، في أكثر الأمر، ظاهرة العِلل، والعدم والفساد خفي العلّة؛ فإن سبب البناء معقول، وسبب الانتقاص والاندراس مجهول في الأكثر. وكذلك إنْ شئت استقريت جزئيات كثيرة، فيعرض لذلك أنْ يكون أكثر ما ينسب إلى الزمان هو من الأمور العدمية الفسادية؛ كالنسيان والهرم والانتقاص وفناء المادة، وغير ذلك، ولذلك صار الناس يولعون بذم الزمان، وهجوه.

(٩) والزمان له عوارض وأمور تدل عليها ألفاظٌ، فحري بنا أنْ نذكرها ونعدّها. فمن ذلك الآن؛ وقد يفهم منه الحدّ المشترك بين الماضي والمستقبل الذي فيه الحديث لا غيره.

the common limiting point between the past and future in which there is nothing but the present. At other times, it is understood to be every common division, regardless of whether it is in the past or future. At still other times, it is understood to be time's limit, even though it does not indicate a common point and, instead, permits the estimative faculty to make it a dividing rather than connecting limit (although it is known from external considerations that it is inevitably something common and cannot be a division—that is, by a kind of reflection other than conceptualizing the meaning of the expression [*now*]). They also might use *now* for a short period of time very close to the present *now*. An independent confirmation of this use is that all time comes to be from [the now], for [time] necessarily has two limiting points that belong to it as two instants posited in the mind, even if we are not aware of it. These two instants are simultaneously in the mind as necessarily present; however, in some cases, the mind is aware that one instant is earlier in existence and the other later, owing to the distance between the two, just as one is aware of the earlier instant of two instants [that delimit] the hour or day. In other cases, the two instants are so close that, as long as the mind does not rely on reflection, it is not immediately aware that there is something in between them. In that case, the mind will perceive the two as if they occur simultaneously and are a single instant, although the mind will deny that on the most rudimentary reflection considering the implications. Still, until the mind thinks the matter over, it is as if the two instants occur simultaneously.

وقد يفهم منه كل فصل مشـــترك ولو في أقســـام الماضي وأقســـام المستقبل، وقد يفهم منه طرف الزمان وإنْ لم يدل على اشـــتراك، بل كان صالحاً لأنَّ يجعل طرفاً فاصلاً في الوهم غير واصلٍ، وإنْ كان يعلم من خارج المفهوم أنّه لا بُدّ من أنْ يكون مشـــتركاً، ولا يمكن أن يكـــون فصلاً وذلك بنوعٍ من النظر غير تصـــور معنى لفظه. وقد يقولون الآن لزمانٍ قريبٍ جداً من الآن الحاضر قصير؛ وتحقيق ســـبب هذا القول هو أنَّ كل زمان يحدث عنه، فله حدّان لا محالة هما آنان يفترضان في الذهن لهّ – وإنْ لم نشعر به. وهذان الآنان يكونان في الذهن حاضرين معاً لا محالة، لكنه قد يشـــعر الذهن، في بعض الأوقات، بتقدم آنٍ في الوجود وتأخّر آن، وذلك لبعد المسافة بينهما، كما نشعر بالآن المتقدّم من آني الساعة واليوم. وفي بعضها يكون الآنان من القرب بحيث لا يشـــعر الذهن بما بينهما في أول وهلةٍ ما لم يستند إلى استبصار، فيكون الذهن يشعر بهما كأنهما وقعا معاً؛ وكأنهما آنٌ واحد، وإنْ كان التعقّب والاســـتقصاء يمنع الذهن عن ذلك فـــي أدنى تأمل، ولكن إلى أنْ يراجع الذهن نفسه يكون الآنان كأنهما وقعا معاً.

(10) Also among the temporal expressions is *suddenly,* which is a relation of a thing to its time occurring in a period of time that is so brief that one is unaware of its measure; and, additionally, the thing was not expected to occur. There is, again, the expression *all at once,* which indicates that something happened at an instant and also frequently indicates the opposite of *gradually* (but we have already commented on that).[19] Another expression is *right away,* which signifies some future instant that is close to the present instant and [such that] the measure of the interval between them is so short as to be negligible. Among them is also *just before,* which indicates a relation to some past instant that is close to the present instant, but not [so close] that one is unaware of the duration between them; and *just after* in the future is the same *mutatis mutandis* as *just before* in the past. *Earlier* is either with respect to the past, in which case it indicates what is farther away from the present instant (and *later* indicates its opposite), or it is with respect to the future, in which case it indicates what is closer to the present (and, again, *later* indicates its opposite). When they are taken absolutely, what is earlier is the past, and what is later is the future. The *ancient*[20] is a time that, between it and now, is considered to be extremely long relative to the time's opposing[21] limits. Moreover, there is also the ancient in time absolutely, which, in fact, is that whose time has no beginning.[22]

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19. See 2.12.3.

20. The translation "ancient" for the Arabic *qadīm* is not an entirely happy one, for, while it perfectly captures one sense of that Arabic term, it fails to do justice to the philosophical connotation attached to that term that expresses the (purported) pre-eternity or everlasting nature of the cosmos.

21. Reading *mutaqābilah* with **Y** and the Latin (*oppositorum*); **Z** has *mutaʿālamah* (known), and **T** is not completely clear, although it seems to be *mutaqābilah.*

22. Secluding **Y**'s *Allah aʿlam* (God knows best), since it is does not appear in the majority of the MSS (in fact none of the MSS consulted by **Z**), nor is it found in **T** or the Latin.

(١٠) ومـــن الألفاظ الزمانية قولهم بغتة؛ وبغتة هو نســـبة الأمر الواقع في زمانٍ غير مشـــعورٍ بمقداره قصراً إلى زمانه، بعد أنْ لا يكون الأمر منتظراً متوقعاً. ومن هذه الألفاظ قولهم دفعة؛ وهو يدل على حصول شيء في آنٍ، وقد يدل على مقابل قولنا قليلا قليلا، وقد شـــرحنا ذلك. ومن هذه الالفاظ قولهم هو ذا وهو يدل على آنٍ قريبٍ في المســـتقبل من الآن الحاضر، لا يشعر بمقدار البُعْد بينهما قصراً شعوراً يعتد به. ومن ذلك قولهم قُبيل وهو يدل على نســـبةٍ إلى آنٍ في الماضي قريبٍ مـــن الآن الحاضر، إلاّ أنَّ المدة بينهما غير مشـــعور بها، ويُعيد في المســـبقل نظير قُبيل في الماضي. والمتقدم، أما في الماضي فيدل على ما هو أبعد من الآن الحاضر، والمتأخر على مقابله، وأما في المستقبل فيدل على ما هو أقرب من الحاضـــر، والمتأخر على مقابله. وأما إذا أُخذ مطلقاً فالمتقدم هو الماضي، والمتأخّر هو المستقبل. والقديمُ زمانٌ يستطال ما بينه وبين الآن بالقياس إلى الحدود المتقابلة للزمان. وأيضاً القديم في الزمان مطلقاً وبالحقيقة هو الذي ليس لزمانه ابتداء.

THIRD BOOK:
CONCERNING WHAT BELONGS TO NATURAL THINGS OWING TO THEIR QUANTITY

Chapter One

The manner of investigation peculiar to this book

(1) Natural things are bodies and the states of bodies, and both are mixed up with quantity in some way. The quantity belonging to bodies is dimensions, while that which belongs to the states of bodies is, for example, time and certain other things that follow upon [bodies], whether essentially or accidentally. Quantity follows upon the states of bodies owing to either the bodies' quantity, which belongs to them or is together with them; or the time, just as it follows upon motion; or the relation to a certain number or its measure that arises from them. The latter is the

المقالة الثالثة

في الأمور التي للطبيعيات من جهة ما لها كم

<الفصل الأول>

في كيفية البحث الذي يختص بهذه المقالة

(١) إنَّ الطبيعيات هي أجسامٌ وأحوال الأجسام، وللكمية مخالطة ما للصنفين. فالكميّة التي للأجسام هي الأقطار، وأما التي لأحوال الأجسام فمثل الزمان، ومثل أشياء أخرى تلحقها بالذات أو بالعرض. وأحوال الأجسام يلحقها الكم؛ إمّا من جهة كميّة الأجسام التي لها أو معها، وإمّا من جهة الزمان كما يلحق الحركة، وإمّا من جهة القياس إلى عددٍ ما يصدر عنها أو مقداره، وهذا أبعد أنحاء لحوق الكم، وهذا كما يقال قوة

most far-reaching manner of including quantity and is like saying that a power is finite or infinite. The states that are considered to belong to bodies from their quantity are either certain states that, in fact, involve bodies taken individually (as, for instance, the state of the finite and infinite in magnitude and the finite and infinite with respect to division and smallness), or certain states that involve an interrelation among [bodies] (as, for instance, succession, contiguity, following immediately, continuity, and what is analogous). As for the states of bodies under which motion and time fall, [what] is considered concerning the states of their quantity is whether [motion and time] had a beginning and will come to an end or are not like that and, instead, are infinite. As for [the states of bodies] under which powers fall, [what] is considered concerning the states of the quantities in them is how they might correspond with finite and infinite things and how that could be in them.

متناهيــة وقوة غير متناهية. والأحوال التي تعتبر للأجســام من كميتها ، إمّا أحوال يصح أنْ تكون بانفراد جســم جســم مثل حال التناهي واللاتناهي في العظم، وحال التناهي واللاتناهي في الانقســام والصغر ، وإمّا أحوالٌ تكون بقياس بعضها إلى بعض؛ مثل التتالي والتماس والتشافع والاتصال، وما يجرى مجراها . وأمّا أحوال الأجسام؛ فالحركة والزمان منهــا تعتبر من أحوال كميتها ، أنهما هل لهما ابتداءان وهل ينقطعان أو ليس كذلك؛ بل لا نهايــة لهما . وأمّا القوى منها فتعتبر من أحوال الكميات فيها أنّها كيف تحاذي أموراً ذوات نهايةٍ أو غير ذوات نهاية، وكيف يمكن ذلك فيها .

Chapter Two

On succession, contiguity, following immediately, interpenetration,[1] cohesion, continuity, intermediate, limit, being together, and being separate

(1) Before we speak about finite bodies and their states with respect to largeness, we should speak about the finite and infinite with respect to smallness and divisibility; and before that we should define *succession, contiguity, interpenetration, following immediately, cohesion,* and *continuity,* as well as defining *intermediate, limit, together in place,* and *being separate.* Now, we say that two things *follow in succession* when there is nothing generically like the two between the first one and the second as, for example, houses in succession, for the one following the first in succession is that one between which it and the first there is nothing generically like them. Sometimes they are alike in species—as for instance, one house after another. [At other times,] they are different in species as, for instance, a line[2] consisting of a man, a horse, a boulder,[3] and a tree. In that case, they are found following in succession, not *qua* varying in species, but inasmuch as they are made up of something common, whether essentially (like corporeality) or accidentally (like whiteness or standing in a

1. "Interpenetration," which is part of the chapter title in both **Y**'s edition and **T**, does not appear in the title in **Z**'s edition or the Latin.

2. Reading *ṣaff* with **Z** and **T** for **Y**'s *ṣanf* (kind); the Latin omits the term altogether.

3. The Arabic *jabal,* which appears in **Y**, **T**, and the Latin (*mons*), most commonly means "mountain" but can also mean any rocky elevation regardless of how small. It can even mean "rock" or "stone"—hence my translation, "boulder." For this use of *jabal,* see Wright *s.v.* Alternatively, **Z** reads *ḥabl* (rope).

<الفصل الثاني>

في التتالي والتماس والتشافع والتداخل والتلاصق والاتصال والوسط والطرف ومعاً وفرادى

(١) وقبل أنْ نتكلم في أمر تناهي الأجسام وأحوالها في الأعظام، فحقيق أنْ نتكلم في تناهيها ولا تناهيها في الصغر والانقسام. وقبل ذلك، فحقيق بنا أنْ نعرف التتالي والتماس والتشافع والتداخل والتلاصق والاتصال، وأنْ نعرف الوسط والطرف، وأنْ نعرف معاً في المكان وفرادى. فنقول: إنَّ المتتالين هما اللذان ليس بين أولهما وثانيهما شيء من جنسهما، مثل البيوت المتتالية، فإنَّ التالي منهما للأول هو الذي ليس بينه وبين الأول شيءٌ من جنسهما. وقد تكون متفقة النوع مثل بيت وبيت، وتكون مختلفة النوع مثل صف من إنسانٍ وفرسٍ وجبلٍ وشجرة، فحينئذ لا توجد متتالية؛ من حيث هي مختلفة النوع، بل من حيث يجمعهما أمرٌ عامٌ ذاتي كالجسمية أو عرضي كالبياض، أو القيام صفاً أو

line, or ascending in size). When there is nothing between them that is said to designate some common feature,[4] then it is said of the one taken to be second that this one following in succession is the co-mate of the other. For example, when these things are taken as individuals ascending [in size], the horse follows the man in succession, and [then] the boulder, and [then] the tree. If they are taken inasmuch as they are animals, then the horse follows the man in succession, while the boulder and tree do not follow in the succession. If they are taken *qua* man, then there is nothing following the individual man in succession; there is just the man.

(2) Something is *contiguous* when, between its limit and the limit of that with which it is said to be contiguous, there is nothing possessing a position. So two things are contiguous whose limits are together, not with respect to place, but with respect to the denotable position that occurs. [That] is because limits are not at all in place; but they do have some position, just as the point has a certain position, where *position* is something such that one can denote its being in some specific location. [In the case of] two contiguous things, this denoting applies to their two limits being together.

(3) When two things coincide with each other such that one trespasses the other's limit to the point that the one completely coincides with the other entity, then that is not an instance of contiguity but, rather, *interpenetration.* Indeed, interpenetration is nothing but the thing itself wholly entering into the other, where that entering is precisely that one of the two coincides with the whole of that which it is said to interpenetrate. If they are exactly equal, then there will be nothing of the one that does not coincide with the other; while, if one of them exceeds [the other], then it will not enter into the whole of it but will enter whatever

4. **Y** reads an *illā* (except), which does not appear in **Z**, **T**, or the Latin. It has been omitted in the translation; but, if retained, the sense would be "when nothing is predicated of [what] is between them except something considered to be general."

الشـــخوص حجماً . فإذا لم يكن بينهما من المقـــول عليه الأمر المعتبر عاماً ، قيل للمأخوذ منهما ثانياً إنَّ هذا يتلو صاحبه . مثلاً ، إذا أُخذت هذه الأشياء ، من حيث هي أشخاص منتصبة ، كان الفرس يتلو الإنســـان والجبل والشجرة . وإنْ أُخذت من حيث هي حيوانات كان الفرس يتلو الإنسان ، ولم يكن الجبل والشجرة يتلوان ، وإنْ أُخذت من حيث هي ناس لم يكن هناك شيء يتلو شخص الإنسان إلاّ الإنسان .

(٢) وأمّا المماس فهو الشـــيء الذي ليس بين طرفه وبين طرف ما قيل انّه مماسٌ له ، شـــيء ذو وضع . فالمتماسان هما اللذان طرفاهما معاً لا في المكان ، بل في الوضع الواقع عليه الإشـــارة ، فإنَّ الأطراف ليســـت في مكانٍ البتة ، ولها وضع مـــا ، والنقطة أيضاً لها وضع ما . والوضع أنْ يكون الشـــيء يحيث يمكن أنْ يشـــار إليه أنّه في جهةٍ مخصوصة ، والمتماسان تقع هذه الإشارة على طرفيهما معاً .

(٣) وإذا كان شيئان يتعدى لقاء كل واحد منهما طرف الآخر حتى يلقى ذات الآخر بأسره ، لم يكن ذلك مماسّة ، بل كان مداخلة . فإنّه ليست المداخلة إلاّ أنْ تدخل كلية ذاتٍ في الآخر ، وليس ذلك الدخول إلاّ أنْ يلقى أحدهما كل ما قيل إنّه مداخل فيه . فإنْ ساواه كان لا شـــيء مـــن هذا إلاّ وهو ملاقٍ للآخر ، وإن فضـــل أحدهما لم يكن داخله كله ، بل

[part] of it that it exactly equals. The true nature of interpenetration, then, is that nothing belongs to this object that does not coincide with the other object, and so nothing is observed that does not coincide with the other. Now, [although] interpenetration necessarily entails that two interpenetrating things be in a single place, [that] is not what is understood by [*interpenetration*]; rather, what is understood is *to encounter completely*. When one thing completely coincides with another and the other does not exceed it, then what[ever] coincides with the other will coincide with the first. Otherwise, part of the first would not be found in it with the encounter; but it was said that the first encountered the whole of it and none of the second exceeded it, which is a contradiction. So two things that encounter [each other] completely are [such that] [(1)] anything encountering one of the two encounters the other; [(2)] one of them does not hinder [something's] being contiguous with the other;[5] and [(3)] joining a thousand [interpenetrating things] does not increase the size (where this is the way a thousand points would be joined). When one thing encounters another, and what is encountered coincides with something that does not coincide with the first thing, then there will be a certain excess in [that second thing] itself beyond [that part] that is coinciding with the first thing, where the second encountered thing provides that excess as something unoccupied as a result of the original encounter.[6] All of these things are evident to the intellect. Likewise, when the thing is occupied by the encounter such that the encounter prevents it from encountering something else, then it occupies either the whole of it or part of it. If it [occupies] the whole of it, then no third thing is contiguous with it, while, if it [occupies] part of it, neither the occupation nor the contiguity occurs completely.

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5. **Y** (inadvertently) omits the phrase *lā yaḥjubu wāḥid minhumā ʿan mumāssah al-ākhar,* which appears in **Z**, **T**, and the Latin (*et unum non prohibet contingi aliud*).

6. Unfortunately, the Arabic is at least as awkward as the English, although Avicenna's point is relatively clear. The whole of his point seems to be thus: if, for example, a smaller disk is imposed upon a larger one, the part of the larger disk that is not covered by the smaller one represents the excess.

داخله ما يساويه منه. فحقيقة المداخلة أنْ يكون لا شيء من ذات هذا؛ إلاّ ويلقى ذات الآخر، فلا يتراءى شيءٌ لا يلقى الآخر. وأمّا كون المتداخلين في مكانٍ واحد، فهو أمر يلزم المداخلة وليس هو مفهومها، بل مفهومها الملاقاة بالأسر. وإذا كان شيء يلقى الآخر بالأسر والآخر لا يفضل عليه؛ فما يلقى الآخر يلقى الأول، وإلاّ فسيوجد فيه بالملاقاة شيءٌ خالياً عن الأول، وقيل إنَّ الأول لاقاه كله ولم يفضل من الثاني عليه، هذا خُلْف. فالمتلاقيان بالأسر، أي شيءٍ لاقى أحدهما، لاقى الآخر، ولا يحجب واحد منهما عن مماسة الآخر، ولا يزداد الحجم باجتماع ألفٍ منها، وهذا هو سبيل ألف نقطةٍ لو اجتمعت. وإذا كان شيء يلاقي شيئاً، ويلقى الملاقي شيءٌ لا يلقى الأول، فهناك فضل في ذاته عمّا لاقى الأول، وذلك الفضل يناله الملاقي الثاني فارغاً عن الملاقاة الأولى. وهذه الأشياء كلها بيّنة في العقل. وكذلك إذا كان الشيء مشغولاً بالملاقاة، حتى تكون الملاقاة تمنعه عن ملاقاة شيء آخر، فإمّا أنْ يكون مشغولاً كله أو بعضه. فإنْ كان كله لم يماسّه ثالث، وإنْ كان بعضه فلا يكون – لا الشغل ولا المماسّة – شغلاً بالأسر، أو مماسّة بالأسر،

(4) These premises are self-evident, and whatever is alleged to refute them refutes premises more general than they are. For instance, it is said that the whole of something, without being divided, might be known relative to and vis-à-vis one thing, while being unknown relative to and vis-à-vis another thing;[7] and something might be to the right of something and not to the right of something without being divided. Likewise, something, without being divided, might be completely occupied relative to one thing, while completely unoccupied relative to another. Where they[8] primarily go wrong concerning this is that this is a refutation of someone who says[9] that something cannot completely have two opposite features relative to a given thing; but we grant this. What is denied is only its specific relation, for instance, to this premise. In other words, [what we are denying is] that, when [something] completely occupies [another] by being [completely] contiguous with [it], [that occupying thing] will not be contiguous with one side [of that which it occupies] while falling short of another side contiguous with [it] that is proper to it. In that case, if it is unoccupied on one side while occupied on another, then there is some excess in the object beyond the occupation. This premise has been neither refuted nor invalidated. Instead, [the purported refutation] has shown that [premises] generically like it and similar to it are not necessary. This premise, however, neither is required nor is affirmed by first reflection because of its generic sense, but because it is

7. **Y** additionally has *wa-yakunu al-shayʾ yumayyizu shayʾan wa-laysa yumayyizu shayʾan min ghayr inqasām* (and something is distinguished from something and not distinguished from something without being divided), which is absent in **Z**, **T**, and the Latin. It appears to be a result of dittography and a confusion of the texts' *yamīn* (to the right of), in the next phrase, with *yumayyizu* (to distinguish), which are quite similar orthographically.

8. It is not clear whether "they" refers merely to Avicenna's imagined objectors or to some real group. If *they* does refer to some actual group, it might possibly be the Stoics and their doctrine of blending (*krasis*). Although there is no evidence that Stoic sources were available to Avicenna in Arabic translation, he may have known of their views through either Galenic sources or Peripatetic commentaries. Alternatively, the text's "they" might refer to the followers of Ibrāhīm al-Naẓẓām (d. ca. 840), who maintained that all purported "accidents," with the exception of motion, were, in fact, bodies, and that these bodies interpenetrate one another as well as corporeal bodies. For this latter possibility see, for instance, *Maqālāt al-Islāmīn wa-ikhtilāf al-muṣallīn*, ed. Helmut Ritter (Wiesbaden: Franz Steiner, 1963), 309.

9. Both **Z** and **T** additionally have *min jihah ukhrá* ([coming] from another perspective). The phrase does not appear in **Y** or the Latin.

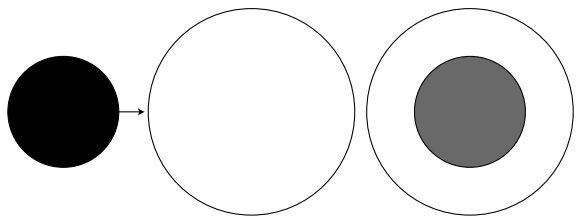
(٤) وهذه مقدمات بيّنة بأنفسها ، وما يورد من النقض لها فهو نقض مقدماتٍ أعمّ منها . وهو ما يقال من أنَّ الشيء قد يكون كله معلوماً بالقياس إلى شيء وعند شيء ، ومجهولاً بالقياس إلى آخر وعند آخر ، من غير انقسام ، وكذلك الشيء يمين شيء وليس يمين شيء من غير انقسام ، مشغولاً بأسره بالقياس إلى شيء ، فارغاً بالقياس إلى آخر من غير انقسام . فأول ما يغلطون في هذا ، أنَّ هذا نقْض قول قائلٍ إنَّه لا يجوز أنْ يكون الشيء بأسره ذا أمرين متقابلين بالقياس إلى شيءٍ ؛ وهذا مسلّم . وإنّما المنكر ما نسبته إلى هذه المقدمة نسبة النوع مثلاً ، وهو أنّه إذا اشتغل بأسره عن أنْ يماس لم يماس في جهةٍ دون جهةٍ مماسّة تخصّه . فإنْ فرغ من جهةٍ واشتغل في جهةٍ ، ففي ذاته فضل عن الاشتغال . وهذه المقدمة لم تتناقض ولم تبطل ؛ بل دلَّ على أنَّ جنسها ليس بواجبٍ ، ولها أشباه ليست بواجبة . وهذه المقدمة لم تجب ولم تثبت في العقل الأول من حيث المعنى الجنسي لها ، بل من حيث هي مخصوصة بالملاقاة ، فإنَّ الملاقاة هذا موجبها ، ولو كان بدل الملاقاة معنى

specific to *encountering;* for this is necessary of encountering. If *encountering* were taken in some other sense, then the whole of something could have one state relative to one perspective and a different state[10] from that former one relative to some other perspective—[that is,] provided that that state in no way requires an occupation while preventing [it], nor does it require an occupation that involves [both] the state of the whole and the state of the part; or [provided that] the occupation of the whole is something relative and not *per se.* Indeed, what is occupied so as to be prevented from being contiguous with something else is not occupied by one thing to the exclusion of some other, for, *qua* occupied, nothing at all is contiguous with it, while, *qua* unoccupied, the whole thing is contiguous with it.[11]

(5) As for what is unknown, its being unknown is not some absolute feature about [the thing]; rather, it is relative to a given thing. Thus, it is not impossible that any given knower know it in any number of ways, unlike the *part* of those [raising the objection], for they limited the possibility of its contiguity to numerable things. In short, that raises no obstacle whatsoever with respect to knowing; and, even if does raise an obstacle to getting at something that is indivisible in every way, it would not be one's knowledge of a thing. Still, we do not need to explain this difference. [That] is because what we said about *encountering completely* (namely, that

10. Reading *bi-ḥāl mukhālifah* with **Z**, **T**, and the Latin (*diversa*).

11. Avicenna's point seems to be the following: if, for example, a smaller disk is imposed on a larger one, then the larger disk inasmuch as it is occupied by the smaller one is not contiguous with it, while inasmuch as it is not occupied by the smaller one it is contiguous with the whole of the disk. An illustration may make the point clearer.



The grey disk represents where the two disks interpenetrate, or encounter each other completely, and here the two are not contiguous; they are only contiguous where the white ring, representing the excess of the white disk, touches the limit of the grey disk.

آخر لكان يجوز أنْ يكون كل الشـــيء بالقياس إلى جهةٍ بحالٍ، وبالقياس إلى جهةٍ أخرى بحال مخالفة لتلك الحال؛ إذا كانت تلك الحال لا توجب شغلاً ومنعاً أصلاً، أو كانت لا توجب شـــغلاً يتعاطى بحال الكل وبحال البعض، أو كان الشغل للكل أمراً بالقياس ليس أمراً في نفســـه. فإنَّ المشـــغول الممنوع عن مماسّة شيء آخر، لا يكون مشغولاً عن شيءٍ دون شـــيء، فإنّه من حيث هو مشغول لا يماسّه شيءٍ البتة، ومن حيث هو فارغ يماسّه كل شيء.

(٥) وأمّا المجهول، فكونه مجهولاً، ليس أمراً يســـتقر فيه البتة، بل هو مضافٌ إلى شـــيء، ولذلك لا يمنـــع أنْ يعلمه أي عالم كان بأي عددٍ كان مـــن العلم، لا كالجزء الذي لهم، فإنهم قصروا إمكان مماسّـــته على أشـــياء معدودة. وبالجملة لا يوجب ذلك في العلم منعـــاً البتة، ولو أوجب منعاً متناولاً لأمرٍ غير متجزّ بوجهٍ من الوجوه، لما عُلم شـــيء. وعلى أنّه لا حاجة بنا إلى إبانة هذا الفرق، فإنَّ الذي نقوله في أمر الملاقاة بالأســـر من أنّه

when it occupies, the entire thing is occupied, and when it does not occupy, then it does not occupy something) is something obvious in itself and obviously different from the case of knowing. The alleged counterexamples refute something different from what was intended, while rendering permissible something more general than what was intended. So it makes what was intended permissible. To be [more] exact, *to encounter completely* is simply in no way to be occupied as a result of being contiguous. [That is] because, when something prior to the state of contiguity occupies the newly arriving contiguous thing, then what is occupied is prevented from being contiguous, whereas what is occupying is not prevented from being contiguous. So the occupying object gets to be contiguous, while the occupied object does not. Also, the occupied object does not entirely encounter the occupying object, and so they do not completely encounter one another. As for when the encounter occurs completely, there, in fact, is interpenetration, where one of the interpenetrating things will inevitably not occupy the other as a result of touching what touches; and so the judgment rendered concerning encountering completely will be the same. When contiguity is different from interpenetration, and [when] each of the two contiguous things is separated by some proper position (in which case there is one object without another), then *contiguity* is to encounter at the limits of the two objects—that is, between their two limits, there is absolutely no interval. Interpenetration, however, is a complete encounter from which it necessarily follows that the position and place of the two become one. On the most rudimentary reflection, you know that when something is contiguous and then your estimative faculty next imagines it to begin interpenetrating, [that thing] needs to move until it encounters some part of that object into which it is penetrating that it had not encountered and continue to do so until the encounter

إذا شـــغل شَغلَ الجميع، وإنْ لم يشـــغل لم يشغل شيئاً هو بيّنٌ بنفسه، وبيّنٌ خلافه في أمر العلم. وما أوردوه من الأمثلة للمناقضة يناقض غير المطلوب، ويوجب تجويزاً في أمرٍ أعمّ من المطلوب، فيجعل تجويزاً في المطلوب. وبالحري أنْ تكون الملاقاة بالأســـر، لا محالة، لا تشـــغل البتة عن المماسّة؛ فإنَّ الوارد المماس إذا شغله المتقدّم السابق إلى المماسة امتنع عن مماسّـــة المشـــغول ولم يمتنع عن مماسّة الشـــاغل، فأصاب ذات الشاغل بالمماسّة دون ذات المشغول، وكان ذات المشغول غير ملاقٍ لجميع ذات الشاغل فما كانت بينهما ملاقاة بالأســـر. أمّا إذا كانت الملاقاة ملاقاة بالأسر، كانت مداخلة بالحقيقة، والمتداخلان – لا محالة – لا يشـــغل أحدهما الآخر عن مسّ ماسّ، فالملاقاة بالأسر كذلك حكمها. وإذا كانت المماسّـــة غيـــر مداخلةٍ، وكان كل واحد من المتماســـين منفرداً بوضع مخصوص؛ فهناك ذاته دون ذات الآخر، فتكون المماسّـــة ملاقاة بأطـــراف الذاتين، وهو أنْ لا يكون بين طرفيهما بُعْدٌ أصلاً، وتكون المداخلة ملاقاة بالأســـر، فيلـــزم ذلك أنْ يصير وضعهما ومكانهما واحداً. وأنت إذا تأملت أدنى تأملٍ علمت أنَّ الشيء إذا كان مماسّاً فلو توهمته صـــار مُداخلاً، احتاج أنْ يتحرك إلى ملاقاةٍ أمرٍ من ذات المداخل ينفذ فيه لم يكن لاقاه،

is completed throughout, so that it has interpenetrated. Our present discussion does not concern whether interpenetration exists or not, but concerns conceptualizing the meaning of the term and how what is conceptualized about it differs from what is conceptualized about *contiguity,* as well as how to distinguish it (should it exist) from contiguity.

(6) As for *following immediately,* it is a state of a contiguous thing following in succession *qua* in succession. Now, some believed that a condition of that is that it share the species in common.[12] I, however, don't believe that what is understood by the term requires that, unless that is initially agreed upon as a technical term. Besides, we would still need some term corresponding with this more general sense.

(7) What *coheres* is something contiguous that adheres to the thing during locomotion to the point that it is very difficult to separate the two. [Cohesion might occur in one of two ways.] It might be because two surfaces so conform to one another that is impossible to separate one from the other without producing a void, which, as has been explained, cannot exist.[13] That occurs when the limit of neither one of the two corporeal surfaces is more apt suddenly to give way, or one does give way only by distorting the surface's form through becoming convex, concave, or the like, and so complying only by force. Alternatively, it might be because parts of this one sink deeply into parts of that one. Cohesion frequently takes place between two bodies by means of some body that can conform very closely with the two surfaces, owing to its fluidity, and it can sink deeply into each one of them and be such as to dry and become hard so that both bodies adhere; thus the adhesion of the two bodies is assumed to be by means of it as, for example, glue and other similar things.

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12. The reference may be to Aristotle and his commentators, since, at *Physics* 5.3.227–10, Aristotle says that what is between (*metaxu*) must involve contraries. Since contraries are always of the same species, Avicenna may have just made the logical inference from Aristotle's claim.

13. See 2.8.

حتى إذا استوت الملاقاة صار مُداخلاً. وليس كلامنا الآن في المداخلة على أنّها موجودة أو معدومة، بل على تصور معنى لفظها، وأنَّ المتصوّر منها كيف يخالف المتصوّر من المماسّة، وأنّها لو كانت موجودة كيف كانت تفارق المماسّة.

(٦) وأمّا التشافع فهو حال مماس تالٍ من حيث هو تالٍ، وظنّ بعضهم أنَّ من شرط ذلك أنْ يشارك في النوع؛ وأظنّ أنَّ مفهوم اللفظ لا يقتضي ذلك؛ اللّهم إلاّ أنْ يصطلح على ذلك من رأسٍ، وبعد ذلك، فنحتاج أنْ يكون لهذا المعنى الذي هو أعمّ منه، لفظ بحسبه.

(٧) وأمّا الملتصق فهو المماس اللازم للشيء في الانتقال حتى يصعب الفصل بينهما؛ إمّا لانطباق السطحين حتى لا يمكن أنْ يفارق أحدهما الآخر إلاّ مع وقوع الخلاء – المبيّن استحالة وجوده. وذلك يكون إذا كان ليس طرف أحد سطحي الجسمين أولى بالسَبْق إلى الانفتاح أو يكون إنّما ينفتح بزوال صورة السطح عن كيفيته، باستحداث تقبيب أو تقعير أو غير ذلك، وهو غير مجيبٍ إليه إلاّ بعنف، وإمّا لانغراز أجزاء من هذا في أجزاء في ذلك. وقد يحدث الالتصاق بين جسمين بتوسط جسم من شأنه أنْ ينطبق جيداً على كل واحدٍ من السطحين لسيلانه، وأنْ ينغرز أيضاً في كل واحدٍ منهما كذلك، ثم من شأنه أنْ يجفّ ويصلب، فيلزم كل واحدٍ من الجسمين، ويفرض لذلك التزام الجسمين بوساطته، وهذا كالغراء وما يشبهه.

(8) *Continuous* is an equivocal term that is said in three senses, which we have noted in [certain] places: Two of them are said of the thing relative to another, while one is said of the thing in itself and not relatively. One of the two [relative senses] is said of the magnitude [in the sense] that it is continuous with another when its limit and that of the other are one; and so both what is continuous and that with which it is continuous must actually be continuous, whether absolutely or accidentally. If there is [continuity] absolutely and is itself [something actually existing] in reality, then it has an absolute limit, like the one [belonging] to two lines of an angle. In this case, one is continuous with the other, since one actually existing line is different from the other, having an actual limit, and yet that limit is the same one for the other line as well. What occurs by positing falls under that which is accidentally [continuous]. So it is like what happens when our estimative faculty imagines or, we posit, two parts for a line that is actually one, where we distinguish one [part] from the other by positing. In that way, a limit is distinguished for [the line] that is the same as the limit of the other division. In that case, both are said to be continuous with one another other. Each one of the two, however, exists individually only as long as there is the positing, and so, when the positing ceases, there is no longer *this* and *that* [part]; rather, there is the unified whole that actually has no division in it. Now, if what occurs through positing were to be something [really] existing in the thing itself and not by [merely] positing, then it would be possible for an actually infinite number of parts to exist within the body (as we shall explain),[14] but this is absurd. Again, in short, there is something that is a *this* in the parts of what is continuous only by pointing in the direction of a certain area

14. See 3.3.12.

(٨) وأمّا المتصل فإنّه لفظٌ مشترك؛ يقال على معانٍ ثلاثة ذكرناها في مواضع، إثنان منها يقال للشيء بالقياس إلى غيره، وواحد يقال للشيء في نفسه لا بالقياس إلى غيره. فأمّا أحد الإثنين فإنّه يقال للمقدار إنّه متصل بغيره إذا كان طرفه وطرف غيره واحداً؛ فيجب أنْ يكون كل واحدٍ من المتصل والمتصل به محصّلاً بالفعل؛ إمّا مطلقاً وإمّا بالعرض. فإنْ كان مطلقاً، وفي الوجود نفسه كان له طرف مطلق كأحد خطّي الزاوية، فإنّه متصل بالآخر؛ لأنّه خطٌ موجودٌ بالفعل غير الآخر، وله طرفٌ بالفعل لكنه بعينه طرف الخط الآخر. وأمّا الذي بالعرض، فمنه ما يكون بالفرض، فكما يعرض إذا توهمنا أو فرضنا الخط الواخد بالفعل ذا جزئين وميّزنا أحدهما عن الآخر بالفرض، فتميّز بذلك له طرفٌ هو بعينه طرف القسم الآخر، فيقال لكل واحدٍ منهما إنّه متصل بالآخر. وإنّما يكون كل واحدٍ منهما موجوداً بعينه ما دام الفرض، فإذا زال الفرض لم يكن ذاك ولا هذا، بل كان الواحد الكل، ولا قسمة فيه بالفعل، ولو كان ما يقع بالفرض موجوداً في نفس الأمر وإنْ لم يفرض – لم يمتنع وجود أجزاء بالفعل لا نهاية لها بالجسم، على ما سنبيّن، وهذا محال. وبالجملة أيضاً إنّما يكون في أجزاء المتصل شيء هو هذا باتجاه الإشارة – بعد

subsequent to the posit; and, likewise there is a *that* only on account of pointing in the direction of some other posited area. This one is *this* and that one is *that* inasmuch as the two acts of pointing are directed toward one [or the other]; for, if the two [acts of pointing] cease, then it is absurd to say that *this* and *that* remain *qua this* and *that*—that is, unless some other distinguishing cause is posited. As for what happens on account of the positing, it ceases when the positing ceases. As will become apparent later,[15] what is continuous has no actual part, and so it comes to have a part that is *this* and a part that is *that* without [that part] having actually existed before. In other words, it is something following upon the pointing. Now, when that pointing ceases, then the effect of that pointing no longer remains. So it is absurd to say afterwards that, even though the pointing has ceased, *this* is inevitably distinguished from *that.* [That] is because it is only by means of the pointing that there is a *this* and *that* during [the pointing]. So it would be like saying that, even though the pointing has ceased, there inevitably is a pointing. The state concerning the parts of something continuous is not like the state of other things whose parts are discontinuous from one another and exist in actuality, for, in the latter case, pointing indicates but does not make, while, in the former case, it makes and then indicates. In some cases, what occurs accidentally[16] specifies some accidental state in some portion [of the thing] but not another, so that when that accident ceases, so does the specification. For example, the whole of a body [might] not be white or hot, and so, on account of the white, [the body] is posited as having some part; [but] when that white ceases, the positing of [the part] also ceases.

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15. See 3.4.

16. Reading *bi-l-ᶜarḍ* with **Z**, **T**, and the Latin (*per accidens*) for **Y**'s *bi-l-farḍ* (by positing).

الفرض – إليه على نحوٍ. وكذلك ذاك، إنّما يكون ذاك لاتجاه الإشـــارة على نحوٍ آخر من الفرض إليه، وهذا هذا، وذاك ذاك من حيث الإشارتان متجهتان إليه، فإنْ بطلتا فمحال أنْ يقــال إنَّ هذا وذاك باقيان، من حيث هما هذا وذاك؛ اللّهم إلاّ أنْ يُفرض ســببٌ آخر مميّــزٌ، وأما ما كان يعرض بالفرض فيبطل بــزوال الفرض. والمتصل لا جزء له بالفعل، كما يظهــر مــن بعد، فيكون حدوث جزء له هو هذا، وجزء له هو ذاك، من غير أنْ كان قبل موجوداً بالفعل، وهو أمرٌ يتبع الإشـــارة، وإذا زالت الإشارة لم يبق معلول الإشارة فمحال أنْ يقال بعد ذلك إنّه وإنْ بطلت الإشارة، فلا بُدّ من تميّز ذاك من هذا، فإنَّ كون هذا وذاك فيها إنّما هو بالإشارة، فيكون كأنه قيل إنْ بطلت الإشارة فلا بُدّ من أنْ تكون إشارة. وليس الحال في أجزاء المتصل كالحال في أجزاء الأشــياء الأخــرى المنفصل بعضها عن بعض؛ موجوداً بالفعل، فإنَّ الإشـــارة هناك تدلّ ولا تفعل، وها هنا تفعل فتدل. ومن الذي يكون بالعــرض اختصاص العرض الحالّ ببعض دون بعض، حتى إذا زال ذلك العرض، زال ذلك التخصيص؛ مثل جسم بيضّ لا كله، أو يسخن لا كله، فينفرض له بالبياض جزءاً إذا زال ذلك البياض زال افتراضه.

(9) The second [relative] sense of *continuous* is said of that [instance in] which, when one side of the continuous thing is moved in a direction away from the other, the other follows it. So this is something more general than the [sense of] *continuous* that we just noted and [more general] than what coheres. The two extremities can be two in actuality, and there can be something actually contiguous after adhering during the motion. It is also possible[17] that the extremity of what is continuous and that with which it is continuous are one, but it is termed *continuous* in the present sense not inasmuch as its extremity and that of the other are one, but only inasmuch as it follows it during the motion in the aforementioned way.

(10) Something is said to be *continuous* in itself when it is such that you can posit parts for it between which there is the continuity that is in the first sense [mentioned above]—that is, between [the parts] there is a common limiting point that is a limit for *this* and *that,* where this is a limiting point of this continuous thing. Its being said to be divisible into things that are always susceptible to division is its definite description, and that is because this is different from that which constitutes its essence. Because the continuous is truly and really understood in the first sense and one is not aware of whether this latter account [namely, being infinitely divisible] is a concomitant of it or not, except through demonstration, it is one of the necessary accidents of the continuous that needs a middle term in order to prove that it does belong to what is continuous.

17. **Y** (inadvertently) omits the phrase *yakuna talāzum fī l-ḥarakah wa-yajūzu an* after *baʿd an,* which appears in **Z**, **T**, and the Latin; it corresponds with the translation following *after* in the previous line up to this footnote.

(٩) وأمّـا الوجـه الثاني؛ فيقال متصل للذي إذا نقل مـا قيل إنّه متصل به في جهةٍ تبعده عن الآخر، تبعه الآخر، فيكون هذا أمر أعمّ من المتصل الذي قلناه قبل هذا، ومن الملتصـق. ويجوز أنْ تكـون النهايتان اثنتين بالفعل، وأنْ يكون هناك تماسّ بالفعل، بعد أنْ يكـون تلازم في الحركة، ويجوز أن تكون نهاية المتصل والمتصل به واحدة، ولكن لا يكون إيقاع اسـم المتصل ها هنا بهذا المعنى عليه؛ من حيث نهايته ونهاية الآخر واحدة، بل من حيث يتبعه في الحركة على النحو المذكور.

(١٠) ويقال متصل للشيء في نفسه؛ إذا كان بحيث يمكن أن تفرض له أجزاء بينها الاتصال الذي بالمعنى الأول، أي بينها حدّ مشـترك هو طرفٌ لهذا وذاك، وهذا هو حدّ هذا المتصل. وأمّا الذي يقال إنَّه المنقسم إلى أشياء تقبل القسمة دائماً فهو رسمه، وذلك لأنَّ هذا غير مقوّم لماهيته، لأنَّ المتصل يفهم بالمعنى الأول فهماً حقيقياً، ولا يُدرَيَ أنَّ هذا المعنـى يلحقه أو لا يلحقه إلاّ ببرهان، فهو من الأعـراض اللازمة للمتصل المحتاج في إبانة وجودها للمتصل، إلى حدٍ أوسط.

(11) We use the expression *being separate* of things each one of which has a proper place whose part is not a part of some place that is common to it and another. *Being together in place* is not said in the way that *being together in time* is said inasmuch as a place of either of two [things] would be the very same place as the other's in the way that the time of one is the time of the other; for this is impossible with respect to place, but not so with respect to time. Instead, *being together in place* is said only of things combined together as a single thing that is [in] a place through its totality, but each one of them has a proper place, part of that proper place being part of the common place. The *intermediate* and *between* are that into which the change occurs before changing into something else during the time [of] any type of change.

(12) These things are useful for our purposes, besides being among the states that necessarily belong to natural things insofar as they possess a quantity.

(١١) وأمّا قولنا فرادى، فإنّما يقال لأشياء لكل واحدٍ منها مكان خاص ليس جزؤه جـزءاً من مـكانٍ عام له وللآخر. ويقال معاً في المكان ليـس كما في الزمان، بأنْ يكون مكان كل واحدٍ منهما هو بعينه مكان الآخر، كما زمانه زمان الآخر، فإنَّ هذا مسـتحيل في المكان وغير مسـتحيل في الزمان. بل إنما يقال معاً في المكان لأشياء مجتمعة كشيءٍ واحدٍ يكون بجملتها مكان، ويكون لكل واحدٍ منها مكان خاص، جزء من ذلك المكان الخاص جزء من المكان العام. والوسـط والبيْن هو الذي يقع التغيّر إليه قبل التغيّر إلى غيره في الزمان؛ أي تغيّرٍ كان.

(١٢) فهذه الأشياء نافعة في غرضنا، ومع ذلك فإنّها من الأحوال التي تلزم الطبيعيات من حيث هي ذوات كمّ.

Chapter Three

The state of bodies with respect to their division and a report of the various arguments on which the detractors rely

(1) People have different opinions concerning these perceptible bodies. [(1)] Some believe that they are an aggregation of atoms[1] and that each body contains a finite number of [these atoms], while [(2)] others believe that the body contains an infinite [number] of parts. [(3)] Still others believe that, in every body, either there is a finite number of actually existing parts, or it does not have actual parts at all; and, when it does have parts, each one of its separate parts is also a body lacking actual parts. So, in their opinion, the body is either a body lacking parts, or it is aggregated of bodies lacking parts. The meaning of *lacking parts* is that [the body] presently has no part that one can posit as distinct, but, instead, [the body] is one by way of continuity, which does not mean that it is not such as to be divided. Instead, their view is that it is always susceptible to division; and, whenever it is divided, what results from the division is itself a body that is divisible. Sometimes, however, you cannot divide it because of the absence of something by which to divide [it], or [because] it is outside the power of the one doing the dividing, or owing to [the body's]

1. The Arabic *al-juzʾ alladhī lā yatajazzaʾu* literally means "the part that cannot be partitioned"; however, it was also the standard locution among the *mutakallimūn* for an atom and is so translated here.

<الفصل الثالث>

في حال الأجسام في انقسامها وذكر ما اختلف فيه وما تعلّق به المبطلون من الحجج

(١) فنقول؛ وقد اختلف الناس في أمر هذه الأجسام المحسوسة، فمنهم مَنْ جعل لها تأليفاً من أجزاء لا تتجزأ البتة، وجعل كل جسم متضمناً لعدةٍ منها متناهية، ومنهم مَنْ جعل الجسم من أجزاء لا نهاية لها. ومنهم مَنْ جعل كل جسم إمّا متناهي الأجزاء الموجودة فيه بالفعل، وإمّا غير ذي أجزاء بالفعل أصلاً، وإذا كان ذا أجزاء بالفعل؛ كان كل واحدٍ من أجزائه المنفردة جسماً أيضاً لا جزء له بالفعل، فالجسم عنده إمّا أنْ يكون جسماً لا جزء له بالفعل، وإمّا أنْ يكون مؤلفاً من أجسام لا جزء لها. ويعني بقوله لا جزء له إنَّه ليس في الحال له جزء مُفترضٌ متميّزٌ، بل هو واحد بالاتصال، وليس يعني أنَّه ليس من شأنه قبول الانقسام، بل عنده أنّه يقبل القسمة دائماً، وكلّما قُسّم فالخارج بالقسمة جسم له في نفسه أنْ ينقسم. لكنه ربّما لم يمكن قسمته بسبب عدم ما يقسم به، أو فواته تقدير

hardness or the impossibility of its being broken up, though, in itself, something intermediate can be posited in it. Before the division, then, every body lacks parts entirely, and, instead, it is the existence of division that makes the part, whether that division is by severing the continuity, or by some accident through whose occurrence we distinguish one part from another (whether it be a nonrelational accident, such as white, or a relational accident, such as being opposite and parallel),[2] or by the act of the estimative faculty and positing.

(2) Those who say that bodies terminate at atoms include some who think that those parts are in themselves bodies, others who make them indivisible lines, and still others who make them neither bodies nor lines nor anything that has in itself dimensions or intervals. Proponents of the first of the former two doctrines [that is, (1) in the main division]—namely, the followers of Democritus, Proclus,[3] and Epicurus—differ from the true doctrine in that they say that combining these bodies occurs only by way of contiguity; that nothing continuous comes to be from them at all; that perceptible bodies are not, in fact, continuous (for those primary bodies actually existing in perceptible bodies are distinct from one another); and that [the primary bodies] are not susceptible to division by separation, but only division by an act of the estimative faculty, and, nevertheless, some are smaller and others larger. Proponents of the truth [that is, opinion (3)] concede that a certain large perceptible body

2. **Y** (inadvertently) omits the phrase *aw ʿaraḍ muḍāf ka-l-muḥādhāh wa-l-muwāzāh* corresponding with "such as being opposite and parallel," which occurs in **Z**, **T**, and the Latin.

3. Although it is odd to see Proclus (Abrūqīlūs) alongside of Democritus and Epicurus, Proclus was an Atomist of sorts, even if not a corpuscularian. He followed Plato's *Timaeus* in holding that the ultimate building blocks of the physical world were atomic triangles; and, moreover, his commentary on Plato's *Timaeus* had been translated into Arabic. Perhaps Avicenna is extending Proclus's line of thought and reasoning that, if these basic triangles are atomic, then there must likewise be atomic or indivisible lines (a position Avicenna explicitly mentioned) from which these triangles, as it were, are constructed. So Proclus, in Avicenna's mind, may very well correspond with those Atomists who affirm indivisible lines. Alternatively, Jules Janssens has suggested to me that the texts Abrūqīlūs is a corruption of Alūqibūs—that is, Leucippus, whom Aristotle mentions as an Atomist in his *Physics*. The suggestion clearly has merit, although it would mean that three scribal errors were made in copying the name and that those errors occurred very early in the transmission process in order to explain the complete absence of this reading of the name in all of the manuscripts.

القاســـم، أو لصلابته أو اســـتحالة انكساره، وهو في نفسه يحتمل أنْ يُفرض فيه وسط. وكل جسم، فإنّه قبل القسمة لا جزء له البتة، بل الفاعل للجزء وجود القسمة، والقسمة إمّـــا بتفريق الاتصـــال، وإمّا بعرض يميّز بحلوله جزءاً عن جـــزء، إمّا عرض غير مضاف كالبياض أو عرض مضاف كالمحاذاة والموازاة، وإمّا بالتوهّم والفرض.

(٢) وأمّا الذين يقولون إنَّ الأجسام تنتهي إلى أجزاء لا تتجزأ؛ فمنهم مَنْ يجعل تلك الأجزاء أجســـاماً في أنفسها، ومنهم مَنْ يجعلها خطوطاً غير منقسمة، ومنهم مَنْ يجعلها غير أجسام ولا خطوط ولا أشياء لها في أنفسها أقطار وأبعاد. ويفارق أصحاب المذهب الأول من هذين المذهبين – وهم شيعة ديموكريتس وأبيقورس وابروقلس – المذهب الحق؛ أنَّ هؤلاء يقولون إنَّ التركيب من هذه الأجسام هو بالتماس فقط، وأنّه لا يحدث منها متصل البتة؛ وأنَّ الأجسام المحسوسة ليست بحقيقية الاتصال؛ فإنَّ تلك الأجسام الأُولى موجودة بالفعل في الأجسام المحسوسة، متميّزاً بعضها عن بعض، وأنّها لا تقبل القسمة المفرّقة، بل القســـمة المتوهمة، وهي مع ذلك بعضها أصغر وبعضها أكبر. وأمّا أصحاب الحق؛ فإنهم يجوّزون أنْ يكون جســـم كبير من المحسوســـات لا جزء له بالفعـــل، ويجوّزون أنْ تكون

does not have some part in actuality. They also grant that when parts that are actually separate happen to encounter [one another] at some time, a single thing comes to be from them, but the specific property of each one of the [formerly separate] parts then ceases and so no longer remains in itself. Getting back to where we were, we say that the followers of Democritus differ from other Atomists in that the others do not make their atom a body.

(3) Each of these [groups] has its own specific arguments. So one of the arguments of those defending atoms that are not bodies[4] is that every body is separable into parts, and also, when it is so separated, its parts can be recomposed as they were. Consequently, there is an aggregation in every body before being separated into parts, otherwise, bodies would not differ in how difficult or easy it is to break [them] up. [This difficulty or ease in breaking certain bodies up], they maintained, is not because [the bodies] differ in genus (meaning by *genus* the specific nature), nor owing to the agent's being different nor [due to] an absence of something, nor because of any of the other options they mention. Hence, it is due to the aggregation. Given that there is an aggregation in [a body], there is nothing absurd in our estimative faculty's imagining it to have passed away; and, when it does so entirely, what remains has no composition in it. What has no aggregation in it, however, is not a body, because every body is divisible, whereas what has no aggregation in it is not divisible. This way of arguing has its origins in Democritus, but [it comes] with a slight twist, which we'll come to understand when we present his argument.[5]

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4. The present form of Atomism is that of the *mutakallimūn*. The earliest study of the Atomism of *kalām,* which is still quite valuable, is Shlomo Pines, *Beiträge zur islamischen Atomlehre* (Berlin: A. Heine G.m.b.H.,1936), translated by M. Schwarz as *Studies in Islamic Atomism,* (Jerusalem: The Magnes Press, 1997). For a more recent study, which incorporates new material and, in many ways, corrects Pines's earlier study, see Alnoor Dhanani, *The Physical Theory of Kalām, Atoms, Space, and Void in Basrian Muʿtazilī Cosmology* (Leiden: E. J. Brill, 1994). See also Abdelhamid I. Sabra, "*Kalām* Atomism as an Alternative Philosophy to Hellenizing *Falsafa,*" in *Arabic Theology, Arabic Philosophy: From the Many to the One: Essays in Celebration of Richard M. Frank,* ed. James Montgomery (Leuven: Peeters, 2006), 199–272.

5. See par. 12.

الأجزاء – إذا حصلت بالفعل منفصلة – تلتقي مرة أخرى، فيحصل منها شيء واحد فتبطل خاصّة كل واحدٍ منها، فلا يكون ثابتاً بعينه. ونعود إلى ما كنا فيه؛ ونقول: لكن أصحاب ديموكريتس يفارقون الآخرين من أصحاب الجزء، بأنَّ الآخرين يجعلون جزءهم غير جسم، (٣) لكل واحدٍ من هؤلاء حججٌ تخصّه. أمّا القائلون بجزء لا يتجزأ، ولا هو جسم؛ فمن حججهم أنَّ كل جسم فإنّه قابل للتفريق، فإذا تفرّق فأجزاؤه قابلة للتأليف كما كانت. فإذا كان كذلك، فكل جسم ففيه قبل التفريق تأليف، ولولا أنَّ فيه تأليفاً لكان لا تختلف الأجسام في صعوبة التفكيك وسهولته. قالوا؛ وليس ذلك لأنَّ جنسها مخالف – ويعنون بالجنس الطبيعة النوعية – قالوا، ولا لاختلاف الفاعل ولا لعدم شيءٍ ولا لأقسام يذكرونها؛ فإذن هو للتأليف. وإذا كان فيه تأليف فتوهمناه زائلاً لم يكن محالاً، وإذا زال بكليته بقي ما لا تأليف فيه، وما لا تأليف فيه فليس بجسم؛ لأنَّ كل جسم ينقسم، وما لا تأليف فيه لا ينقسم وهذا الاحتجاج مبدؤه لديموكريتس إلاّ أنّه حُرّف عنه بشيء يسير، نفهم ذلك إذا أوردنا حجته.

(4) They further say that if the parts of the body were not finite, then they would be infinite; but then a body would be divisible into half, and again into half, and so on infinitely.[6] When something in motion intends to cross a given distance, it would need to cross half, but, before that, half of half of it; and, in a finite time it would need to cross an infinite number of halves. So it could not cross the distance at all. Also, the fleet-footed Achilles could never catch up with the plodding tortoise, and the ant would never completely cross a sandal over which it travels (the first example is from the Ancients, the second is from the Moderns).[7] Motion, however, exists. So the body's divisions are finite.

(5) They further claimed that, if the body could be divided infinitely, it would follow from that necessarily that the mustard seed is divisible into parts that would completely cover the face of the Earth.

(6) [Similarly,] they said that, if the body were infinitely divisible, the parts of a mustard seed would equal the parts of an enormous mountain, which is absurd.

(7) Again, they said that the point must be either a substance subsisting in itself or not. On the one hand, if it subsists in itself, then it is, in fact, the atom. Moreover, that which encounters it will be another point, and so the points following in succession will make up a body (or [they will make up] a line, which makes up a surface, which, in its turn, makes up that body). If it is an accident, on the other hand, then it inheres in a substrate, and everything that inheres in a substrate does so in what is similarly equal to [the substrate]. Thus, the point would inhere in an indivisible substance.

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6. The arguments of this paragraph rely heavily on Zeno's paradoxes; see Aristotle, *Physics* 6.9 for the classical understanding of Zeno's paradoxes, and G. E. L. Owen, "Zeno and the Mathematicians," in *Logic, Science and Dialectic: Collected Papers in Greek Philosophy* (Ithaca, NY: Cornell University Press, 1986), 45–61, for a contemporary discussion.

7. The reference to the "Ancients" is clearly to Zeno, while the "Moderns" refers to the *mutakallimūn,* and specifically Abū Hudhayl (d. 841), who is credited with formulating the paradox in terms of the ant and the sandal.

(٤) وقالوا أيضاً، إنَّه لو لم تكن أجزاء الجسم متناهية لكانت غير متناهية، فكان للجسم أقسام وأنصاف في أقسام، وأنصافٌ من غير نهاية. فكان المتحرّك إذا أراد أنْ يقطع مسافةً احتاج أنْ يقطع نصفها، وقبل ذلك نصف نصفها، واحتاج في زمانٍ متناهٍ أنْ يقطع أنصافاً بلا نهاية، فكان يجب أنْ لا يقطع المسافة أبداً، ويجب أن لا يلحق ‹أخيل› السريع العدو، السُلحفاة البطيئة العدو. وكانت الذرة لا تفرغ من قطع نعْلٍ يسير عليها. فالمثل الأول للقدماء والثاني للمحدثين؛ لكن الحركة موجودة، فأقسام الجسم متناهية.

(٥) وقالوا أيضاً إنّه لو جاز أنْ ينقسم الجسم إلى غير نهاية، لوجب من ذلك أنْ تكون الخردلة تنقسم أقساماً تبلغ إلى أنْ تغشى أديم الأرض كله.

(٦) قالوال ولو كان الجسم ينقسم إلى غير نهاية؛ لكانت الخردلة في أقسامها متساوية لأقسام الجبل العظيم، وهذا محال.

(٧) وقالوا أيضاً؛ إنَّ النقطة لا تخلو إمّا أنْ تكون جوهراً قائماً بنفسه أو لا تكون، فإنْ كانت قائمة بنفسها، فقد حصل الجزء الذي لا يتجزأ، ويكون الذي يلقاها أيضاً نقطة أخرى، فتتوالى النقط فاعلةً لجسم أو لخطٍ فاعلٍ لسطح فاعلٍ لذلك الجسم. وإنْ كانت عرضاً، فهي تحلّ محلاً؛ وكل حالٍّ في محلٍ فهو يحلّ فيما يساويه ويكون مثله، فتكون النقطة تحلّ جوهراً لا يتجزأ.

(8) They additionally said that, if the body could be divided into an infinite number of parts, it could be composed of an infinite number of parts, or, along with something else, it could make up an infinite composition.[8]

(9) They could also say that, when we assume that one line is made to coincide with another so that the point [on one line] parallels the point [on the other]—or encounters, or interpenetrates, or whatever term you want to use to indicate what is understood by the idea—and then the line moves, the point that was contiguous will no longer be such, and the contiguity will cease all at once such that, in a single instant, [the point] will no longer be contiguous—that is, at that instant, it will encounter some point that follows the first point in succession. So the points on the line follow in succession, and from them the line is composed, since the [same] account will apply to the loss of contiguity with the second point, just as it did to the loss of contiguity with the first point, and so on.

(10) Also among their arguments is the existence of an indivisible angle—namely, the one that Euclid deemed the smallest acute angle.[9]

(11) Likewise they asked: What do they say about a sphere's rolling over a smooth surface? Isn't it contiguous with one point after another such that the line that the sphere maps out is composed of points?[10]

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8. The argument is enthymematic but seems to be that, if a body is infinitely divisible, then the body is composed of an infinite number of parts (or it is part of something that has an infinite number of parts), in which case there is an infinity of parts; but an infinite is impossible (a common premise in many *kalām* arguments). Thus, since what gives rise to something impossible is itself impossible, the assumption that the body is infinitely divisible is impossible.

9. This is the so-called horn angle, whose vertex is the point of tangency between a line and a circle. In his *Elements* 3.16, Euclid provided a proof that the horn angle is smaller than any rectilinear angle. For Avicenna's treatment of angles and, specifically, his criticism of Euclid's proof, see Irina Luther, "The Conception of the Angle in the Works of Ibn Sīnā and al-Shīrāzī," in *Interpreting Avicenna: Science and Philosophy in Medieval Islamic,* ed. Jon McGinnis (Leiden: E. J. Brill, 2004), 112–125.

10. Reading *nuqaṭ* with **Z**, **T**, and the Latin (*punctis*) for **Y**'s *nuqṭa* (meaning point, sing.).

(٨) وقالوا أيضاً ؛ إنْ جاز أنْ ينقسم الجسم إلى أجزاء غير متناهية، جاز أنْ يتركب من أجزاء غير متناهية، أو أنْ يُركّب مع غيره تركيباً بلا نهاية.

(٩) ولهم أنْ يقولوا أيضاً ؛ إنّا إذا فرضنا خطاً منطبقاً على خط، حتى تكون النقطة محاذية للنقطة أو ملاقية أو مداخلة، أو أي إسم شئتم أنْ تدلّوا به على المعنى المفهوم، ثم تحرّك الخط، فقد صارت النقطة المماسّة غير المماسّة، وزوال المماسّة دفعة، فتكون في آنٍ واحدٍ صارت غير مماسّة؛ وهي في ذلك الآن ملاقية لنقطةٍ تالية للنقطة الأولى. فتكون النُقط متتالية في الخط، والخط مؤلفاً منها، إذ الكلام على زوال مماسّة النقطة الثانية، كما هو في زوال مماسّة النقطة الأُولى كذلك، وهلمّ جرا.

(١٠) ومن حججهم وجود زاويةٍ غير منقسمةٍ، وهي التي جعلها أقليدِس أصغر الحادّات.

(١١) وقالوا أيضاً ؛ ما يقولون في حركة الكرة على سطح أملس، أليس تكون بمماسةٍ واقعةٍ بنقطةٍ بعد نقطة، فيؤلّف الخط، الذي تمسحه الكرة، من نُقط؟

(12) Those who make this ultimate part a body—namely, the followers of Democritus—said that the body must either be wholly divisible, such that nothing remains of it that is not divided, or it is not wholly divisible. If it is in its nature to be divided, then that [such a division] should occur is not impossible. When something that is not impossible is assumed to exist, no absurdity arises from it. (Indeed, some nonabsurd falsity might result, but a nonabsurd falsity does not entail an absurdity.) So let us assume that every possible division in the body has actually resulted. In that case, either nothing exists, or points exist, or indivisible bodies exist. It is absurd, however, that they terminate at nothing or at points. [That] is because, if [the body] breaks down into nothing, then it is an aggregation of nothing, which is absurd; whereas, if it breaks down into points, then it is an aggregation of points, which is also absurd. (The consensus among the learned is that, no matter how many points are joined together, they do not exceed the size of a single point; [points] encounter one another completely, not with some of them hindering others from encountering one another; they are not moved so as to form a composition and so become something occupying a place; and nothing continuous comes to be from them). So it remains that [the body] breaks down into bodies whose nature is not to be separated and divided [further], except through the act of the estimative faculty and positing.

(١٢) وأمّـا الذين جعلوا الجزء المنتهى إليه جسـماً - وهو شـيعة ديموكريتس - فقالوا إنَّ الجسـم لا يخلو إمّا أنْ ينقسـم كله حتى لا يكون منه ما لا ينقسم، أو لا ينقسم كله. فإنْ كان في طباعه أنْ ينقسم، فغير ممتنع أنْ يقع، وغير الممتنع - إذا فرض موجوداً لـم يعرض منه محال، بل ربّما عرض منه كذب غيـر محال، والكذب غير المحال لا يلزمه المحال. فلنفرض أنَّ كل قسـمة ممكنة في الجسم فقد خرجت بالفعل، فحينئذ لا يخلو إمّا أنْ يحصل لا شيء؛ أو تحصل نقطٌ، أو تحصل أجسامٌ لا تنقسم. لكن من المحال أنْ تنتهي إلى لا شـيء أو إلى النقط، فإنه إنْ كانت انتقاضه إلى لا شيء فتأليفه من لا شيء وهذا محال. وإنْ كان إنتقاضه إلى النقط فتأليفه من النقط، وهذا أيضاً محال. قد أجمع العلماء على أنَّ النقط كمّ اجتمعت، لا تزيد على حجم نقطة واحدة، وأنّها إنّما تتلاقى بالأسـر، ولا يحجب بعضها بعضاً من الملاقاة، ولا تتحرّك إلى التأليف فتصير شـاغلة مكاناً، ولا يحـدث منها متصل، فيبقى أنْ يكون إنتقاضه إلى أجسـامٍ ليـس في طبيعتها أن تنفصل وتنقسم، اللّهم إلاّ بالوهم والفرض.

(13) Those who said that the body has an infinite number of existing parts[11] [that is, group (2) noted at the beginning] were driven to this account by the impossibility of composing bodies out of indivisible parts and indivisible bodies. They said: Since bodies in themselves also possess divisions (even if they are not actually separated), if it is stipulated and assumed that they are divided into parts, then each one of [those parts] is a portion and part of the body (even if it is not at all separated). It remains, they continued, that the parts of the body are infinite, and, because of that, the body is infinitely divisible. [This is so] since the divisions (whether [resulting from] positing or actual separation) occur only at parts that exist adjacent to one another in the body, in which case the parts of the body are commensurate with the capacity for the divisions. So, if the capacity for divisions is infinite, [the body] possesses an infinite number of parts.

(14) Since the Atomists harassed those [advocating that the body has an infinite number of parts] and forced their hand with the problem of the sandal and the ant, as well as the tortoise and Achilles, and, in general, that motion would proceed over an infinite number of halfway points such that the final end would never be reached, [those advocating that the body has an infinite number of parts] took refuge with Epicurus and so advocated the leap.[12] In other words, the body might cross a given distance in order to arrive at an intended end point from a point of departure without encountering or passing directly over the intermediate [space].

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11. This position seems to be that of Ibrāhīm al-Naẓẓām. See Sabra, "*Kalām* Atomism as an Alternative Philosophy to Hellenizing *Falsafa*," esp. 226 and 262–263.

12. The author of the theory of the leap is, in fact, the *mutakallim* Ibrāhīm al-Naẓẓām (d. ca. 840).

(١٣) وأمّا الذين قالوا بوجودِ أجزاء غير متناهيةٍ للجسم؛ فقد دفعهم إلى هذا القول امتناع تركيب الأجسام من الأجزاء غير المتجزئة ومن الأجسام غير المتجزئة. قالوا، فإنَّ الأجسام أيضاً في نفسها ذوات أقسام وإنْ لم تفصل بالفعل، فهي إذا جزئت بالتعيين والفرض، كان كل جزء منها بعضاً وجزءاً من الجسم وإنْ لم ينفصل البتة. قالوا؛ فبقي أنْ تكون أجزاء الجسم بلا نهاية، وبسبب ذلك ينقسم الجسم إنقساماً لا يتناهى، إذ الانقسام الفرضي أو التفريقي إنّما يرد على أجزاء موجودة في الجسم متجاورةٍ، فتكون أجزاء الجسم بحسب احتمال الانقسام، فإنْ احتمل انقساماً غير متناهٍ؛ كان ذا أجزاء غير متناهية.

(١٤) ولمّا ضيّق أصحاب الجزء على هؤلاء وألجأوهم إلى مسألة النعل والذرّة والسُلحفاة و‹أخيل›، وبالجملة إلى أنْ تكون الحركة تأتي على أنصافٍ لا تتناهى فلا تبلغ الغاية البتة، التجأوا إلى ما التجأ إليه ‹ابيقورس› فقالوا بالطفرة؛ وهي أنَّ الجسم قد يقطع مسافة حتى يحصل في حدّ منها مقصود عن حدّ متروك، ولم يلاقِ ولم يحاذِ ما في الوسط.

(15) The first of Epicurus's foreign imitators produced an example of that from the rotations of two circles:[13] one near the edge of a spinning millstone, and the other near the center. They noted that, if the motion of the part at the edge were equal to the motion of the part that is near the center, the two together would cross an identical distance. Now, it is absurd that what is in the middle would be at rest, because the [whole millstone] is continuous, with each part adhering to one another. So, clearly, what is in the middle is moved, but its leaps are few; and equally clear is [the fact] that the part at the edge is moved, but it leaps more frequently in order to cover a larger interval than the interval of that which is in the middle.

(16) Since the first of the noted foreigners clung to this account but considered the leap repulsive and, further, did not allow that one continuous motion is faster than another motion without the intermediacy of a rest, they were forced to make that which is near the center rest more frequently than that which is at the edge and were forced into the possibility that what is in the middle rests. They were also forced to conclude that the millstone fragments while [it is] moving, with some of its parts breaking away from others such that one of them does not need to be moved together with the other but, instead, one of them rests while the other is moved. Thus, one [group] would not forsake the repulsive leap, while the other [would not forsake] the repulsive fragmentation.

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13. The example is that of al-Naẓẓām.

(١٥) وأورد، أوّل من تشـــبه بأبيقورس من الخارجين لذلك، مثالاً من دوران الدائرة القريبـــة من طرف الرحـــى والدوّامة، والأخرى القريبة من المركز، وذكروا أنّه لو كان الجزء الذي عند الطرف يتحرّك مع حركة الجزء الذي عند الوســـط بالسواء؛ لقطعا معاً مسافةً واحدةً، ومحال أنْ يســـكن الذي في الوسط لأنّه متصلٌ ملتزمٌ بعضه لبعض. فبيّنٌ أنَّ الذي في الوسط يتحرك وتقل طفراته، مع أنَّ الذي عند الطرف يتحرك ويطفر أكثر حتى يحصل في بُعْدٍ أكثر من بُعْد الذي في الوسط.

(١٦) ولمّا استشنع الأولون من الخارجين المذكورين الطفرة ولزومهم هذا الكلام، ولم يجوّزوا أنْ تكون حركة متصلة أسرع من حركةٍ بلا توسط سكون؛ اضطروا إلى أنْ جعلوا الذي يلي الوســـط يسكن سكونات أكثر من سكونات الذي على الطرف، واضطروا إلى تمكين المتوســـط من الســـكون، وإلى أنْ حكموا بأنَّ الرحى تنفك أجزاؤها عند الحركة، بعضها عن بعض تفكّكاً لا يلزم أحدهما أنْ يتحرك مع الآخر، بل يسكن أحدهما ويتحرك الآخر، فلم يزل أحدهما في شناعة الطفرة، والآخر في شناعة التفكّك!

Chapter Four

Establishing the true opinion and refuting the false

(1) Since we have indicated the different schools of thought concerning this question of ours, let us begin by indicating the soundness of the true doctrine, then take up and resolve the doubts produced by its detractors. The view that maintains that an actually infinite number of parts are in the body is obviously false, because it is impossible to traverse an infinite number of things in a finite period of time and because the assertion of the leap is clearly false in itself. [It is also false] in that any given multiple consists only of its units, and, when one unit does not actually exist, then neither does a multiple. So, when a unit part does not exist, there would not be an infinite number of parts. Now, the unit part, insofar as it is a unit, is indivisible, and so, when units like it are added to it, then the addition must be by either contiguity, interpenetration, or continuity. If it is by continuity, what is continuous comes to be from delimited magnitudes, and so the opinion is falsified. If [the addition] is by way of interpenetration, then no determinate quantity comes to be from it whatsoever, even if there really were an infinite number of additions. If it is by encountering one another [that is to say, by contiguity], then each one of two parts requires a position proper to

<الفصل الرابع>

في إثبات الرأي الحق وإبطال الباطل

(١) وإذ قد دلّلنا على اختلاف المذاهب في مسألتنا هذه، فلنبدأ بالدلالة على صحة المذهب الحق، ثم لنحمل على الشكوك التي أوردها مخالفوه فنحلّها حلاً. فنقول: أمّا المذهب القائل إنَّ الجسم فيه أجزاء بالفعل غير متناهية، فيظهر بطلانه من جهة استحالة قطع أشياء بلا نهاية في زمانٍ متناهٍ، ولأنَّ إثبات الطفرة بيّن البطلان في نفسه وبأنَّ كل كثير فإنّما هو من آحادٍ، وإذا لم يكن واحدٌ موجوداً بالفعل لم يكن كثيراً، فإذا لم يكن جزءٌ واحدٌ موجوداً بالفعل لم تكن أجزاء بلا نهاية. والجزء الواحد لا ينقسم من حيث هو واحد، فإذا أُضيف إليه آحاد أمثاله؛ لم يخل إمّا أنْ تكون الإضافة على سبيل المماسّة أو على سبيل المداخلة، أو على سبيل الاتصال. فإنْ كان على سبيل الاتصال؛ حدث المتصل من مقادير منها محدودة، فبطل الرأي، وإنْ كان على سبيل المداخلة لم يحدث منها قدر وإنْ بلغت أضعافاً لا نهاية لها في الوجود، وإنْ كان على سبيل الملاقاة؛

it and must have some determinate corporeal quantity in itself (as we will explain later),[1] in which case it is a body. Now, when one body is joined with a finite number of bodies like it, the composition of that undoubtedly results in a certain body [*x*] that will have a certain proportion to the body [*y*], [made up of] infinite parts, where the proportion is of one delimited [body] to another with respect to its size. So, when that proportion is increased with respect to the parts, then *x,* which is composed of finite parts, will ultimately reach the level of *y*. So *x* will be a body consisting of a finite number of parts that is equal to [*y*], but then *y,* likewise, consists of a finite number of parts.

(2) We'll set aside discussing the view of those who claim that the division terminates at bodies [whose] continuity[2] cannot be divided by separation, for they do not deny that the bodies at which the division terminates have a certain capacity such that parts are posited of them. They deny only that that occurs in actuality; and we may or may not allow that, for it depends upon another kind of investigation whose proper place is the investigation of the elements.[3]

(3) We need to make clear what is wrong about the position of those who aggregate bodies from [indivisible] nonbodies.[4] We say that, when these parts are combined and a body comes to be from them, their combination must be by means of either mere succession, contiguity, interpenetration, or continuity. [That follows] because there either is or is

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1. The reference appears to be to *Ilāhīyāt* 2.3, where Avicenna discusses the relation between corporeality and being localized.

2. Paul Littinck, in "Ibn Sīnā on Atomism, Translation of Ibn Sīnā's *Kitāb al-Shifāʾ al-Ṭabīʿiyyāt 1: al-samāʿ al-ṭabīʿī,* Third Treatise, Chapter 3–5," (in *Al-Shajarah* 4 [1999]: 1–51, esp. 30, fn. 52) suggests that the texts *li-l-ittiṣāl* (continuity) be emended to *wa-l-infiṣāl* (and severing). In that case, the text would read, "the division terminates at bodies that cannot be divided by separation *and severing,*" which clearly makes more immediate sense. Still, all the manuscripts seem to agree in reading *li-l-ittiṣāl*, which is also the *lectio difficilior,* and so it should probably be retained.

3. See 3.12.1–9.

4. *Kalām* atoms, while being conceptually indivisible and so having no real or even conceptual parts, were envisioned a being cuboidal. Thus, while they had no parts, they did have directions (*jihah*)—namely, up, down, front, back, left, and right. Since these atoms have no parts, despite being cuboidal, a single atom cannot be said to be composed or aggregated of lines and planes. In fact, according to *kalām* Atomists, the smallest possible line consists of two atoms; the smallest possible plane consists of four atoms; and the smallest possible body consists of eight atoms.

فكل واحدٍ من الجزئين يقتضي وضعاً مخصوصاً ، ويجب أنْ يكون له في نفسه قدر جسماني ، – على ما يُوضّح من بعد – فيكون جسماً ؛ والجسم إذا قُرن بأجسام أمثاله متناهية العدّة ، كان من تركيب ذلك جسمٌ لا محالة ، له نسبة إلى الجسم غير المتناهي الأجزاء نسبة محدودٍ إلى محدودٍ في عِظمه . فإذا زيد في الأجزاء على تلك النسبة ، بلغ المؤلّف من الأجزاء المتناهية مبلغه ؛ فكان جسماً مساوياً له من أجزاء متناهية العدد ، فكذلك الجسم الأول هو من أجزاء متناهية العدد .

(٢) وأمّا مذهب القائلين بأنَّ القسمة تنتهي إلى أجسامٍ لا تنقسم بالتفريق للاتصال ، فإنّا نؤخّر الكلام في النظر في أمر هذه الأجسام ؛ فإنّهم ليسوا يمنعون كون الأجزاء التي إليها تنتهي القسمة ذات احتمال لأنْ يُفرض لها أجزاء ، إنّما يمنعون وقوع ذلك بالفعل . وعسانا نجوّز ذلك أو لا نجوّزه ، فيتعلق بنوعٍ آخر من النظر ، إنّما الموضع الأخص به ؛ النظر في الأُسْطُقسّات .

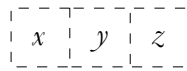
(٣) وأمّا مذهب المؤلفين للاجسام من غير الاجسام ، فيجب أنْ نوضّح بطلانه فنقول : إنَّ هذه الأجزاء إذا اجتمعت وكان منها جسم ، فإمّا تجتمع على سبيل تتالٍ فقط ، أو على سبيل تماسّ ، أو على سبيل تداخل ، أو على سبيل اتصال ، إذ الأشياء

not an interval between the aggregated things. If there is no interval between them, either they encounter one another completely or not. If [they encounter one another] completely, they interpenetrate, as we explained,[5] whereas if they do not [encounter one another] completely, then either there is something unique to each of them with which it encounters the other, or that thing [with which one encounters the other] is common to both. If it is unique, then there is contiguity, while if it is common, there is continuity. Thus, when these parts are combined, their combination must be in one of these ways. If they are combined according to mere succession, then no perceptibly continuous bodies result. Our discussion, however, is about [just such bodies]. When they are combined according to either continuity or contiguity, then each one of them is divisible into what is occupied and what is unoccupied, what is being touched and what is not, according to what we explained in the preceding chapters.[6] If they do not interpenetrate, then when one of them [x] meets another [y], and then a third one [z] encounters one of the two [for example, y], then, as a result of [y's] intermediate position, [z] necessarily is hindered from encountering x. In that case, each has conferred on the contact [with y] something of itself that the other has not.[7] This is self-evident. So what is in the intermediate position [that is, y] is divisible. If they encounter one another completely, then they interpenetrate, and so their combination produces no quantitative increase; for, whenever they are combined, they will be like the unit, which has no length, breadth, or depth. Since these atoms do not combine such that

5. See 3.2.3.

6. See specifically 3.2.5.

7. Again, the position that Avicenna is trying to refute is a conception of wholly indivisible atoms, whether actually or even conceptually. Avicenna's example shows that, if such atoms were aggregated in the way illustrated in the diagram below, then x would contact some *part* of y different from the *part* that z contacts; for if they both contacted y at one and the same place, they would, in fact, be interpenetrating y, but it was posited that they were not interpenetrating.



المجتمعة إمّا أنْ يكون بينها بُعْدٌ أو لا يكون. فإنْ لم يكن بينها بُعْدٌ، فإمّا أنْ يكون تلاقيها بالأسر أو لا بالأسر، فإنْ كان بالأسر كانت مداخلة - على ما أوضحنا - وإنْ كان لا بالأسر، فإمّا أنْ يختص كل منها بشيءٍ به يلقى الآخر، أو يكون ذلك الشيء مشتركاً. فإنْ اختص فهو مماسّة، وإنْ كان مشتركاً فهو اتصال. وكذلك هذه الأجزاء إذا اجتمعت لم يخلُ اجتماعها من أحد هذه الوجوه؛ فإنْ اجتمعت على التتالي فقط لم تحدث منها الأجسام المتصلة في الحس - وكلامنا فيها - وإنْ اجتمعت على اتصالٍ أو تماسّ، فكل واحد منها ينقسم إلى مشغولٍ وفارغٍ وممسوسٍ وخالٍ، على نحو ما شرحنا في الفصول السالفة. ويجب، إن لم يتداخل، أنْ يكون إذا لقي واحدٌ منها واحداً فجاء ثالث ملاقٍ لأحدهما، أنْ يكون محجوباً عن ملاقيه الآخر بتوسط هذا الملاقي؛ فيكون كلٌ قد نال بالملاقاة من ذاته ما لم ينله الآخر - وهذا بيّنٌ بنفسه - فيكون المتوسط منقسماً. وإنْ كانت الملاقاة بالأسر كانت مداخلة، فلا يزداد باجتماعها قدر؛ فتكون كلما اجتمعت كالواحد الذي لا طول له ولا عرض ولا عمق. فإذ كانت هذه الأجزاء التي لا تتجزأ لا

their aggregation forms a body, the body is not reducible to them. Thus, the division of bodies does not terminate at parts that cannot be divided by any type of division, and the same holds for all other magnitudes (I mean surfaces and lines).

(4) Also, what sane person would allow us to say that a sheet of atoms that the Sun illuminates on one side (or any other state that happens to it on one side) must be such that the other side is in that state as well? Or [who would allow us] to say that the sheet in itself does not have two sides, and, rather [that] the light falls on one side of the sheet and the side that does not face the Sun is that very same side? So [for example] when one sees *this* side, one has already seen *that* side, since this one and that one are the same when there is no *this* and *that*. In that case, anyone standing on one side of the sheet sees the sheet illuminated from the other side.

(5) In fact, the existence of atoms would necessarily entail that there be no circles, right triangles, or many other [geometrical] figures. [This follows in the first case,] since the circle requires that the outside circumference be larger than any inside circumference that is contiguous with it; but what is contiguous is equal to that with which it is contiguous, not

تجتمع اجتماعاً يتألف به منها جسم فالجسم إذن غير منتقصٍ إليها ، فإذن ليس تنتهي قسمة الأجسام إلى أجزاء لا يمكن أنْ تقسم نوعاً من القسمة ، وكذلك سائر المقادير ، أعني السطوح والخطوط.

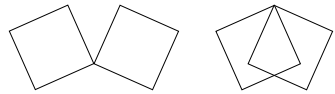
(٤) وأي عاقلٍ يرخّص في أنْ نقول إنَّ صفيحة من أجزاء لا تتجزأ أضاءت عليها الشمس ، أو عرض لها حالٌ من جهة ، فيجب أنْ تكون الجهة الأخرى بتلك الحال؟ أو يقول إنَّ الصفيحة ليس لها في نفسها وجهان ؛ بل الضوء على كل ما هو وجهٌ للصفيحة ، والوجه الذي لا يلي الشمس هو ذلك الوجه بعينه ، فإنّه إذا أبصر هذا الوجه فقد أبصر ذلك ؛ إذ هذا وذلك واحدٌ ، وليس ها هنا هذا وذاك ، فيكون الواقف من جهةٍ من الصفيحة يرى الصفيحة مضيئة من الجهة الأخرى؟

(٥) وقد يجب ، من وجود الأجزاء التي لا تتجزأ ، أنْ لا تكون دائرة ولا مثلث قائم الزاوية ، ولا كثير من الأشكال ، إذ الدائرة توجب أنْ يكون الطوق الخارج أكبر من طوقٍ

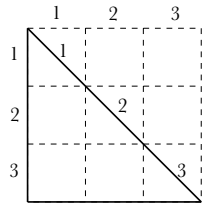
larger.[8] [In the second case,] when two sides of a right triangle are each ten units, then the hypotenuse is the square root of two hundred, which [according to the present view] would either be an absurdity that does not exist, or it is true, but parts would be broken up, which [according to the present view] they are not.[9]

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8. Avicenna's point becomes obvious as soon as one images composing a circle (or any arc) solely from tightly fitting squares (which does seem to be the way that *kalām* Atomists envisioned their atoms)—that is, joining the squares such that neither do the bottom corners overlap nor is there any gap between the upper corners (see diagrams). In the case of the overlap, the indivisible atom would be divided, while in the case of the gaps there would be increments smaller than the smallest measure, both of which the Atomists deny.



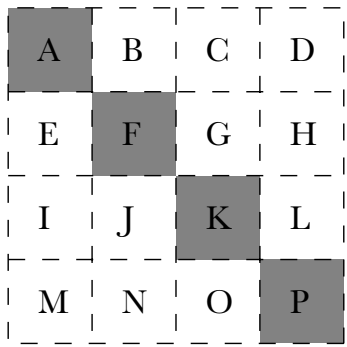
9. Avicenna's argument is that, if atoms were indivisible, the Pythagorean theorem, $A^2 + B^2 = C^2$, could not even be approximately true. According to the *mutakallimūn*'s own description of their atoms, they are cuboidal. So, construct a three-by-three piece of atomic space thus:



According to the Pythagorean theorem, the hypotenuse should equal $\sqrt{18}$; but according to the figure, the equation becomes $3^2 + 3^2 = 3^2$, or $9 + 9 = 9$, which is clearly false. It also does no good to complain that the hypotenuse of an atom is larger than the side, for whether the side or the hypotenuse of an individual atom is set at unit length 1—which by the Atomists' own assumption would be the smallest possible magnitude—there will be a magnitude smaller than 1, and so there will be a magnitude smaller than the smallest magnitude, which is absurd. This result is obvious if the hypotenuse of the atom is set at unit length 1, since the side of the atom is smaller. Similarly, if the side is set at unit length 1, the hypotenuse's magnitude can be calculated using the Pythagorean theorem as $\sqrt{2}$, which is 1.4142…, and so once more there is a magnitude, 0.4142…, which is less than the indivisible and purportedly smallest possible unit 1.

داخلٍ يماسّـــه، والمماسّ مساوٍ للمماس، والمساوي لا يكون أكبر. والمثلث القائم الزاوية؛ إذا كان كل واحدٍ من ضلعيه عشرة عشرة كان وتر القائمة جذر مِئتين، وهو إمّا محالٌ لا يوجد، وإمّا صحاح وكسّر، وأجزاء لا تنكسر.

(6) They say, however, that vision errs with respect to the circle and right triangle, and these figures are, strictly speaking, made up of successively indented layers. They nonetheless do not deny the existence of a square, for example, having the following description. Let one construct a straight line from four atoms, as well as three other lines like it. Now, take one of the lines, AD, and let us superimpose it on another line EH such that there is no space whatsoever between them, and in like manner IL is after EH, and MP is after IL until a surface A[DM]P is produced, according to their doctrine. Now, it is commonly accepted [according to their doctrine] that there is no space left between these atoms in the surface to accommodate another atom, so four atoms—namely, the first, [A] (from line AD),[10] the second, [F] (from line EH), the third, [K] (from line IL), and the fourth, [P] (from line MP)—are the diagonal.[11]



10. **Y** has inadvertently omitted a number of lines found in **Z**, **T**, and the Latin, which read *La-nuṭabbiq bihi ʿalá khaṭṭ* jd, *wa-ḥattá lā yakuna baynhumā saʿah shayʾ wa-kadhālika* hz *baʿd* jd *wa-*ḥṭ *baʿd* hz *ḥattá yaḥdutha saṭḥ* aṭ *ʿalá madhabihum. Fa-maʿlūm annahu laysa yasaʿu bayn hādha al-ajzāʾ fī al-saṭḥ juzʾ ākhar al-battatah, fa-l-ajzāʾ al-arbaʿah allatī hiya al-awal min khaṭṭ* ab…, corresponding with the translated lines "and let us superimpose it on another line EH such that there is no space whatsoever between them, and in like manner IL is after EH, and MP is after IL until a surface A[DM]P is produced, according to their doctrine. Now, it is commonly accepted [according to their doctrine] that there is no space left between these atoms in the surface to accommodate another atom, so four atoms—namely, the first, A (from line AD)…."

11. Reading *huwa quṭr,* which **Y** secludes.

(٦) لكنهم يقولون إنَّ البصر يُخطيء في أمر الدائرة والمثلث، وإنّما هي أشكال مضرّسة، ومع ذلك فإنّهم لا يدفعون وجود المربع القائم الزوايا مثلاً على هذه الصفة. ليركّب من أربعة أجزاء لا تتجزأ؛ خط على الاستقامة وليركّب لمثله منه خطوط ثلاثة غيره، وليؤخذ منها خط مثل خط (آ ب) ولنطبق به على خطّ (ج د)، وحتى لا يكون بينهما سعة شيء وكذلك (ه ز) بعد (ج د) و(ح ط) بعد (ه ز) حتى يحدث سطح (ا ط) على مذهبهم. فمعلوم أنه ليس يسع بين هذا الاجزاء في السطح جزء آخر البتة،

There are only two possibilities. One possibility is that these atoms must be touching one another along [a line] projected between atoms A and P, in which case there is a straight line composed from them—namely, the diagonal—but it will be equal to the two equal sides. This, however, is far from acceptable, for it is known from observations that the diagonal in a case like this is longer than the side. The other possibility is that these atoms must be separated from one another. In this case, there is either an empty space between them or not. If there is an empty space between them, then the lines were not superimposed on one another with no empty space between them; but that is what was done. This is a contradiction. If there is no empty space between them, then there must be something between them, whether an atom or more or less than [an atom]. If it is less than an atom, then the atom has been divided. If it is an entire atom or two atoms, it will always follow that the length of the diagonal either does not fall short of the two sides together, or it falls short of the combined length of the two sides by a single imperceptible atom.[12] The diagonal, however, always falls short of the combined length of the two sides, and [the length by which it falls short] is perceptible and a significant magnitude.

12. Avicenna's point here is that the Atomists cannot explain the well-known property of the triangle that the combined length of any two sides of a triangle always exceeds that of the third side. So, if more than a single atom were inserted between each of the squares of the diagonal, the hypotenuse would exceed the combined length of the two sides. If a single extra atom were inserted between each of the squares of the diagonal, the length of the two sides would exceed that of the hypotenuse by only a single atom; but, of course, a right or obtuse triangle puts the lie to this suggestion.

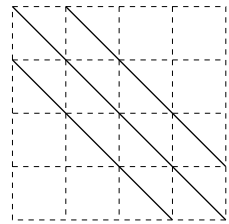
فالاجـزاء الأربعـة التي هي الأول من خطّ (آ ب) والثانـي من خط (ج د) والثالث من خـط (هـ ز) والرابع من خط (ح ط) ، لا يخلو إمّا أنْ تكون هذه الأجزاء يماسّ بعضها بعضاً على سـمتٍ بين جزء (آ) وجزء (ط) ، فيكون خطاً مسـتقيماً مؤلفاً منها وهو القطر، ويكون مسـاوياً للضلعين المتسـاويين، وهذا بعيد عن الجواز. فمعلوم بالمشاهدات أنَّ القطـر فـي مثل هذا أطول من الضلع. وإمّا أنْ تكون هذه الأجزاء متباينة؛ فحينئذ إمّا أنْ يكون بينها فُرج أو لا يكون، فإنْ كان بينها فُرج فلم تطبق الخطوط تطبيقاً لا فُرج فيه، وقد فعل ذلك، هذا خُلْف. وإنْ لم يكن بينها فرجة، فيكون فيما بينها شيء لا محالة إمّا جزء أو فوقه أو بعض جزء. فإنْ كان بعض جزء فقد قُسّـم الجزء، وإنْ كان جزء بتمامه أو جـزءآن لزم دائماً أنْ يكون طول القطر إمّا أنْ لا ينقص عن الضلعين معاً، أو ينقص عن ضعف الضلعين بجزءٍ واحدٍ غير محسوس، ونقصان القطر عن ضعف الضلعين دائماً فهو أمرٌ محسوس وقدر كبير.

(7) They claim, however, that this line is not straight, but indented according to a form like such: ~o~o~o~o.[13] I mean that there is one atom and another atom diverging from it in some direction, then another atom along the projected path of the first, followed by another diverging atom (as if each diverging atom is placed in the common [space] separating two atoms arranged along a single projected path). It will soon become obvious that [this view] is faulty and futile. That is because the two squares that are arranged along the single projected path are either contiguous or not. On the one hand, if they are contiguous, then all the atoms arranged along the single projected path encounter one another such that a continuous straight line is formed from them. So, from the two arrangements, there would be two straight lines, one of

13. This figure is the one that appears in **Z** and **T** and is here reproduced on the Arabic side; however, there are at least two other different depictions of the situation that Avicenna is trying to represent in the manuscripts: these (represented below) are found in the Bodleian manuscript, which appears in **Y**'s text, and in the margins of **T**. None of the three seems to be particularly helpful.



Bodleian



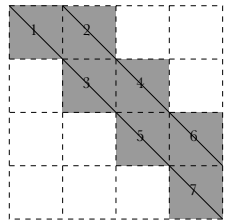
Tehran ms marginalia

(٧) وأمّا ما يقولون إنَّ هذا الخط لا يكون مستقيماً بل مضرّساً على صورةٍ هكذا : ~o~o~o~o~ . أعني أنْ يكون. جزء وجزء آخر منحرف عنه إلى جهةٍ، ثم جزء آخر في سمت الأول، ثم جزء ينحرف عنه، وكأنَّ كل منحرف عنه موضوع في الفصل المشترك بين المرتبتين في سمتٍ واحدٍ – فإنّه يظهر فساده وبطلانه عن قريب. وذلك لأنَّه إمّا أنْ يكون المرتّبان في سمتٍ واحدٍ متماسّين أو غير متماسين، فإنْ كانا يتماسان فكل أجزاء مرتبة في سمتٍ واحدٍ متلاقية، بحيث يتصل منها خطٌ مستقيم، فيكون من الترتيبين خطان مستقيمان موضوعٌ أحدهما بجنب الآخر؛ فلا تضريس. وإنْ كانا غير

which is placed next to another. In that case, however, there is no indentation.[14] If, on the other hand, they are not contiguous, then there must be an atom between them, in which case [the line] is not indented, but continuous along a straight line.[15] It would be indented only if part of the atom occurs in that which is in between the two and part of it outside. The atom, however, does not have parts; and, instead, only an entire [atom]

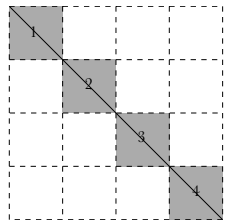
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14. The present argument and the ones that follow are based upon different ways by which one might construct the Atomists' indented diagonal. In the present case, each atom must be contiguous with the next, where the series of "projecting" and "diverging" atoms might be presented thus:



So atom 2 represents the atom diverging from the first atom (1); 3 is the atom along the projection of the first, and so on; however, in this case there is not a single indented line, but two straight lines along the two projections "1, 3, 5, 7" and "2, 4, 6." Thus, the intended indented line is not formed.

15. In this case, the atoms in the series are not contiguous and so might be presented thus:



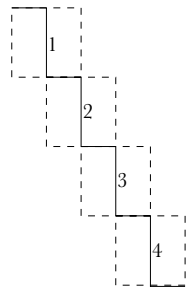
While there is only a single line, it will not be indented in such a way as to avoid the initial objection (presented in paragraph 6) that the Atomist cannot even approximate the Pythagorean theorem.

متماســين فلا محالة أنْ يكون بينهما جزء ، فلا يكون مضرّساً بل يتصل على الاستقامة . إنّمــا كان يكون مضرّســاً لو كان بعض الجزء واقعاً فيما بينهمــا وبعضه خارجاً والجزء لا يتبعّض ، بل إنّما يكون كله بينهما أو لا شــيء منه بينهما . وإذا كان كله بينهما فليس هناك

would be between the two or nothing at all.[16] When an entire [atom] is between the two, there will not be anything there apart [from what is in between the two], but neither will there be any indentation; and, instead, it will fall along a straight line in just the way that they agree that atoms are capable of being ordered into a straight line. If they think that in relation to what is between the parts arranged along a single projected path, there are two atoms not in the order of the projected path, but along the width so as to be indented, then each atom would have something in relation to what is between the two atoms and something apart from it; but then they would have made each atom divisible.

(8) What they say about the straight line works, which, again, is that [the line's] first atom is laid out at the point A, with the line being made to coincide with [a line on] the surface [ADMP] so that it meets point P. Now, it is known that this is possible; and so, then, it is clearly possible to construct a straight line between the two atoms, from which it necessarily follows that some direction belongs to the atom different from those that are possible for [the Atomists].[17] Now, when it is, in fact,

16. In this case, we are to imagine that, instead of being separated by a complete atom, the diagonal is formed by slightly offsetting the atoms, thus:



Such a scenario only works if the atoms are divisible or have parts. So, for example, the first atom (1) can be divided into that part that does *not* overlap 2 and that part that *does* overlap 2.

17. The atoms of the Muslim Atomists were cubical. Moreover, they believed that there were only six directions—up, down, front, back, left and right—corresponding with the six surfaces of these atoms. Avicenna's point here, which he argues for in depth at 3.13, is that there are more than just six directions. Thus, as in the present case, there also would be the directions defined by the two extremities of a diagonal running through one of the Atomists' cubic atoms. See Alnoor Dhanani, *The Physical Theory of Kalām,* 113–117, who argues that the atoms of Muslim Atomists are cubical in shape and so have six sides or directions (*jihah*).

زوال وتضريس البتة، بل يكون هناك وضْعٌ على الاستقامة، كما هو مقبولٌ عندهم أنَّ من شأن الأجزاء أنْ ينتظم منها خط مستقيم. فإنْ جعلوا فيما بين المُرتبين على سمتٍ واحدٍ جزءين لا في نظام السمت بل عرضاً حتى يتضرّس، فقد جعلوا من أمر كل جزء شيئاً فيما بين الجزئين؛ وشيئاً زائلاً حتى يكون تضريس، فجعلوا كل جزءٍ منقسماً.

(٨) وما يقولون في خطٍ مستقيم يُعمل ثم يُرَكّب جزؤه الأول على نقطة (آ) ويطبق على السطح حتى يلقى الخط نقطة (ط)، ومعلوم أنَّ هذا ممكن. فبيّن إذن أنّه يمكن أنْ ينْظمَّ بين الجزئين خط مستقيم، فيلزم من ذلك وجود جهةٍ للجزء غير الجهات التي لهما. وإذا ضحّ أنّه يمكن أنْ يُفرض بين الجزئين خط مستقيم، على أي وضعٍ كان الجزءان،

possible to posit a straight line between two atoms, whatever the placement of the atoms, we can place two atoms on top of the two atoms A and P, with nothing between the two [atoms placed on top themselves], and construct a line between them, superimposing it on the diagonal. So how are the points that follow the first one that is placed on the point A going to be? Will [the second point of line that they form] fall on the second point of the diagonal, which is the second point [F] of the line EH?[18] Or will it fall at the common space separating [the two] so that it is contiguous with both of them, such that they parallel some common space of separation and do not encounter one another? [In that case,] either that empty space is smaller than the space that [an atom] occupies (in which case there is something smaller than the size of that which cannot be divided), or it is [equal to] the space of it (in which case the contradiction[19] that we previously mentioned arises).[20] If [the second point] falls on itself [that is, on point F], the straight line corresponds with the [original] diagonal [AFKP], and what corresponds with the straight line is straight so as to equal it.

(9) It is simply amazing what they are forced into in this situation—namely, that it is possible for an atom to occur on top of the common division between two atoms and that one and the same [atom] can move a little so that it coincides with only one of them. On the one hand, if that with which it coincides when it is contiguous with the first and the second is the very same thing as that with which it coincides when it is contiguous with only the second, then it is still touching [the first] when it

18. The Arabic text's *ḥ* needs to be corrected to a *j* (rendered as *E* in the translation) in order to conform to Avicenna's earlier lettering in par. 6.

19. The "contradiction" in paragraph 6 is that spaces will exist between the atoms when it was posited that there are no spaces between them. That contradiction does not seem to apply in the present case; the problem here seems to be the next issue mentioned in par. 6, that the length of the diagonal will exceed the combined length of the two sides, in which case there could not be a triangle.

20. **Y** has (inadvertently) omitted the line *fa-yakūnu shayʾ aṣghar min ḥajm mā lā yatajazzaʾu au yakunu yasaʿuhu*, which occurs in **Z** and **T** but is omitted in the Latin. It corresponds with "(in which case there is something smaller than the size of that which cannot be divided), or it is [equal to] the space of it in the translation."

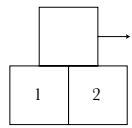
فيمكننا أنْ نضع على جزئي (آ) و(ط) جزئين ولا يكون بينهما شيء، ونُنظم بينهما خطاً ونطبقه على خط القطر، فكيف يكون حال النقط التي تتلو النقطة الأولى الموضوعة على نقطة (آ)؟ أتقع على النقطة الثانية من القطر الذي هو النقطة الثانية من خط (ج د)، أو تقع في الفصل المشترك حتى يماسّ كلاهما محاذياً لفصلٍ مشتركٍ بينهما لا يتلاقيان عليه؟ أو تكون تلك الفرجة أصغر من أنْ تسعه فيكون شيء أصغر من حجم ما لا يتجزأ أو يكون يسعه فيكون ما قدمنا من الخُلْف. وإنْ وقع عليه نفسه فقد انطبق الخط المستقيم على القطر، وما طابق المستقيم فهو مستقيم مساوٍ له.

(٩) ومن العجيب ما يضطرون إليه في هذا الموضع؛ من إمكان وقوع جزء على فصلٍ مشتركٍ بين جزئين، وهو بعينه يمكنه أنْ يتحرك قليلاً حتى يلقى أحدهما وحده، فإنْ كان الذي يلقاه وهو يماسّ الأول والثاني هو الذي كان يلقاه بعينه وهو يماسّ الثاني وحده، فيكون عند التنحي مماسّاً أيضاً؛ هذا خُلْف. وإنْ كان يلقى منه غير الذي لقيَ أولاً، فيكون قد

moved away from [it], which is a contradiction.[21] If, on the other hand, it coincides with something different from that with which it originally coincided, then it would have been divided at the [different] places where it coincided. Also that which they tried to avoid necessarily follows for them—namely, the directions exceed six, which they erroneously thought must be six but which is not at all necessary.[22] That is only recognized with respect to the division of animals' [anatomical] directions, but then it was thought that that recognized division is some necessary pronouncement for everything. The truth is that, between any two atoms sharing a common border, there is some other direction and potentially infinitely many so. This is also like the [erroneous] belief of some of them that the body has a determinate length, breadth, and depth, all of which are actual and each one of which has two limits; and so the directions are not more than six. (We ourselves shall discuss this soon;[23] and, in fact, one should know that, while the account that there are six directions is widespread and commonly accepted, it is neither true nor demonstrated.) They contradict themselves in saying that squares are the configuration of these four parts from which a large square is composed [as, for example, the squares making up the large square ADMP in figure 1], and the squares along the diagonal [AFKP] do not encounter one another at their limits that are the line nor at anything between them. Now, they are wrong about that to an unusual degree, and that is because [the squares] encounter each other at points—that is, the limit of the limit[24] is where they truly meet—not at lines, whereas between these lines there are other halves of squares with which they coincide, since the squares are divisible and so fill the empty space, which is not the case for atoms.

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21. The situation that Avicenna is picturing is something like the following diagram:



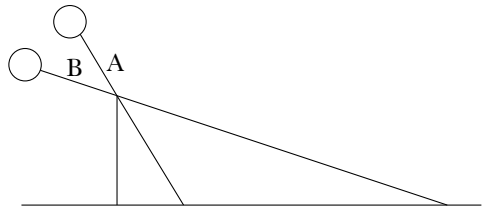
22. See 3.13.3.

23. See 3.13.3–6.

24. In other words, the line is the limit of the square, whereas a point is the limit of the line; and it is at the point defining the corner of the square where the squares of the diagonal meet.

انقسم بمواضع اللقاء ، ويلزمهم ما يهربون منه من أمر زيادات الجهات على الست ؛ التي يظنون أنّها واجب أنْ تكون ستّاً ، وليس ذلك بواجبٍ البتة . إنّما ذلك أمر قد تعورف في قسمة جهات الحيوان ، فظنّ أنَّ ذلك المتعارف – بحسب القسمة – حكمٌ واجبٌ في كل شيء ، بل الحق أنَّ بين كل جهتين متجاورتين جهة أخرى ، وذلك إلى غير النهاية بالقوة . وهذا أيضاً مثل ما يظنّ بعضهم أنَّ للجسم طولاً وعرضاً معيناً وعمقاً معيناً ، وانَّ كل ذلك بالفعل ، فيكون لكل واحدٍ منهما طرفان ؛ فتكون الجهات ستّاً ليس غيرها . ونحن سنقول في هذا عن قريب ، بل يجب أنْ يُعلم أنَّ القول بكون الجهات ستّاً أمرٌ مشهور متعارف ؛ ليس بحقٍ ولا عليه برهان . ولكنهم يناقضون ما قلناه بمربعاتٍ تكون على هيئة هذه الأجزاء الأربعة ، يؤلّف منها مربعٌ كبير ، فتكون المربعات التي على القطر لا متلاقية بأطرافها التي هي الخطوط ، ولا بينها شيء . وقد ضلّوا في ذلك ضلالاً بعيداً – وذلك لأنّها متلاقية بالنقط ، وطرف الطرف طرفٌ يصلح به اللقاء ، وغير متلاقية بالخطوط ، وبين تلك الخطوط أنصاف مربعات أخرى تملؤها ، إذ المربعات تنقسم فتسدّ الفُرج ، ولا كذلك الأجزاء .

(10) One thing that is known with certainty, about which there is no doubt or difference of opinion, is that there is a certain projected path between any two things having some placement such that, when we make a straight line between them, it either fills that projected path



or occurs along it. Now, assume that there is a body, like the Sun, that undergoes a number of motions, and also assign some body opposite it, like the Earth, and erect there a vertical upright (all of which can, in fact, exist in the intellect). Next, assume that the Sun illuminates the Earth and the upright provides a shadow corresponding with the Sun's projected path. In that case, when the Sun moves away one atom, the projected path between the Sun and the upper limit of the upright either ceases [pointing toward the exact same] limit of the shadow [projected onto the Earth] or continues [pointing toward it]. If, on the one hand, it continues [to point toward the very same point on the Earth], then there undoubtedly continues to be a projected path, and the projected path has the status of a straight line. So that other one, issuing in a straight line from the Sun to the upper limit of the upright on the Earth, will also be a straight line, like the line designated A from the two lines A and B. There will then be two distinct straight lines coming together at a single point, after which they unite into one straight line such that that line is straight together with each one of them. So the common part—that is, that

(١٠) وممّا يُعلم يقيناً لا شك فيه ولا اختلاف؛ أنَّ بين كل شيئين ذوي وضْع سمْتاً؛ حتى أنّا إذا عملنا خطاً مستقيماً بينهما فإنّه يملأ ذلك السمت أو يقع في ذلك السمت. فإذا كان جسم كالشمس يتحرّك حركات كثيرة، وقد جُعل جسمٌ بإزائه كالأرض أيضاً، ونُصب هنالك شيء نصباً قائماً - وجميع ذلك صحيح جواز الوجود في العقل - ثم كانت الشمس مضيئة للأرض، وكان المنصوب يستر على قدْر سمْت الشمس، فإذا زالت الشمس جزءاً، فلا يخلو إمّا أنْ يزول السمْت الذي بين الشمس وبين طرف المنتصب عن طرف الظّل، أو يبقى. فإنْ بقي بقي لا محالة سمتاً، والسمّت على حكم خطٍ مستقيم، فيكون ذلك الآخر، المخرج من الشمس على الاستقامة إلى طرف المنتصب على الأرض، أيضاً خطّاً مستقيماً كالخط الذي عليه علامة (ب) من خطي (أ ب) فيكون خطّان مستقيمان متباينان يجتمعان عند نقطةٍ ويتحدان بعد ذلك خطاً مستقيماً، حتى يكون

which is between the two limits of the upright and the point on the Earth—is together with each one of the two projected paths connecting the Sun and the upper limit of the rod as a single straight line. This is known to be impossible. Additionally, they have made the Sun stand opposite a single atom (that is, the one at the upper limit of the rod) from two directions, one of which goes beyond what their [theory] can project. If, on the other hand, the projected path does not remain the same and, instead, ceases [pointing toward the exact same point on the Earth], it moves away either by an atom, or more than an atom, or less. If [the projected path] ceases [pointing toward the exact same point on Earth] by either an atom or more, then the amount of motion of the Sun in the Heavens will equal the amount of motion of the extreme limit of the projected path or the extreme limit of the projected path will cover a larger distance, both of which are manifestly absurd, whereas if it is less than an atom, the atom has been divided.

(11) The same holds when we submit a straight line—like the hypotenuse along a right angle, one of whose sides is shorter—to punishment. So [for example] we yank on the extreme limit of that line—one of its extreme limits being against a wall and the other on the ground (where the height of the wall is less than the space between the [right] angle and the ground)—so that [the line] is stretched out,[25] letting [the part that is stretched out] be cut off.[26] In that case, when we yank on the extreme limit that is on the ground so that this line is stretched out one atom, and then[27] the other extremity is yanked on so as to be stretched

25. The verb *jarrara* is the intensive form of *jarra*. To capture its intensive nature, I have slightly overtranslated it as "to yank so as to stretch out."

26. The text's *jadᶜ*, which most of the MSS have, literally means "what is cut off [by an act of mutilation] of the anterior parts of the nose, to its further, or utmost part" (see Lane *s.v.* J-D-ᶜ). One of the MSS read *jidhᶜ* (tree trunk), which is followed by the Latin (*lignum*) and which Paul Lettinck also follows ("Ibn Sīnā on Atomism," 37). While "tree trunk" might appear to make more immediate sense, I believe that *jadᶜ*, which is clearly the *lectio difficilior,* is the intended sense, as I hope will become clear below.

27. Reading *fa* with **Z**, **T**, the Latin (*si igitur*), and two of the earlier MSS consulted by **Y**, for **Y**'s preferred *wa* (and).

ذلك الخط مستقيماً مع كل واحدٍ منهما . فيكون الجزء المشترك – وهو الذي بين طرفي المنتصب ونقطةٍ على الأرض، هو مع كل واحدٍ من السمتين المتصلين بين الشمس وبين طرف المقياس – خطاً واحداً مستقيماً ، وهذا معلوم الاستحالة. ومع ذلك فقد جعلوا جزءاً واحداً ، وهو طرف المقياس، توازيه الشمس من جهتين، إحداهما خارجة عن السمْت الذي لهم. فإنْ لم يثبت السمْت بل زال، فإمّا أنْ يزول جزء أو أكثر من جزءٍ أو أقل. فإنْ زال جزء أو أكثر فتكون حركة الشمس في السماء مساوية لحركة طرف السمْت ومسافتاهما متساويتان، أو يكون طرف السمْت بقطعٍ أكثر، وجميع هذا ظاهر الإحالة. وإنْ كان أقل من جزء فقد انقسم الجزء .

(١١) وكذلك إذا أوقعنا خطّاً مستقيماً كالوتر على زاوية قائمة، أحد ضلعيها أقصر، فجررنا طرف ذلك الخط – وليكن جِذعاً – أحد طرفيه على حائط والآخر على الأرض، وارتفاع الحائط أقصر من البُعْد بين الزاوية والأرض. فإذا جررنا هذا الخط من الطرف الذي على الأرض جزءاً ؛ فكان ينجّر الطرف الآخر جزءاً ؛ وجب من ذلك أنْ

out one atom, it should follow that what is cut off the two sides would be the same. That, however, is not the case; and, instead, less is cut off from the smaller side.[28] Whatever follows as a result of fragmentation or loss of continuity [among the atoms] is nothing but a difference in the iron and adamant used and the wood used; but the two intervals will be equal in all [cases]. Even then, should we start again [by] placing a straight line, corresponding with the length of the stretched body, at the extreme limit to which the stretched body was brought, it would come to precisely where the stretched body comes.

(12) The same thing holds for the atoms at the edge of the millstone, and what we related about the group—[again the one] who were forced to affirm fragmentation and the fragmented thing—does necessarily follow on their [view, namely, the view of the Atomists].[29] [That outcome follows] whether the fragmentation of [the body] occurs inasmuch as its atoms are separated from each other by having gaps [between them] (in which case the measurement of the millstone increases during the motion), or inasmuch as the atoms separate from one another in such a way that there is a mutual replacement of the places, so that the whole retains its size (in which case they cease being distinct and the atoms do not retain the positions that they had vis-à-vis one another in the millstone).

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28. In other words, assuming an initial right triangle ABC, where AC is the hypotenuse and AB is less than BC, we are asked to calculate how much longer a new hypotenuse AC′ (i.e., AC + x) would be for (BC + 1) and then again for (AB + 1). Since, on the atomic theory, AC is being stretched only one atom along the ground or one atom along the wall, then *x*—the difference between AC and AC′—should also be only one atom, according to the theory. In fact, however, *x* is smaller when one atom is added to AB than when one atom is added to BC. While the formal proof for this claim is complex, a concrete example will give one a feel for the argument. So, for example, start with a triangle AB = 3, BC = 4, AC = 5, and then calculate AC′ (i.e., (AC + x) when AB is increased by one atom to equal 4, while BC remains the same. Then calculate AC′ when BC is increased by one atom to equal 5, while AB remains the same. When AB is lengthened by one atom, the difference between AC and AC′, is 0.6568542494492, while it is 0.830951894845 when BC is lengthened by one atom. So, as Avicenna notes, what is cut off from the hypotenuse when it is extended toward the shorter side of the triangle is less than what is cut off from it when it is extended toward the longer side. A variation of this argument appears in al-Ījī (see Sabra, "*Kalām* Atomism as an Alternative Philosophy to Hellenizing *Falsafa*," 270–71, "Argument 5.4(3)."

29. For the millstone example, see 3.3.15–16.

يكون ما يُقطع من الجانبين سـواء ، وليس كذلك ، بل يكون القطع من الجانب الأقصر أقل . وليـس ذلك ممّا يتبع تفكّكاً أو يفـرّق الاتصال البتة ، وإلاّ لا ختلف في المعمول من الحديد والألماس والمعمول من الخشب ، بل يستوي البُعْدان في الجميع . وإلاّ لو استأنفنا وضع خطٍ مسـتقيم على الطرف الذي نزل إليه المجرور بقدر طول المجرور ، كان لا يقع إلا حيث يقع عليه المجرور .

(١٢) وكذلك الأجزاء التي في طرف الطاحونة ويلزمهم ما حكيناه عن قوم أحوجوا هـؤلاء إلى القـول بالتفكّك والمتفكّك ؛ إمّا أنْ يكون تفكّكه بـأنْ تتزايل أجزاؤه بفُرَجٍ تقع لها ، فيجب أن تزداد مساحة الرحى عند الحركة ، أو بأنْ تتزايل الأجزاء على نحو تبادل الأمكنـة ، حتى تبقى الجملة على حجمها ، فتكون العلامات تزول ولا تبقى الأجزاء التي في الرحى على الأوضاع التي كانت لبعضها عند بعض .

(13) This is a response to those who maintain [that] fragmentation [occurs] and [that] slow motions are interspersed with rests. What do they say about the galloping horse? Do we have any doubt that its motions are greater than its rests? If the number of rests were greater, the slowness and slowing down would be clearly obvious; and, even if they deny this about the horse, they cannot with respect to the shot arrow. In addition, the ratio of the galloping horse and flying arrow to the procession of the Sun is not one that can be squeezed out by increasing the rests [during] the galloping and flight. That is because, if the motions were equal to the number of rests in the galloping and flight, while the Sun has no [rests], but only motions, the galloping horse and flying arrow would [still] be moving at half the speed of the Sun, but that is not the case at all. The fact is that this is not even comparable to that [actual ratio]. The galloping horse is known [to move slower than half the speed of the Sun] from immediate observation. As for the flight of the arrow, it has been tested among a group [of archers] who stand at certain distances from given targets, where each one shoots his arrow exactly when the arrow of his companion hits nearby, and so, in that, the dissimilarity [between the motions of a flying arrow and the Sun] was learned. Were one to consider this ratio closely, one would find that it is less than the ratio of one part of one thousand parts of [the Sun's speed]. From that, it necessarily follows that the horse and the arrow would undergo thousands of rests [for] each single motion. One would simply not be able to see their motion, which would not be apparent because the resting would overwhelm it! Even if some [motion] did appear, it would be minuscule. Reality is different from this, for motion does appear without any apparent rest.

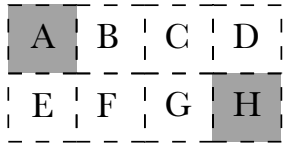
(١٣) هــذا جواب مَنْ يقول بالتفكّك وتخلّل الســكونات الحركات البطيئة. وماذا يقولون في فرسٍ شــديد العدو؛ هل نشــك في أنّ حركاته أكثر من ســكناته؟ ولو كانت الســكنات أكثر لكان البُطْء أظهر والفتور أوضح. وانْ أنكروا هذا في الفرس، لم يمكنهم أنْ ينكروه في الســهم المرمي. ومع ذلك فإنَّ نســبة حركة عدو الفرس وارتماء السهم إلى سير الشمس، ليست نسبة تقتضيها زيادة حركات العدو والارتماء على السكنات. وذلك لأنَّه لو كانت الحركات في الركض والارتماء مســاوية للســكنات، وكانت الشمس ليس لها إلاّ الحركات فقط؛ لكان ركض الفرس أو ارتماء الســهم نصف سير الشمس، وليس الأمر كذلك، بل لا قياس لهذا إلى ذلك. أمّا ركض الفرس فمعلومٌ بالمشاهدة، وأمّا ارتماء السهم فقد جُرّب في قومٍ يقفون على أبعاد مرامي ســهامٍ، وكل واحدٍ يرســل سهمه مع سقوط ســهم صاحبه بالقرب منه، فعُرف التفاوت في ذلك. ولو اســتقصى المستقصي في هذه النسبة، لوجدها أقل من نسبة جزءٍ من أُلوف أجزاء منه. فيجب من ذلك أنْ يكون الفرس أو الســهم يسكن أُلوف سكناتٍ ويتحرك واحدة، وكان يجب أنْ لا تُرى حركته ولا تظهر لغلبة الســكون عليها، وإنْ ظهر منها شيءٌ كان قليلاً يسيراً. والوجود بخلاف هذا؛ فإنَّ الحركة هي الظاهرة والسكون لا ظهور له البتة.

(14) One thing that will clear this up is what we know about what is heavy[30]—namely, whenever there is an increase in heaviness, the motion downward is faster. So assume some heavy object is undergoing a downward motion with certain pauses intermingled with it. If we then perpetually increase the magnitude of the body so as to require that the heaviness increase, we shall, in that way, at some moment reach a motion with which no rest is intermingled. In that case, when we double that body, [that larger body] would necessarily move faster without the occurrence of any interspersed rest to account for the slowness [of the initial body's motion]. The same holds if we were to assume that a single atom were undergoing motion without pause, and then [we] joined something heavy to it. Here is something that is amazing. Grant that something is moved through calm air or a void (which they acknowledge). In other words, [it is moved through] something in which there is no opposition. Also, grant that the principle of [the mobile's] motion is a certain inherent inclination or tendency toward some direction. [It is just amazing, then,] that that tendency and inclination should remain the same throughout the distance [covered], while the motion does not; and, in fact, a rest occurs during slow motion, as if the inclination grows tired of working and so chooses to take a rest and then, feeling refreshed, gets back at it. Just how does some obstructing and neutralizing cause come to be in the calm air or a void? Also, in what way can it be said that the inclination and tendency in it are used up and renewed?

30. For a brief discussion of the role of heaviness and speed, see 2.8.11.

(١٤) وممّـا يوضّح هذا مـا نعلمه من أنَّ الثقيل، كلما ازداد ثقلاً، كانت حركته إلى أسفل أسرع. فإذا كان ثقيل ما يتحرك إلى أسفل تخالطه وقفات، فإنْ زدنا مقدار الجسم دائماً نطلب زيادة الثقل، بلغنا بذلك وقتاً مّا إلى حركةٍ لا يخالطها سكون. فإذا ضممنا إليها ضعف ذلك الجسم لزم أنْ يتحرك أسرع، من غير تخلّل سكونٍ يكون سبباً للإبطاء. وكذلك لو فرضنا جزءاً واحداً يتحرك الحركة التي لا وقوف لها؛ ثم اتصل به ثِقْل. ومن العجائب أنَّه إذا تحرّك المتحرّك في هواء راكد أو في خلاء مقرون به، وهو ممّا لا مقاوم فيه، ويكون مبـدأ حركته ميلٌ فيه، أو اعتمادٌ إلى جهـة، أنْ يبقى ذلك الاعتماد وذلك الميل في تلك المسافة بعينها ولا تبقى الحركة، بل يحدث سكونٌ يقع فيه البُطء، كأنه يعرض كَسَل متعب، فيميل بالاختيار إلى السـكون ثم ‹يؤوب› إليه النشاط. وكيف يحدث سبب يمنع ويبطِل فـي هواءٍ راكدٍ أو خلاء وكيف يمكن أنْ يقال أنَّ الميل والاعتماد يبطلان فيه ويتجددان؟

(15) One of the repugnant consequences of the atom is the following: We know with absolute certainty that, when a moving object is moved from right to left and another is moved from left to right along two parallel, straight lines, the two keep getting closer to one another until they meet opposite each other and then depart from one another. So let



us posit one set of four atoms and another set of four, and construct from each set of the four a line and place one of the lines next to the other (just as we did for the square built of atoms). Now, we posit an atom on the right extreme of one of them and an atom on the left extreme of the other. We set the two atoms in motion until the one that was on the right arrives at its other extreme and the one that was on the left arrives at its other extreme, also imagining that they move at the same speed. In that case, the two will [at some point] be opposite one another, and then they will depart from one another. Now, the two must be opposite one another either along the [first] half or after the half. If the opposition occurs precisely when the latter is at the second atom from the extreme from which it is moved and the former is at the second atom from the extreme from which it is moved, then the two are not yet opposite, because the second atom from both of [the points of departure] is the third from the other, according to what was laid down.

(١٥) ومن الشناعات التي تلزم الجزء أنّا نعلم يقيناً لا نشك فيه أنّه إذا تحرّك متحرّك من اليمين إلى اليسار، ومتحرّك آخر من اليسار إلى اليمين على خطّين متوازيين مستقيمين؛ أنهما لا يزالان يتقاربان حتى يلتقيا متحاذيين، ثم يتفارقان. فإذا فرضنا أربعة أجزاء لا تتجزأ، وأربعة أخرى، وركّبنا من كل أربعةٍ خطّاً، وكان أحد الخطّين موضوعاً بجنب الآخر - كما فعلنا في المربع الذي أنشأنا من أجزاء لا تتجزأ - وفرضنا على طرف أحدهما الطرف الذي على اليمين جزءاً، وعلى طرف الآخر، الطرف الذي يلي اليسار جزءاً، وحركنا الجزئين حتى صار الجزء الذي على أحد الخطّين وعلى طرفه الأيمن نافذاً إلى طرفه الآخر، والجزء الذي على طرف الخط الآخر وعلى طرفه الأيسر نافذاً إلى طرفه الآخر، وتوهمنا أنَّ حركتيهما متساويتان، فتحاذيا وتفارقا؛ فلا يخلو إمّا أنْ يكون تحاذيهما على النصف أو بعد النصف. فإنْ كان التحاذي إنّما يقع إذا كان هذا على الثاني من الطرف الذي تحرّك عنه، وذلك على الثاني من الطرف الذي تحرّك عنه، فبعد لم يتحاذيا، لأنَّ محاذي الثاني من كل واحدٍ منهما هو الثالث من الآخر وما يوضع عليه. فإنْ

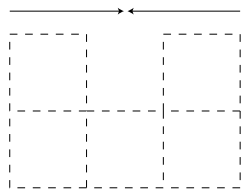
If they are opposite one another by each one being at the third atom, then the two departed from one another at the very moment of the opposition. If they are opposite when one is at the second atom on its line and the other is at the third atom of its line, then they were not moving at the same speed.[31]

(16) One of the things forced on them, which is obvious to anyone with an ounce of intelligence, is the well-known fact that, when two things are opposite one another [and] moving toward each other until they meet, and there is absolutely no external obstacle that prevents their meeting, then the two can simultaneously move until they encounter one another. When they encounter one another, they can obstruct one another; but before[32] that, there is no obstacle between them. This is something that is self-evident. So when our estimative faculty imagines three atoms forming a row and two atoms on top of the two extreme [atoms], and each one [of the atoms on top] moves without obstruction until it meets the other, they both will meet each other after not having done so.[33] In that case, their meeting each other occurs either when

31. The argument assumes atomic motion, that is, for example, when a mobile moves along AD in the diagram, at the beginning of the motion it completely occupies A, then in the next instant it completely occupies B, and so on for C and then D. In other words, the mobile cannot continuously move along the atomic line, since, then, when some mobile, *x,* which is itself an indivisible atom, starting at A, is halfway over E and F, both of which are also purportedly indivisible, an atom would be conceptually divided (for *x* would be *half* over E and *half* over F), which is a contradiction. Given the assumption of atomic motion, Avicenna has us construct two atomic lines AD and EH. He then has some mobile, *x,* starting at A move to the right until it reaches D, and another mobile, *y,* moving at the same speed as *x,* start at H and move to the left until it reaches E. Now, maintains Avicenna, *x* and *y* must pass by each other, that is, be opposite one another, at some point during their motion, and he wants to know when. At the first instant after moving, *x* is at B while *y* is at G, and so they are not passing by each other; however, at the next instant, *x* is at C, while *y* is at F, which means they have already passed by each other, but there will be no instant when they passed by each other.

32. Reading *qabl* with **Z**, **T**, and the Latin (*ante*) for **Y**'s (typographical error) *qīla* (it was said).

33. The situation Avicenna is describing is represented in the following diagram:



تحاذيا – بأنْ يكون كل واحدٍ منهما على الثالث – فهما في حال التحاذي متفارقان وإنْ تحاذيا ، وأحدهما على الثاني من خطّه والآخر على الثالث من خطّه ، فليست حركتاهما على السواء .

(١٦) وممّا يلزمهم لزوماً يظهر لكل ذي عقل ما نعلمه أنّه إذا تقابل شيئان لكل واحدٍ منهما أنْ يتحرك إلى الآخر حتى يلقاه ، ولا مانع له البتة على لقاء الثاني خارجاً ، فلهما أنْ يتحركا معاً حتى يلتقيا . فإذا التقيا أمكن أنْ يتمانعا ، وقبل ذلك لا تمانع بينهما ، وهذا شيءٌ بيّنٌ بنفسه . فإذا توهمنا ثلاثة أجزاء على صف ، وعلى الطرفين جزءان ، لكل واحدٍ منهما أنْ يتحرك حتى يلقى الآخر ولا مانع ، فإنَّ لهما جميعاً أنْ يتحركا إلى أنْ يلتقيا

each one of them is completely situated at the middle atom, having completely moved into it, in which case the two are interpenetrating one another, or each one of them covers part [of the way] until they encounter one another, and so, consequently, the middle atom, the two extreme atoms, and the two moving atoms are divided. Now, lo and behold, what do they say against this? That it is impossible for both to move together because of the impossibility of being divided! It is as if, when one of them is moved and the other rests, [the other's] motion just peters out.[34] So, if the other wanted to move and the one is aware of that, then either [(1)] the one stops [because of the other's intention], or [(2)] some cause comes from the other that forcibly stops the one, or [(3)] the one stops as a result of encountering the other. [Against (3)], it is no more fitting that one as opposed to the other should get there before the encounter. Also [against (1)] no rational individual is ignorant of the fact that, should both of them want to move at the same time, the intention of one of them to move does not in itself impede its counterpart from moving—[that is,] until they meet one another. It is just absurd, then, to say that this is an impediment because the other had a mind to move. Next [in response to (2)] how is that a cause that hinders [the one's] power to push away the impediment such that both remain at a standstill while neither yields? The two are not touching each other, nor are they stuck to what is underneath them, nor is there some influence to impede the other in either of them, nor is there any external impediment. In short, when the two are hindered and still continue to be so, one must provide some nonvarying state so that the two hinder each other [from moving]; but that state [on the Atomists' view]

34. Reading *nafidat* with **Z** and **T** for **Y**'s *nafadhat* (to pierce).

بعدما ليسا بملتقيين. فلا يخلو التقاؤهما إمّا أنْ يكون وكل واحدٍ منهما مستقر على كمال الوسط وقد انتقل إليه بكماله فيكونان متداخلين، أو كل واحد قطع شيئاً إلى أنْ التقيا. فإنْ كان كذلك، فقد انقسم الجزء الوسط والجزءان الطرفان والجزءان المتحركان. والعجب من قولهم على هذا إنَّ هذا يستحيل فيه أنْ يتحركا معاً لا ستحالة الانقسام، كأنَّ أحدهما إذا تحرّك والآخر ساكن نفدت حركته، فإنْ كان الآخر يريد أنْ يتحرك يشعر بذلك فيقف، أو يقفه سببٌ واردٌ من الآخر إليه يقسره، أو يقفه بملاقاة الآخر له، وليس سبق الآخر إلى الملاقاة أولى من سبق هذا. وليس يخفى على العاقل أنَّه إذا أُريد تحريكهما معاً، لم يكن قصد أحدهما ليتحرّك في نفسه حابساً لصاحبه عن أنْ يتحرك إلى أنْ يلقاه. فمن المحال أنْ يقال إنَّ هذا تحبيسٌ بسبب أنَّ الآخر يهمّ أنْ يتحرك. فكيف يكون ذلك سبباً معاوقاً لقوة الدفع من الحبْس حتى يقفا ولا يطيعان وليسا بمتماسين ولا ملتصقين بما تحتهما، ولا في أحدهما تأثير حابسٍ من الآخر، ولا من خارجٍ حابس؟ وبالجملة؛ يجب أنْ يحدث عند

is nothing but running into each other. Who is satisfied by the claim that the impossibility of division holds the two in check and makes them such that they don't yield to what pushes and sets [them] into motion? Now, if one of them were to have something that pushes it, while the other does not, it would be pushed and respond to some cause; but when it so happens that there is something present pushing the other as well, and neither this one nor that one responds—right, let someone be satisfied with [that]! As for the sane person, he will deem the obvious impossibility of this impeding a reason for abandoning [the view that atoms] are absolutely indivisible, not that the [purported] absolute indivisibility [of the atom] is a reason for this impeding.

(17) Now, when you expand upon and consider closely what we have presented briefly, you will become absolutely certain of the falsity of this school of thought. Also, when this school of thought and its contrary are false, the truth must lie in its contradictory opposite—namely, that the single body does not have an actual part but that it is potentially divisible infinitely.

احتباسهما – بعد الاستمرار – حالٌ غير التباين حتى يتمانعا ، وتلك الحال ليست غير المصادفة . ومَنْ قنع بأنْ يقول إنَّ امتناع القسمة تحبسهما وتجعلهما غير مطاوعين للتحريك والدفع ولو كان لأحدهما دافع ولم يكن للآخر دافع لاندفع وأجاب بسبب . لكنه لما اتفق حضور دافع للآخر صار لا هذا يجيب ولا ذاك : فليقنع . وأمّا العاقل فإنّه يجعل ظهور استحالة هذا الاحتباس سبباً لبطلان منع الانقسام ؛ لا منع الانقسام سبباً لهذا الاحتباس .

(١٧) وأنت إذا بسطت ما أوجزنا القول فيه وتأملته ، أيقنت بطلان هذا المذهب أصلاً ، وإذا بطل هذا المذهب ومضاده معاً ، وجَبَ أنْ يكون الحق مقابله بالنقيض ؛ وهو أنّه ليس للجسم الواحد جزء بالفعل وأنّه ينقسم إلى غير النهاية بالقوة .

Chapter Five

Solution to the puzzles of those who prattle on about the atom

(1) Let us now begin to solve [the Atomists'] puzzles and complete what is appropriate to this discussion with respect to the potentially infinite divisibility of what is moved, motion, and time. That is what follows.

(2) Since they believed their claim that there is an aggregation in anything that is separable[1] to be true, they built upon it. This, however, is not something [that we] concede, if by *aggregation* one means that there are two actually distinct parts in [the body], between which there is contiguity, and if *to separate* [means] to set one of them at some distance from the other and undo the contiguity. This, then, is not conceded. If it were conceded, there would be no need to resort to *separating* in order to complete their proof; and, instead, it would turn out valid, once aggregation is established as such. [That] is because, in determinate parts, there must be no aggregation, since it impossible that an infinite number of parts actually exist, while it is necessary that there be an actual unit wherever there are many [parts]. Now, if by *aggregation* they mean the

1. See 3.3.3.

<الفصل الخامس>

في حل شكوك المبطلين في الجزء

(١) فلنشرع الآن في حلّ شكوكهم، وفي تتميم ما يليق بهذا الكلام من مناسبة المتحركات والحركات والأزمنة في هذا الانقسام غير المتناهي بالقوة؛ وما يتبع ذلك:

(٢) أمّا قولهم إنَّ كل قابلٍ للتفريق ففيه تأليف، فهو الذي لما ظنّوه حقاً بنوا عليه، وليس هذا بمسلّم. فإنْ عنى بالتأليف أنْ يكون فيه جزءان متميزان بالفعل وبينهما مماسّة؛ وأنَّ التفريق تبعيد أحدهما عن الآخر وإبطال المماسّة، فهذا غير مسلّم. ولو سُلّم لكان لا يحتاج إلى أنْ يلتجئوا إلى التفريق حتى تتمّ حجتهم، بل كانت تكون صحيحة مع ثبات التأليف تأليفاً، إذ كان يجب أنْ تكون أجزاء حاصلة لا تأليف فيها؛ لا ستحالة وجود ما لا يتناهى من الأجزاء بالفعل، ووجوب واحدٍ بالفعل حيث يكون كثيراً. وإنْ عنوا

preparedness to become many in what is a single thing in which there is no multiplicity, then this is conceded. You cannot remove this from the body; otherwise, the body would cease, since there is no way to undo the unity of the actual unit, except by making it altogether cease to be or making it many. When it does not cease to be, but becomes many [for example, it is divided into two], there remain two units whose state is like that of [the initial unit], whereas the entirety of the unity is eliminated completely only by making [the unity] cease to be. Some have reckoned that the existence of bodies that differ in the speed and difficulty with which they can be separated necessarily establishes aggregation. They said: Now, that is not because the bodies differ in genus—that is, in their specificity [as bodies]—nor because of a difference in the agent, nor [due to] the occurrence or nonoccurrence of something—as if they believe that these are the only options and believe that bodies do not differ generically. Let us concede all of that to them. Why, then, must it be solely due to aggregation? Instead, why aren't these two things—namely, the difficulty and speed with which [bodies] are susceptible [to separation]—simply accidents that just happen to bodies by which [the bodies] differ while still agreeing in the specified ways? [In this respect, they] would be just like black, white, and the rest of the accidents. So [for example] you see that, when bodies differ by being black and white, that requires that they differ by some accident other than being black and white—namely, aggregation—since [differing by being black and white] is not due to the genus, the agent, or the occurrence and nonoccurrence of something.

بالتأليف الاستعداد لأنْ تحدث كثرةٌ فيما هو واحدٌ لا كثرة فيه – فهذا مسلّم. وهذا لا تجوز إزالته عن الجسم أو يبطل الجسم؛ إذ لا سبيل إلى إبطال وحدة الواحد بالفعل إلاّ بإعدامه أصلاً أو تكثيره. فإذا لم يعدم بل كثر، بقي واحدان حالهما حاله، وجملة الوحدة لا ترفع عنه البتة إلاّ بإبطاله. وحسب بعضهم أنَّ وجود الأجسام، مختلفة في سرعة قبول التفريق وعُسْر قبوله، يوجب إثبات التأليف؛ قال: وذلك ليس لاختلاف جنس الأجسام أيّ نوعيتها، ولا لاختلاف الفاعل ولا لحدوث شيء ولا لعدم شيء، كأنَّ عندهم ليست الأقسام إلاّ هذه، وعندهم أنَّ الأجسام لا تختلف نوعيتها. فلنسلّم كل ذلك لهم، فلِمَ يجب أنْ يكون للتأليف لا غير؟ . بل لِمَ لا يكون هذان المعنيان – وهو عُسْر القبول وسرعة القبول – عرَضين يعرضان للأجسام، تختلف بهما بعد الاتفاق المذكور؛ كالسواد والبياض وغير ذلك من الأعراض؟ فترى أنَّ الأجسام إذا اختلفت بالسواد والبياض احتاج ذلك إلى أنْ يكون اختلافهما بعرضٍ غير السواد والبياض هو التأليف، إذ ليس للجنس والفاعل والحدوث وعدم الشيء.

(3) There would be something to their argument based upon halving[2] only if we were to say that the body has a certain part that is not divisible into halves, thirds, fourths, or the like, for it would it would have an infinite number of parts. We ourselves, however, in no way require that the body have parts, unless it is divided into parts; but a body cannot have already been divided into an infinite number of halves. So what they said does not follow. Most of what they say here is, "You see that . . ." when nothing is pointed to and no part marked off from another. There is no separate *this* and *that*. They are simply oblivious to the fact that that becomes *this* and *that* only by pointing and, when there is no [pointing], neither is there *this* or *that;* but when there is no *this* and *that,* how can there be a separate *this* and *that*? And [all of this] despite the fact that the distance covered is covered in a time like itself—that is, whose limits are finite, being infinitely divisible into halves through an act of the estimative faculty and positing, while having no actually existing division.[3]

(4) As for the account of the mustard seed and the mountain[4], neither one of them has divisions as long as it is not divided. So, when they are divided together, the number of their divisions is, in fact, equal (and that does go on infinitely), but the [size of] the divisions that belong to the mustard seed are smaller. The repugnancy would result only if [the divisions] were to go on infinitely in them in terms of equal magnitudes. An example of this is to let the mountain and also the mustard seed be doubled infinitely through an act of the estimative faculty or the power of God. So, just because the doubling is equal it does not result from that that the multiplied mountain and the multiplied mustard seed have

2. See 3.3.4.
3. Cf. Aristotle, *Physics* 6.2.233a2ff.
4. See 3.3.6.

(٣) وأمّـا الحجّة المبنية على الأنصاف؛ فإنّما كان يكون من ذلك شـيء لو قلنا إنَّ للجسـم جزءاً ما لم يُجزّأ نصفاً أو ثلثاً أو ربْعاً ، أو غير ذلك، فكان يكون له أجزاء بلا نهاية. ونحن لا نوجب للجسم جزءاً البتة إلاّ أنْ يجزّأ ، ولا يمكن أنْ يكون جسم قد جُزِّئ بأنصافٍ لا نهاية لها ، فلا يلزم ما قالوا . وأكثر ما يقولون ها هنا ترى أنك – إذا لم يُشر ولم يعيّن إلى جزء جزء – لا يكون ذلك مفرداً ؛ وهذا مفرد ، ولا يدرون أنَّ ذلك إنّما صار ذلك وهذا بالإشـارة. فإذا لَمْ تكن لمْ يكن لا ذلك ولا هذا ، وإذا لم يكن ذلك ولا هذا ، كيف يكـون ذلك مفرداً وهذا مفرداً؟ وعلى أنَّ المسـافة المقطوعة تُقطع بزمانٍ مثلها ، متناهي الأطراف، منقسـم بلا نهاية في الأنصاف توهماً وفرضاً ، ولا قسـم لـه وجوداً وفعلاً .

(٤) وأمّا حديث الخردلة والجبل، فإنّه لا أقسـام لأحدهما ما لم يُقسم، فإذا قسّما معاً حصلت عدّة أقسـامهما متسـاوية في العدد ، وكل واحد من الأقسـام التي للخردلة أصغر ، ويذهب ذلك إلى غير النهاية. وإنّما تكون الشناعة لو كان الذهاب إلى غير النهاية فيهما بمقادير متساوية. ومثال هذا أنَّ تُضعّف الجبل في التوهّم، وفي قدرة اللّه، إلى غير النهاية والخردلة أيضاً ، فلا يكون من ذلك أضعاف الجبل مسـاوية، في المقدار، لأضعاف

the same magnitude; rather, they will differ in determinate quantity, even though they are equal in number. What precludes things from being equal in number while not equal in magnitude—[that is,] as individuals but not collectively? The fact is that things capable of going on infinitely can be greater than others—as, for example, multiples of tens in relation to multiples of hundreds.

(5) As for [the possibility that] the divisions of the mustard seed would cover the face of the Earth,[5] let us grant them the existence of the atom and additionally judge that the mustard seed is divided into its indivisibly small atoms such that the number of them existing in the mustard seed does cover the entire Earth, should they be spread over it one by one. In this case, we do not know whether it is true or false. Perhaps there does exist in the mustard seed a significantly large quantity of the atoms so as to cover the earth's surface. Who knows the atom's measure so as to know which is the first body composed of them that includes the requisite number to cover the Earth? The fact is that, when it is conceded that the parts of the mustard seed might cover the Earth, they can offer nothing but an incredulous look. A dogmatic assertion that this is impossible, however, is not a very reliable [argument]. So, [if covering the face of the Earth with the parts of a mustard seed] is not clearly impossible with a finite number of divisions, how could its [purported] impossibility show the impossibility of infinite divisibility? Nonetheless, we are not claiming that what is possible concerning that might pass into actuality.[6]

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5. See 3.3.5.

6. **Z** and **T** additionally have *bal nusallimu annahu yajūzu an yantahiya ilá aṣghar yaᶜjizu ᶜan tafriqah li-basṭah ᶜalá al-arḍ au ghayrihi, wa-lā yaᶜjizu ᶜan qismatihi bil-farḍ wa-l-tawahhum wa-bi-wujūh ukhrá lā tuʾaddiy ilá tafrīqihi wa-taqṭīᶜihi;* "rather we are [merely] granting the possibility that [division] terminates at some smallest atom [and that there is enough] to be able to cover the Earth or the like, whether by posit, an act of the estimative faculty, or any other means that lead to its being separated and cut up." The lines are not found in three of the MSS consulted by **Z**, nor are they found in the Latin. **Y** does not note the omission.

الخردلة لأجل أنَّ التضعيف متســاوٍ، بل يكونان مختلفين في القدر، وإنْ تساويا من وجهٍ في العدد. وما الذي يمنع أنْ تكون أشــياء متســاوية في العدد، وليســت متساوية في المقدار، أفراداً ولا جملة؟ بل يجوز أنْ يكون في الاحتمال أشــياء تذهب إلى غير النهاية أكثر من أشياء، كتضعيف العشرات مع تضعيف المِئين.

(٥) وأمّا تغشية أديم الأرض من أقسام الخردلة؛ فلنسلّم لهم وجود الجزء، ومع ذلك لنحْكم بأنَّ الخردلة تنقسم أجزاؤها التي لا تتجزأ في صغرها؛ بحيث يكون عدد الموجود منها في الخردلة يغشــى الأرض كلها لو بســطت عليها واحدة واحدة، فما كان يدرينا أنَّ هذا حقٌ أو باطل؟ فعســى أنْ يكون في الخردلة من الأجزاء التي لا تتجزأ ما تبلغ كثرته أنْ تغشــى به صفحة الأرض. ومَنْ عرف تقدير الجزء الذي لا يتجزأ، حتى يعرف بذلك الجسم الذي هو أول جسم مركب منها يشتمل على العدد المحتاج إليه في تغشية الأرض؟ بل لا يكون في أيديهم – إذًا سُلْمٍ أنَّ أجزاء الخردلة تغشّيّ الأرض – شيءٌ غير التعجّب! وأمّــا جزم القول بأنَّ هذا ممتنعٌ، فأمرٌ غير موثوقٍ به. فالذي لا يكون بيّن الاســتحالة، مع فرض تناهي الانقســام، فكيف تبين باستحالته استحالة لا تناهي الانقسام؟ على أنّا لسنا نقول إنَّ الممكن من ذلك قد يخرج إلى الفعل.

(6) As for their argument taken from substance and accident,[7] let them know that we do not grant them that it belongs to the true nature of the accident that it itself is equal to the substrate itself, spreading over and coinciding with it. The fact is that the accident is nothing more than an attribute of the thing, which does not make the thing itself subsist in that it is a part of it, as we have said in other places.[8] So perhaps it is not such as to indicate an entity that spreads throughout the very thing of which it is an accident, such as all relations, motion, and a mode of being[9] that they maintain. Indeed, that [type of accident] is not like white that spreads throughout its substrate. So, if by *accident* one means what they mean—namely, that it is an entity belonging to an entity throughout which it is spread—then a point is neither an accident nor a substance, since not every existing thing must either coincide with some entity so as to pervade it or, otherwise, not exist in a subject. [That] is because the two, [that is, coinciding so as to pervade a subject or not existing in it] are not contradictory propositions, nor are they the obvious concomitants of contradictory propositions. If one means by *accident* something belonging to a thing by which [the thing] comes to have a certain attribute but [which does] not [play] some part in its subsistence, then a point is an accident, because it is a certain extremity belonging to what is limited by it, while not being part of its existence. It is an accident of its substance in that it is an attribute in this sense, because it is an extremity of [the substance] and nothing else.

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7. See 3.3.7.

8. See for instance *Kitāb al-madkhal* 1.14, where Avicenna argues that the accident is not equivalent with the substance, and *Kitāb al-maqūlāt* 1.4 where he discusses the difference between the ways accidents stand to subjects and forms stand to matter—namely, that accidents subsist through their subjects, whereas matter subsists through the form.

9. The Arabic *kawn,* translated "mode of being" is the standard term for accident among the *mutakallimūn;* see Richard Frank, *Beings and Their Attributes: The Teaching of the Basrian School of the Mu'tazila in the Classical Period* (Albany, NY: State University of New York Press, 1978), ch. 5.

(٦) وأمّا الحجّة المأخوذة من الجوهر والعرض، فليعلموا أنّه لا نُسلّم لهم أنَّ العرض من حقيقته أنْ يكون له ذات مساوية لذات المحل؛ فاشية فيه مطابقة له، بل ليس العرض أكثر من وصفٍ يكون للشيء، ليس يقوّم ذاته بأنّه جزء منه، على ما قلنا في مواضع أخرى. فربما لم يكن بحيث يُشار أنَّ ذاته فاشية في ذات الشيء الذي هو له عرض؛ كالإضافات كلّها وكالحركة وكالكون الذي يقولون، فإنَّ ذلك ليس كالبياض المنتشر في محله. فإنْ عنى بالعرض ما يقولون من أنّه ذاتٌ مساويةٌ لذات ما هو فاشية فيه؛ فليست النقطة بعرضٍ ولا بجوهر. إذ ليس يجب أنْ يكون كل موجود إمّا مطابقاً لذاتٍ ساريا فيها، وإمّا موجوداً لا في موضوع؛ لأنّه ليس أحدهما نقيض الآخر، ولا بيّن اللزوم للنقيض. وإنْ عنى بالعرض معنى للشيء يصير به الشيء ذا صفةٍ وليس جزءاً في قوامه؛ فالنقطة عرضٌ لأنّها نهاية ما موجودة لما هو بها متناهٍ، وليست جزءاً من وجوده. وكونها عرضاً لجوهرها هو أنّها صفة بهذه الصفة لأنّها نهاية له، وليس غير هذا.

(7) The account comparing divisibility to composition—whether the composition of the body in itself or together with something else[10]—is unsound. [That] is because division produces the parts, whereas composition requires that parts determinately exist. It is impossible, however, that an infinite number of determinate parts[11] exist such that [the body] is composed from them.

(8) As for the account of contiguity and its passing away,[12] a foundation has already been advanced in the section on time, which, if you recall it, provides an immediate response to [the objection].[13] In brief, noncontiguity does not occur all at once at an instant.[14]

(9) Concerning the report of the celebrated [horn] angle,[15] it is not indivisible, but is, in fact, divisible. There is a potential infinity of angles smaller than it. [Euclid's] demonstration was based solely on the fact that no acute angle [constructed] from two rectilinear lines is smaller than that one; but when one claims that nothing having such a description is smaller than that, it does not prove that nothing at all is smaller than it. Now, anyone who has acquired some knowledge of the fundamentals of geometry knows that that angle is infinitely divisible by arcs.[16]

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10. See 3.3.8.

11. Following **Z** who secludes the *hā* (their).

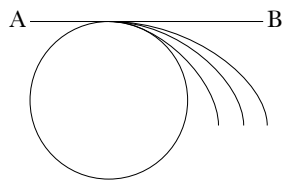
12. See 3.3.9.

13. See 2.12.4, where Avicenna specifically treats the issue of the cessation of contiguity.

14. Following **Z**, **T**, and the Latin (*subito*) for **Y**'s *lā mumāssah* [*lā*] *tahṣulu illā fī ān* (non-contiguity does not occur except at an instant), which is just the opposite of Avicenna's claim at 2.12.4.

15. See 3.3.10.

16. The horn angle is represented by the angle formed from the circle and the tangent line AB, while the curves in the following diagram illustrate Avicenna's point.



(٧) وأمّا حديث تشـــبيه الانقسام بالتركيب – سواء كان تركيب الجسم في نفسه أو تركيبه مع غيره – فليس بصحيح؛ لأنَّ الانقسام يُحدِث الأجزاء، والتركيب يحتاج إلى أجزاء حادثة حاصلة، ويســـتحيل أنْ توجد أجـــزاء حاصلة بلا نهاية حتى يركب منها.

(٨) وأمّا حديث المماسَّـــة وزوالها فقد مضى أصلٌ في باب الزمان، إذا تذكرته كان الجواب مقتضباً منه؛ وبالجملة أنْ لا مماسّة لا تحصل دفعة في آن.

(٩) وأمّا حديث الزاوية المذكورة، فإنّها ليســـت غير منقســـمة، بل هي منقسمة، وهناك زوايا أصغر منها بالقوّة بلا نهاية. إنّما قام البرهان على أنّه لا تكون زاوية من خطّين مســـتقيمين حادّة أصغر من تلك، وليس إذا قيل إنّه ليس شـــيء بصفة كذا أصغر من كذا دلَّ على أنّه ليس شـــيء البتة أصغر منه، وكل مَنْ حصّل علماً بأُصول الهندسة؛ علم أنَّ تلك الزاية تُقسم بالقسي قسمة إلى لا نهاية.

(10) As for what was related about the surface and the sphere,[17] one does not know whether a sphere could exist on a surface having this description in reality or only in the activity of the estimative faculty, in the way that mathematical objects do. Nor is it known (if it exists in reality) whether [the sphere] is, in fact, rolling over [the surface] or not, for perhaps it is impossible for it to roll over it. Aside from all this, it is not necessary, in any case, that the sphere touch the surface and the line at only a point; rather, it may be like that [only] when it is stationary and at rest. In that case, when it is moved, it would touch [the sphere] at the line during the time of the motion, and there simply would be no actual moment at which it touches at the point, save in the estimative faculty. [That] is because the estimative faculty images that [contact at a point] only when it imagines the instant, whereas the instant has no existence in actuality. In summary, this problem does not turn out to be truly admissible, because what is admitted is that the sphere does not meet the surface at a single instant save at a point, from which it does not necessarily follow that the motion involves a locomotion from one point to another point immediately adjacent to it and from one instant to another, immediately adjacent one. Indeed, if this is admitted, there is no need to mention the sphere and the surface; rather, there would be points that encounter one another from which the line is composed, as well as immediately adjacent instants from which time is composed. So what [they take] for granted is that the sphere encounters the surface at some given instant; the difference among motions and times that are not composed of indivisible phases and instants is like the difference with

17. See 3.3.11.

(١٠) وأمّا ما أورد من حديث السطح والكرة، فإنّه لا يدري هل يمكن أنْ توجد كرة على سطحٍ بهذه الصفة في الوجود، أو هو في التوهم فقط على نحو ما تكون عليه التعليمات؛ ولا يدري أنّه إنْ كان في الوجود، فهل يصحّ تدحرجه عليه أو لا يصح، فربما استحال تدحرجه عليه. وبعد هذا كله، فليس يلزم أنْ تكون الكرة مماسّة للسطح والخط في أي حالٍ كان بالنقطة لا غير؛ بل تكون في حال الثبات والسكون كذلك. فإذا تحرّكت ماست بالخط في زمان الحركة، ولم يكن البتة وقت بالفعل يماس فيه بالنقطة إلاّ في الوهم؛ إذ ذلك لا يتوهم إلاّ مع توهم الآن، والآن لا وجود له بالفعل. وبالجملة فإنَّ هذه المسألة لا تتحقّق مسلّمة، لأنَّ المسلّم هو أنَّ الكرة لا تلقى السطح في آنٍ واحدٍ إلاّ بنقطة، وليس يلزم من هذا أنْ تكون الحركة تنتقل من نقطةٍ إلى نقطةٍ مجاورة لها، ومن آنٍ إلى آنٍ مجاورٍ له. فإنّه إنْ سُلّم هذا، لم يحتج إلى ذكر الكرة والسطح، بل صحّ أنَّ هناك نقطاً متلاقية، ومنها تأليف الخط، وآنات متجاورة منها تأليف الزمان. فإذا كان المسلّم هو أنَّ الكرة تلاقي السطح في آن، وكان الخلاف في أنَّ الحركات والأزمنة غير مركبة من أمور غير

respect to spatial magnitude; and only if instants are, in fact, immediately adjacent to one another does it necessarily follow that points are immediately adjacent to one another. Using [all] that, however, to prove that points follow in succession is as good as begging the question! The fact is that this explanation is completed only by what I was saying—namely, that at this state it touches a point, and at the second state it is touching a point, [and so on], where the states are immediately adjacent so that the points are as well. If we do not say this, the argumentation is incomplete. This will become clear to you once you learn that there is no first part among the parts of motion, rest, and distance.[18]

(11) Democritus erred in his argumentation[19] in granting himself one premise—namely, that the whole body is divisible—since this has two senses. One is that [the body] is simultaneously divided in its entirety, while the other is that [the body] is not divisible in a given way unless it leads to parts that are themselves divisible without end. The first is simply not granted, nor is its true opposite that the division of the body terminates at what is indivisible; rather, its opposite is [that the whole of it is not actually divided simultaneously].[20] As for the whole of its not being actually divided simultaneously, this does not preclude its being divided one division after another infinitely. Moreover, neither is it the case that, when each one of [the divisions] taken separately is separately possible, the whole is something whose occurrence is possible. For instance, any numerical doubling can apply to number, but not every numerical doubling can apply simultaneously. The truth, in fact, is that any division

18. See 3.6.3–6.

19. See 3.3.12.

20. The text is apparently incomplete here and seems to require the bracketed material if it is to make sense. The omission may be because there was a repetition in the original text of the immediately following clause, "The whole of it is not actually divided simultaneously," which, as noted, would in fact be the true opposite of "The body is simultaneously divided in its entirety," and so completes the thought. In that case, then, it is quite possible that the first instance was omitted quite early by homeoteleuton.

متجزئــة ومن آنات، كالخلاف في المســافة، وكان إنّما يلزم تجاور النقط – لو صحّ تجاور الآنات – كان استعمال ذلك في إثبات تتالي النقط كالمصادرة على المطلوب الأول. فإنّه لا يتــم هذا البيان إلاّ بما أقول إنَّه في هذه الحال ملاقٍ بنقطة، وفي الحال الثانية ملاقٍ بنقطة، والحــالات متجاورة، فالنقط متجاورة، فإنْ لم نقل هذا لم يتم الاحتجاج. وأنت ســتتبين هذا إذا علمت أنّه ليس في أجزاء الحركة والســكون والمســافة ما هو أول جزء حركة أو جزء سكون أو جزء مسافة.

(١١) وأمّا احتجاج ديموكريتس فقد ضلَّ فيه، في تســليم مقدمة واحدة لنفســه؛ وهو أنَّ الجســم ينقســم كله، لأنَّ هذا يدلّ على معنيين، أحدهما أنّه ينقسم بكليته معاً، والآخر أنّه لا ينقسم قسمة إلاّ أدت إلى أجزاء هي أيضاً تقبل القسمة ولا تقف. فأمّا الأول فليس ذلك بمســلّم، ولا نقيضه الصادق هو أنَّ الجسم ينتهي في القسمة إلى ما لا ينقسم؛ بل نقيضه. وأمّا أنْ لا ينقســم كله بالفعل معاً، وهذا لا يمنع أنْ يكون ينقســم إنقساماً بعد إنقسام بلا نهاية، وليس أيضاً إذا كان كل واحدٍ من الانفصالات انفصالاً ممكناً، فالكل ممكن الوقــوع، كما أنَّه كل تضعيــف عددي جائز على العدد، وليس كل تضعيفٍ عددي جائز

you want can occur in the body when each one of the successive divisions is of the potentially infinite sort. We simply do not grant that they all occur [simultaneously], because the first thing that that would require is that the things bringing about the divisions are themselves actually infinite, and this is impossible. In summary, this is one of the errors that occurs as a result of equating the two expressions *the whole* and *each one*. We shall show to a greater extent that the existence of these atoms comes to naught when we take up the more specialized discussions.

(12) As for the proof of those who affirm an infinite number of parts,[21] you are able to resolve it from what you understand.

21. See 3.3.13–16.

أنْ يقع معاً . بل الحق أنَّ كلّ قسمةٍ أردتها ، وكل واحد واحد من أصناف قسمة ، هي بلا نهاية بالقوّة ، يجوز أنْ تقع في الجسم ، ولا نسلّم أنَّ الكل يقع البتة ؛ لأنّه يحتاج أول شيء إلى أنْ يكون الذين يوقعون القسمة لا نهاية لهم بالفعل ، وهذا مستحيل . وبالجملة ، فإنَّ هذا من جملة الخطأ الواقع لتشابه لفظي الكل وكل واحد ، وسنبلغ في إبطال وجود هذه الأجسام غير المتجزئة إذا شرعنا في الكلام – الذي هو أشدّ تخصصاً من هذا الكلام .

(١٢) وأمّا حجة مثبتي أجزاء بلا نهاية ؛ فأنت تقدر – مما فهمت – على حلّها .

Chapter Six

On the interrelations of distances, motions, and times with respect to this topic, and an explanation that no first part belongs to them

(1) We say: When the distance can be potentially divided infinitely,[1] the motion along it (in the sense of *to traverse*) likewise can be divided infinitely. If the motion were indivisible, then the distance it [traverses] would either be indivisible as well—which is absurd—or divisible. If [the distance] were divisible [while the motion is not], then the motion from the beginning of [the distance] to the place where there is the division would be less than from the beginning to the end; but nothing is less than what is indivisible. Additionally, that motion [to where there is the division in the distance] would be a *part* of [that purportedly indivisible] motion that completely crosses the distance. Also, when the motion is divisible, the time corresponding with it is divisible—or, rather, the motion is divisible precisely because the time and distance are divisible. It also becomes clear that each one of these [namely, distance, motion, and time] is divisible from the fact that there exists fast and slow motion. [That] is because the distance that the slow motion traverses in a given time must be less than that which the fast motion traverses, and so the distance is divided. Also, the fast motion traverses that lesser [distance] in less time, and so the time is divisible, and (as you have already learned)[2] motion follows distance and time with respect to divisibility.

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1. I have moved the phrase *allatī bi-maʿná al-qaṭʿ* (in the sense of *to traverse*), which appears here in **Y**'s edition, so that that it follows the phrase "the motion along it," which is how it appears in **Z**, **T**, and the Latin.

2. See 2.12.7 and 2.13.3–4.

<الفصل السادس>

في مناسبات المسافات والحركات والأزمنة في هذا الشأن وتبيين أنّه ليس لشيءٍ منها أول جزء

(١) فنقول: إذا كانت المسافة تنقسم إلى غير النهاية بالقوة فكذلك يجب أنْ تنقسم الحركة التي بمعنى القطع، معها إلى غير النهاية بالقوة. ولو كانت حركة لا تتجزأ؛ لكانت مسافتها إمّا غير متجزئة وهذا محال، أو متجزئة. ولو كانت متجزئة لكانت الحركة من مبدئها إلى موضع القسمة أقل من الحركة من مبدئها إلى منتهاها، ولا أقل من غير المتجزئ، ومع ذلك لكانت تلك الحركة جزءاً من الحركة التي بها استوفت المسافة. وإذا انقسمت الحركة انقسم بإزائها الزمان، بل إنّما تنقسم الحركة بسبب انقسام المسافة أو الزمان. ومن الموجود حركة سريعة وبطيئة، ومنها يتبين أنَّ كل واحدٍ من هذه ينقسم؛ فإنَّ المسافة التي تقطعها السريعة في زمانٍ يلزم أنْ تكون البطيئة تقطع أقلّ منها فتنقسم المسافة، والسريعة تقطع ذلك الأقل في زمانٍ أقل فينقسم الزمان، والحركة تتبع المسافة والزمان في الانقسام كما علمت.

(2) Motion, however, happens to have a certain kind of divisibility that does not correspond with anything in time—namely, that it is divided by dividing the mobile, where this seems best suited to motions other than local motion. [That] is because the parts of what undergoes local motion are either actual or potential. If the parts are, in fact, actual, then they are joined together either by way of continuity or contiguity; but how could there be [motion on the part of what is moved locally], for not one of them leaves its place? [That is] because, if [the parts] are continuous, they do not actually have a place, whereas if they are contiguous, they have a place; but they leave their place as a surface that is a part of the place of the whole, while not leaving the place[3] that surrounds them, and so they would not depart from their place and so would not have undergone motion. If they are potential parts, the improbability of motion resulting from them is all that more obvious, for how would the actual parts of a given motion be related to them? As for the rest of the motions, if they have actual parts, then one correctly says that part of the change changes the part. If they have potential parts, the motion likewise will have potential parts for, which if they were differentiated, there is, corresponding with each part of what changes, a change that is proper to it that is part of the whole's change. [That] is because, from *this* change that is in *this* part and *that* change that is in *that* part, there comes to be the sum total of the change of the whole, since that summed total is a total change, and the total change is a change. Now, every change is *of* something; but there is nothing that underlies these changes except the whole and the parts, and it is not *of* a part of a part. So [the change] is *of* the whole.

3. Reading *makān* with **Z** and **T** for **Y**'s *kamāl* (perfection) and the Latin *complete* (completely). Neither **Y** nor **Z** mentions the other's variant. If *perfection* is retained, the sense of the argument might be thus: since *motion*, according to Avicenna, is the actuality and *perfection* of the potential as such (see 2.1), when the perfection of what surrounds—that is, the place—is not left behind (and, consequently, a perfection remains, and there is no actualization of a potential), there cannot be a motion with respect to place.

(٢) لكـن الحركة يعرض لها ضربٌ من الانقسـام لا يطابقها فيـه الزمان ، وذلك هو انقسـامها بانقسام المتحرك ، ويشـبه أنْ يكون هذا بغير الحركة المكانية أولى . فإنَّ أجزاء المتحـرّك الحركة المكانية لا يخلو إمّا أنْ تكون أجزاء حاصلة بالفعل أو أجزاء بالقوة . فإنْ كانت أجزاء حاصلة بالفعل ؛ فلا يخلو إمّا أن يكون اجتماعها على سبيل تماسّ أو اتصال ، وكيـف كانت ، فإنَّ كلّ واحدٍ منها لا يفارق مكانـه . لأنّها إنْ كانت متصلة فلا مكان لها بالفعل ، وإنْ كانت متماسّـة فلها مكان ؛ لكنها تفارق من مكانها سـطحاً هو جزء مكان الـكل ، ولا تفارق مكان المحيـط بها ، فلا تفارق مكانها ، فلا تتحرك . وإنْ كانت الأجزاء بالقوة فبُعْد الحركة عنها أظهر ، فكيف ينسـب إليها أجزاء حركة بالفعل؟ وأمّا في سـائر الحركات ، فإنْ كان لها أجزاء بالفعل ، صحّ أنْ يقال إنَّ جزء التغيّر يغيّر الجزء . وإنْ كان لها أجـزاء بالقوة فللحركة أيضاً أجزاء بالقوة ، لو فصلت لكان بإزاء كل جزء من المتغيّر تغيّر يخصـه ، هو جزء تغيّر الكل . فإنَّ من هذا التغيّر الذي في هذا الجزء ، وذلك التغيّر الذي في ذلك الجـزء ، يحصل مجموع تغيّر الكل ، إذ تلك الجملة المجتمعة جملة تغيّر ، وجملة التغيّر تغيّر ، وكل تغيّر فهو لشـيء ، ولا شـيء يحمل هذه التغيّرات إلاّ الكل والأجزاء ، وليس لجزء جزء ؛ فهو للكل .

(3) Also, since every motion and change is in a time that is infinitely divisible, it would be absurd that the motion should have something that is the first that the mobile moves. That is because, if a certain motion is first, it inevitably is along a certain distance, where that distance is potentially divisible. Now, when [the distance along which there is the purported first motion] is divided, one of its two parts will be prior and the other posterior, and so the motion along that first part is first, but we stipulated that this [whole] motion was the first. This is a contradiction.

(4) The fact is that *first* with respect to motion and change, is understood in only one of three ways, one of which is [(1)] *first* in the sense of the limit—that is, that which corresponds with the first of the distance and its limit as well as the first of the time that is congruent with that motion and the limit of [that time]. This one, then, is first.[4] *First* has another sense [(2)]—namely, when the motion happens to bring about a division, whether actually or by supposition, then the prior part is the first of the parts of motion that is actual. It might also be thought that motion has a *first* in some other way [(3)]—that is, some have said that even if these bodies can be potentially divided *ad infinitum* it is not the case that, when they are divided, they preserve their forms and dispositions other than that of quantity. So [for example] the body reaches a certain limiting point that, should it be divided further, it would not, in fact, be water, air, or fire. They said that whether it is what undergoes motion or some spatial magnitude, when the spatial magnitude as such has some limiting point (which, in their opinion, is unsurpassable in smallness), the motion will also have some limiting point, which is the smallest existing motion. In that case, no separate motion exists that is smaller than it, even though, through an act of the estimative faculty,

4. Avicenna is probably punning here and so means something like, "This sense of *first* is the primary (first) sense of the term *first*."

(٣) ولمّا كان كل حركةٍ وكل تغيّرٍ فهو في زمانٍ ينقسم إلى غير النهاية، فمحالٌ أنْ يكون للحركة شيءٌ هو أول ما يحرّكه المتحرّك. وذلك لأنّه إنْ كان حركة هي أوّل حركة، فإنّها لا محالة في مسافة، وتلك المسافة منقسمة بالقوة، وإذا قُسّمت كان أحد جزئيها متقدماً والآخر متأخراً، فكانت الحركة في الجزء الأول هي أوّل حركة، وقد جُعلت هذه أوّل حركة، هذا خُلْف.

(٤) بل الأول في الحركة وفي التغيّر إنّما يفهم على أحد وجوهٍ ثلاثة: أحدها؛ الأول بمعنى الطرف، وهو الذي يوافق أول المسافة وطرفها، وأول الزمان المطابق لتلك الحركة وطرفه، فهذا أوّل. وأوّل بمعنى آخر؛ وهو أنّه إذا عرض للحركة تقسيم بالفعل أو بالفرض، كان الجزء المتقدّم أوّل أجزاء الحركة التي بالفعل. وقد يظنّ أنَّ للحركة أولاً على وجهٍ آخر، وهو أنّه قد قال بعضهم إنَّ هذه الأجسام، وإنْ كانت تنقسم إلى ما لا نهاية في القوة، فليست تنقسم حافظة لصورها وهيئاتها غير هيئة الكم، فإنَّ الجسم يبلغ حَدّاً لا يصحّ لو انقسم بعد أنْ يكون ماء أو هواء أو ناراً. قالوا؛ أو كان متحركاً أو مسافة؛ فإذا كان للمسافة – من حيث هي مسافة – حدٌّ عندهم لا يتعداه في الصغر، كان للحركة حدٌّ هو في الوجود أصغر الحركات، فلا توجد حركة مفردة أصغر منه. وإنْ كان قد يجوز أنْ

it might be possible for us to imagine something smaller than that—namely, half or some part of it, since that in itself is potentially divisible. It is just that that division will never pass into actuality in the sense of being separate and differentiated. (We'll discuss this later.)[5] In that case, the mobile would have a first motion during its motion, and that would be in[6] potency—namely, as that which is equivalent to the smallest motion.

(5) The *first* of the motions, in the sense of *limit,* is not a motion, and so nothing can be the first motion in that sense of *first.* What moves can be first in the second sense; however, its being first is hypothetical and accidental, not real. As for the third way, even if it is true that motion has something that is the smallest motion that can exist, it is so only in the sense that there is a certain motion that, in itself, [has] an actually separate beginning and ending. It is not [first] in the sense that it is some first of a total motion, of which that first is part and after which the total would have continued on. This division into parts, which is the focus of discussion, is by supposition, whereas that indivisible unity belonging to motion does not depend upon supposition, but existence [itself]. At best, one might say that the amount of that[7] motion, out of the total of all motion, rightly deserves to be posited as first, since no motion in existence is smaller than it, save by supposition. So the discussion comes to a standstill until we clarify this view.

(6) As for the *first* that would result in the motion by our dividing [the motion] corresponding with division of the distance (the division of which does not stop at some limiting point), there [simply] is no magnitude possessing a beginning and end such that it is indivisible at that

5. See 3.12.

6. Reading *fī al-qūwah* with **Z** and the Latin (*in*), which is also the same in meaning as **T**'s text *bi-l-qūwah;* Y's text simply reads *qūwah.*

7. **Y** has conflated the text *qadr tilka*, as it appears in **Z**, **T**, and the Latin (*quantitatem istius*), to *qudratak* (your power).

نتوهم ما هو أصغر من ذلك، وهو نصفه أو جزء منه، إذ كان ذلك يتجزأ في نفسه بالقوة، لكن ذلك التجزؤ لا يخرج إلى الفعل بتّةً خروجاً على معنى الأفراد والفصل، وسنتكلم في هذا بعد. فإنْ كان كذلك، فالمتحرّك يكون له في حركته أوّل حركةٍ وذلك في القوة، وهو ما يساوي الحركة التي هي أصغر الحركات.

(٥) فأوّل الحركات – بمعنى الطرف – ليس بحركة فلا يكون للشيء بمعنى ذلك الأول، أول ما يحرّك، وأمّا بالوجه الثاني فيكون له أول ما يحرّك، لكن أوّليته وضعية عرضية لا حقيقية. وأمّا الوجه الثالث؛ فهو وإنْ صحّ أنَّ للحركة شيئاً هو أصغر حركة يمكن أنْ توجد، فإنّما يصح على أنّها حركة بنفسها مفردة ابتداء بالفعل وانتهاء بالفعل، لا أنْ تكون هي أوْل جملة حركةٍ، ذلك الأول بعضها، وقد استمرت الجملة بعده. فإنَّ هذا التبعيض – الذي كلامنا فيه – هو بالفرض، وتلك الوحدة غير المنقسمة للحركة ليست بحسب الفرض، بل بحسب الوجود. اللّهم إلاّ أنْ يقول قائل إنَّ قدر تلك الحركة مستحقٌ في جملة كل حركةٍ أنْ يُفرض أولاً، إذ كان لاحركة أصغر منها في الوجود إلا بالفرض، فيقف الكلام إلى أن نوضح عن أمر هذا المذهب.

(٦) وأما الأول في الحركة الذي يكون بتقسيمنا إياها موازيا لقسمة المسافة التي لاتقف عند حدّ في القسمة فإنه لايكون مقدار ذو ابتداء وانتهاء غير منقسم الى ما يصحّ

which can be supposed to be *first*.[8] The same holds for whatever parallels the magnitude in that [respect], for it likewise will not stop at some limiting point that has some beginning and ending and [yet] cannot be so divided further. Consequently, no smallest motion could exist in a continuous motion so as to exist as a part of what is continuous. That is because the part in what is continuous is assumed to be actual only by assigning limiting points in one of the ways mentioned earlier.[9] Now, the assignment of limiting points cannot simply stop being possible. Only on account of an actual separation and discontinuity—in which case there would no longer be something continuous—could it come to stop, where this separation and discontinuity seem to terminate at limiting points that cannot be separated and discontinuous. If, however, it is possible to posit some division at them by assigning limiting points, then the division of the continuous, which does not involve separation in some way, is infinite, where these sorts of divisions of [the continuous] will be equivalent, none of them having some special status that the others do not. In that case, the smallest of motions is still divisible in this way, while perhaps being indivisible in another way. In other words, there is no motion, which actually passes from some starting point to some end point at which it is complete, that is actually the smallest. When this is the form, motion has no first part in this sense except as the limit, unless certain motions follow upon one another successively, not continuously, where the prior of which would have this description. As for what is continuous, no first part exists having this description, because no motion is found along [a continuum] that is in itself independent [and] discontinuous; rather, the parts of that motion are continuous

8. **Y** seems to have inadvertently omitted a number of lines through homeoteleuton, which appear in **Z**, **T**, and the Latin. They are *idh kāna lā ḥarakah aṣgar minhā fī al-wujūd illā bi-l-farḍ fa-yaqifu al-kalām ilá an nūḍiḥu ʿan amr hādhā al-madhhab. wa-ammā al-awwal fī al-ḥarkah alladhī yakūnu bi-taqsīminā iyyahā muwāzīyan li-qismat al-masāfah allatī ʿinda ḥadd fī al-qismah fa-innahu lā yakūnu miqdār dhū ibtidāʾ wa-intihāʿ ghayr munqasim ilá mā yaṣiḥḥu an yafriḍa awwalan;* corresponding with "since no motion in existence is smaller than it, save by supposition. So the discussion comes to a standstill until we clarify this view. As for the *first* that would result in the motion by our dividing [the motion] corresponding with division of the distance (the division of which does not stop at some limiting point), there [simply] is no magnitude possessing a beginning and end such that it is indivisible at that which can be supposed to be *first*."

9. See 3.2.8.

أن يفــرض أوّلا وكذلك ما يحاذي المقــدار في ذلك ؛ فإنّه أيضاً لا يقف عند حدّ يكون له ابتداء وانتهاء ، ولا ينقسم هذا النحو من الانقسام. فإذا كان كذلك ، كانت الحركة المتصلة لا يجــوز أنْ يوجد فيها ما هــو أصغر حركة ، على النحو الذي توجد جزءاً في المتصل. وذلــك أنَّ الجزء في المتصل إنّما يفرض بالفعل بتعيــين الحدود على أحد الوجوه المذكورة. وليــس لتعيــين الحدود وقوف البتة فــي الاحتمال ، إنّما الوقوف عســى أنْ يكون للتفريق والتقطيــع بالفعل ، وحينئذ لا يكون متصلاً البتة. ويشــبه أنْ يكون هذا التفريق والتقطيع يتناهى إلى حدودٍ لا يمكن تفريقها وتقطيعها . وإنْ أمكن فرض قسمة فيها بتعيين الحدود ، فتجزئــة المتصل الذي يقــع لا على وجه التفريق ، غير متناهٍ ، وأصنــاف هذه التجزئة فيه متســاوية ، ليس بعضها أولى من بعض. فأصغر الحركات لا يعدم هذا النحو من التجزئة ، عســى أنّه يعدم التجزئة بنحو آخر ؛ أي لا تكون حركة خارجة إلى الفعل عن مبدأ وإلى منتهى ، يتمّ عنده بالفعل أصغر منها . وإذا كانت الصورة هذه ، فلا يكون للحركة أوّل جزء بهــذا المعنى إلاّ الطرف ، إلاّ أنْ تكــون حركات متتالية غير متصلة ومُتقدمها بهذه الصفة. وأمّــا في المتصل فلا يوجد جزء أوّل بهذه الصفة ، لأنّه لا توجد فيه حركة منفردة منقطعة بنفســها بل تكون أجزاء تلك الحركة متصلة بعضها ببعض. فلو كان في جملة تلك الحركة

with one another. So, if, in the totality of that motion, some motion were the first that something produces (in the sense that [the motion] is a part of what is continuous, no part in the continuous thing being smaller than it), then that part of the motion would undergo the division that removes continuity[10] (which is our focus, since we are supposing that the division of the entire motion to this first is such that it does not remove the continuity). Now, if this part of the motion were not susceptible to division in this way, the first motion would be wholly unextended, and so no distance would be covered at all. In that case, there would be no motion. When motion is infinitely divisible in such a way as to preserve the continuity, then whatever part you stipulate to be *first* (in the sense of *part,* not *limit*) will potentially have some other first [part]. The same holds for rest and the phenomenon called *coming to a rest,*[11] which either increases the motion's speed, if it is natural [motion], or decreases it, if it is not natural but forced, in both cases leading to rest. The same holds for the accidental things that accompany motion, such as separating, joining, drawing near, and shattering (which is a certain scattering by motion).[12] There is no period of time for arriving and becoming contiguous and what is similar to that, [so] being first is denied of them by way of absolute negation. (Later we'll explain that more clearly.)[13]

(7) To the question of whether that which has no parts (if it exists) can undergo motion, one finds in the works of the Peripatetics that that is absurd and that what is indivisible cannot undergo motion.[14] One thing that they rely on to illustrate that is that whatever moves, first moves some [distance] equivalent to itself, and then again something equivalent to itself, and so on until it exhausts the distance.[15] So, if what

10. Literally, "then that part of the motion would not undergo the division that does not remove the continuity."

11. See the Arabic, *Physics* 6.8, where *tawaqquf* translates *histamenon.*

12. Reading *bi-ḥarakah* with **Z**, **T** (*bi-l-ḥarakah*), and the Latin (*cum motu*) for **Y**'s *yuḥarrikuhu* (that moves it).

13. The reference may be to 3.7.2, where Avicenna discusses what is meant by *absolute negation.* Alternatively, the reference may be to 3.12, where he argues that there is a smallest motion that can exist in actuality and reality, even if it is not the smallest motion that can exist potentially.

14. See Aristotle, *Physics* 6.10.

15. See specifically Aristotle, *Physics* 6.10.241a6–14.

حركة هي أوّل ما يحركها الشـــيء ، وكانت بمعنى أنّها جزء من المتصل لا جزء في المتصل أصغـــر منه ، لم يكن يعرض لذلك الجزء من الحركة الانقســـام الذي لا يبطل الاتصال الذي كلامنا فيه ، إذ وضعنا أنَّ انقسام الحركة كلّها إلى هذا الأول انقسامٌ لم يبطل الاتصال . ولو كان هذا الجزء من الحركة لا يقبل هذا النوع من الانقسام ، لكان أوّل الحركة ليس فيه امتدادٌ بتّةً – فلم يكن على مســـافة البتة – فلم تكن حركة . وإذا كانت الحركة تنقسم الانقسام الحافـــظ للاتصال إلى غير النهاية ، فكل ما جعلته أولاً – بمعنى الجزء لا بمعنى الطرف – فله أوّل آخر بالقوة . وكذلك الســـكون ، وكذلك الشـــيء الذي يســـمى توقّفاً ؛ وهو تزيّد الحركة في السرعة إنْ كانت طبيعية ، أو في البُطْء إنْ كانت غير طبيعية بل قسرية ، متجهاً بالوجهين إلى الســـكون . وكذلك الأمور العارضة مع الحركة ؛ كالمفارقة والمقارنة والمجاورة والانكســـار الذي هو افتراق ما بحركة . وأمّا الموافاة والمماسّـــة وما أشبه ذلك ، فلا زمان لها ، ونفي الأولية عنها هو على السلب المطلق ، وسنوضّح القول في ذلك بعد .

(٧) وأمّا هل يجوز أن يكون ما لا جزء له يتحرك – إنْ كان له وجود – فالموجود فـــي كتب المشـــائين أنَّ ذلك محال ، وأنّ ما لا يتجزأ لا يصـــحّ أنْ يتحرك . والمعوّل لهم في إيضاح ذلك ؛ هو أنَّ كل متحركٍ فإنه يتحرك أوّلاً مثل نفســـه ، وبعد ذلك أيضاً مثل نفسه ،

is indivisible undergoes motion, then the distance would be composed of indivisible parts, and the point would be a certain distance because it is what is first left behind. I don't find this argument satisfying at all. That is because this judgment does not extend to what moves essentially to the exclusion of what moves accidentally; rather, it is general to whatever has some position vis-à-vis something, whatever the position might be, and then steadily moves some distance away from it. If this [judgment], then, is not accidental to what stands in for the state of coinciding [with the distance equal to itself], it will not be accidental to what stands in for the place; and, if it is accidental to what stands in for the place, it will be accidental for that which stands in for the state of coinciding. So, if the point actually exists at the limit of some moving body, then, as a result of the [point's] accidental motion, it will describe a line over which it continuously had moved and with which it coincided. That line, however, would not be composed of points. Nor would it be said that, to the extent that that point coincides, it first coincides with something equivalent to itself, and, to the extent that it leaves, it first leaves something equivalent to itself, and, through coinciding again with something equivalent to itself, it makes [a line] follow in succession,[16] and so on until the line is finished. So, likewise, it would not be said of [that point] (were it independent) that it undergoes motion essentially and that, for instance, it has a place essentially and that it must, in fact, describe something like itself, one thing successively following after another. The fact is that this is not necessary. The motion has no first motion such that that would inevitably traverse something indivisible that is equivalent to itself; rather, its states of coinciding, at any instant

16. Reading *wa atlathu* with **T** and two of the MSS consulted by **Y** and **Z** for **Y**'s and **Z**'s *wa latlathu* (as voweled in **Y**), which I must confess to not understanding. The Latin *sequitur* (to follow) suggests the Arabic *talat* or perhaps *atlat,* as I have suggested.

وكذلك هَلُمَّ جرا ، حتى تفنى المسافة . فلو كان ما لا يتجزأ يتحرك ؛ لكان تركيب المسافة من أجزاء ما لا يتجزأ ، ولكانت النقطة مسافة لأنّها أوّل ما تفارق ، وهذا الكلام ليس يقنعني بوجه . وذلك أنَّ هذا الحكم ليس يتناول المتحرّك بالذات دون المتحرك بالعرض ، بل هو عام لكل ما يكون موضوعاً أي وضع كان عند شيء ، ثم يفارقه مستمراً على نسبةٍ مسافية . فإنْ كان المستبدل للملاقاة لا يعرض له هذا ، فلا يعرض للمستبدل للمكان ، وإنْ عرض للمستبدل للمكان عَرضَ للمستبدل للملاقاة . فإنْ كانت النقطة الموجودة بالفعل في طرف جسم من الأجسام المتحرّكة ترسم بحركتها التي بالعرض خطاً ، تكون قد استمرت عليه ملاقيةً له ، ولا يكون ذلك الخطّ مؤلفاً من نقطة ، ولا يقال إنَّ تلك النقطة أوْل ما لاقتْ لاقتْ مثل ذانها ، وأوْل ما فارقتْ فارقتْ مثل ذاتها ، وَأَتلَته بملاقاة أخرى مثل ذلك ، وكذلك حتى انتهى الخط . فكذلك لا يقال لها – لو أنّها كانت منفردة – تتحرك بذاتها ، ولها مثلاً مكان بذاتها ، <و> أنّها يجب أن تكون ترسم بالفعل مثل ذاتها شيئاً بعد شيء على التتالي ، بل ليس هذا بواجب . ولا للحركة ، أوّل حركةٍ ، حتى يكون ذلك لا محالة

one cares to take, are with something equivalent to itself, where instants are not immediately between one another, but between them there is always a period of time, as we explained in responding [to the objection involving] the sphere's motion over the surface.[17] So, whenever you posit something coinciding with what is equivalent to itself, it has already traversed what does not correspond with itself—namely, the line. This proof is simply not necessary so as to be convincing.

(8) The proof that appears convincing to us is that whatever is moved essentially and essentially undergoes *corporeal* changes—not just because it changes—essentially has some position proper to it [call that thing *x*]. In that case, insofar as [*x*] separates the extremities of what surrounds it, should an indivisible point, similar to *x,* encounter *x,* either [that point] does not fully encounter *x* and, instead, a portion falls short of it, or that is not the case. If it has the former description [namely, a portion falls short], then, obviously, *x* is itself divisible. If it does not have this description, then, were a point to encounter *x,* it would correspond with *x* completely. Now, *x* has a distinct position, and whatever corresponds with what has a distinct position comes to have a distinct position [itself]; and so the point would have a distinct position separate from the position of the line. In that case, the line would terminate at a point before that one, and the same argument will arise about [that point]. In short, each point would come to have a distinct position and could be separate from the line, while the line terminates at some other point before them, which is absurd. So, from this, it is clearly obvious that the position of whatever is indivisible is not independently separate, but whatever is not such does not undergo the motions that in themselves are in place.

17. See 3.5.10.

قطعاً ممّا لا يتجزأ مثل ذاته، بل تكون ملاقاتها في كل آنٍ يفرض شيئاً مثل ذاته، ولآنات لا تتشافع، وبينها زمانٌ دائماً على ما أوضحناه في جواب حركة الكرة على السطح. فكلما فرضت ملاقية مثل ذاتها، تكون قد قطعت ما لا يطابق ذاتها وهو الخط، وهذه الحجّة ليست واجبة تقنع.

(٨) فيشبه أنْ تكون الحجة التي تقنعنا هي أنَّ كل متحرك بذاته، وكل متغيّر التغيّرات الجسمانية بذاته، لا لأجل أنّه يتغيّر، فله وضْعٌ بذاته يخصّه. فحينئذ لا يخلو إمّا أنْ يكون بحيث يفصل بين نهايات ما يحيط به، ويكون لو لقيته نقطة غير متجزئة مثله لم تستغرق ذاته لقاء، بل أصابت منه جانباً، أو لا يكون كذلك. فإنْ كان على هذه الصفة؛ فظاهرٌ أنَّ ذاته منقسمة، وإنْ لم يكن على هذه الصفة، كان بحيث لو لاقته نقطة طابقت ذاته بأسرها، وذاته لها وضْعٌ متميّز. وما طابق ذا وضع متميّز صار له وضْعٌ متميّز، فيكون للنقطة وضْعٌ متميّزٌ منفصلٌ عن وضْع الخط، فيكون الخط منتهياً دون تلك النقطة بنقطة، الكلام فيها هذا الكلام. وبالجملة تصير كل نقطة ذات وضْع متميّز، ولكل نقطة انفصالٌ عن الخطّ، والخطّ ينتهي دونها بنقطةٍ أخرى، وهذا محال. فواضحٌ بيّنٌ من هذا أنَّ ما لا يتجزأ لا ينفصل وضعه منفرداً، وكل ما لم يكن كذلك، لم يتحرك الحركات التي بذاتها في المكان.

(9) The same holds for the state of other corporeal motions, and it follows that whatever changes so as to undergo corporeal[18] alteration and augmentation is also divisible. That is obvious in the case of augmentation, because it is an increase of some pre-existing thing. As for alteration, because the cause of alteration affects the encountered side of what is being altered before affecting the unencountered side, if [the cause] were to surround completely [what is being altered], it will affect what is near its exterior before affecting what is near its interior, since every case of change is divisible (with generation and corruption alone being indivisible). Some erroneously believe that there are cases of alteration that [occur] all at once, but that is because the event escapes perception on account of the brevity of time. The instantaneous occurrence of illumination all at once is, in fact, not an alteration primarily in bodies but, rather, is something that is a concomitant of surfaces in that they are visible, whereas it will become clear, concerning transparency in the air, that nothing at all happens to the air during the transparency; rather, what happens is only in the object of sight.[19] So, when the object of sight becomes visible as a result of light's shining upon it, then the air can convey [the light] to the body and so is called *transparent*. Because of this, when someone is deep in the shadows of a cave and the air between him and the object of sight is thick with shadows, but the object of sight is luminous, like a light is shining on it, the gloom of the air will not prevent one from perceiving it.

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18. Adding *jismānīyah* with **Z**, **T**, and the Latin (*corporalibus*), which **Y** (inadvertently) omits.

19. See *Kitāb al-nafs* 3.1.

(٩) وكذلك حال الحركات الجسمانية الأخرى. ويلزم أنْ يكون كل متغيّر تغيّرات الاستحالة الجسمانية والنمو منقسماً. أمّا النمو فذلك ظاهر فيه؛ لأنّه ازدياد على أصل موجود. وأمّا الاستحالة الجسمانية فلأن تأثير المحيل في الجهة التي يلقاه المستحيل، أقدم من تأثيره في الجهة التي لا تلقاه. فإنْ كان مشتملاً عليه فتأثيره فيما يلي ظاهره أقدم من تأثيره فيما يلي غوره، إذ كان كل متغيّر منقسماً – وإنّما الكون والفساد هو الذي يكون غير منقسم. وأمّا الذي يظنّ في بعض الاستحالات أنّها تكون دفعة، فذلك لفوات الأمر الحسي لقصر زمانه. وأمّا الإضاءة دفعة فليس ذلك استحالة أولية في الأجسام، بل أمراً يلحق السطوح بأنْ تظهر. وأمّا الاشفاف في الهواء فسيتبين أن الهواء ليس يعرض له في الاشفاف شيء البتة، بل العارض إنّما هو في المرئي، فإذا صار المرئي بحيث تجوز رؤيته بإشراق الضوء عليه، أمكن الهواء إداءه إلى الجسم فسميَ مُشفّاً؛ ولهذا إذا ما كان الإنسان في كهفٍ بعيدٍ مظلم، وكان بينه وبين المرئي هواء مظلم جداً، وكان المرئي نيّراً أشرق عليه الضوء، لم تمنع ظلمة الهواء إدراكه.

Chapter Seven

The beginning of the discussion about the finitude and infinitude of bodies and people's opinions concerning that

(1) Let us now investigate the meaning of *infinite* and how it exists in natural bodies and their states. (For now, this is not the place to investigate things outside of natural philosophy—that is, to discuss whether there is an infinite with respect to number, power, or the like,[1] nor does anything in the following demonstrations touch those [topics].) [Instead,] our discussion should be about quantities possessing position and numbers that possess some ordered position, either in nature or in position, where our investigation into them will involve whether there is something infinite in them or whether this is absurd. Now, the first thing we should inquire into is what is to be understood by *infinite.* Afterwards, we must indicate the reasons prompting one to affirm an infinite in some way or other. We'll also mention the differences among the Ancients concerning it, followed by the truth that we ought to believe about it, and then we will refute the doubts surrounding it.

1. The proper place for such a discussion would seem to be the science of metaphysics, and while Avicenna has no appreciable discussion of the infinite in number in book 3 of his *Ilāhīyāt,* which is his most extended account of the philosophy of mathematics, he does have scattered, extended discussions of the infinite in book 6 (particularly chapters 2 & 4) where he discusses causes.

<الفصل السابع>

في ابتداء الكلام في تناهي الأجسام ولا تناهيها وذكر ظنون الناس في ذلك

(١) فلننظر الآن معنى غير المتناهي كيف وجوده في الأجسام الطبيعية وأحوالها؛ فإنَّ النظر في الأمور غير الطبيعية، وأنّها هل تكون غير متناهية في العدد أو في القوة، أو غير ذلك، فليس الكلام فيها لائقاً بهذا الموضع، ولا شيء من هذه البراهين يتناول تلك. ويجب أن يكون كلامنا في الكميّات ذوات الوضع، وفي الأعداد التي هي ذوات الترتيب في الطبع أو في الوضع؛ وننظر من أمرها أنها هل يكون فيها ما لا نهاية له أو هذا محال. فأول ما يجب أنْ نبحث عنه هو المفهوم من قولنا لا نهاية له. وبعد ذلك فيجب أنْ ندلّ على الأسباب الداعية إلى إثبات ما لا نهاية له على وجهٍ ما، ونذكر اختلاف القدماء في أمره، ثم نذكر الحق فيما يجب أنْ نعتقد فيه، ثم نبطل الشكوك في أمره.

(2) So we say that *infinite* may be spoken of literally and metaphorically. That which is spoken of literally may be spoken of either by way of absolute negation or not by way of absolute negation. That which is said [to be infinite] by way of absolute negation involves something of which what is concomitant with being finite is negated owing to [that thing's] having no quantity—as, for example, the way *point* is said to be infinite [that is, having no limit]. This is like when we say that sound is not seen because that which is concomitant with being seen—namely, color—is negated of it, since sound neither is a color nor has a color. [The literal infinite] that is not spoken of by way of absolute negation frequently is said of what, in fact, corresponds with the finite—that is, something whose nature or essence is of such a character that it can be finite, but then is not. This is said in two ways, one of which is that the species or nature of [the thing] is of such a character in itself that it can be finite, but the particular instance is not of such a character that it be [finite]. An example would be the infinite line (should there be one), for numerically one and the same line cannot be a subject of the finite and the infinite. Yet, in the opinion of those who posit an infinite line, the nature of line is susceptible to being finite. The doubt concerns only the infinite [line], in which case, if this line is infinite, it cannot be that the very same [line] at some other time is finite. This sense of *infinite* is what we want to inquire into—namely, that which whatever you take from it—and any of the things equal to that thing you took from it—you [always] find something outside of it.[2] The second [sense in which the literal infinite is not spoken of by way of absolute negation] is that it is of such a character that it accidentally has some endpoint,[3] but [that endpoint] does not exist in actuality. An example

2. Cf. Aristotle, *Physics* 3.6.206b33–207a2.

3. The terms *endpoint* here and *no endpoint* in the next sentence are translations of *nihāyah* and *lā nihāyah,* which are the same terms that were translated above as *finite* and *infinite.*

(٢) فنقــول : إنَّ مــا لا نهاية له يقال على الحقيقة وقد يقال على المجاز . فالذي يقال على الحقيقة فقد يقال على جهة الســلب المطلق ، وقد يقال لا على جهة السلب المطلق . والذي يقال على جهة السلب المطلق فهو أنْ يكون الشيء مسلوباً عنه المعنى الذي تلحقه النهاية ؛ بأنْ يكون لا كمّ له ؛ مثل ما يقال إنَّ النقطة لا نهاية لها ، وهذا كما نقول إنَّ الصوت لا يُرى ؛ لأنّه مســلوبٌ عنه المعنى الذي يلحقه أن يُــرى وهو اللون ، إذ ليس الصوت بلونٍ ولا ذا لون . وأمّا الذي يقال لا على جهة السلب ؛ فقد يقال لمقابلة التناهي بالحقيقة ، وهو أنْ يكون الشــيء من شــأن طبيعته وماهيته أنْ تكون له نهاية ثم ليست . وهذا يقال على وجهين : أحدهما على أنّه من شــأن نوعه وطبيعته أنْ تكون له نهاية ، لكنه ليس من شأنه بعينــه أنْ يكون له ذلك ، مثل الخط غيــر المتناهي لو كان ؛ فإنّه ليس يجوز أنْ يكون خطّ واحــد بالعدد موضوعاً للتناهي ولغير التناهي ، لكن طبيعة الخط قابلة لأن تكون متناهية عند مَنْ يضع خطّاً غير متناهٍ . إنّما الشــك في غير التناهي ، فإنْ هذا الخط غير المتناهي ليس من شأنه أنْ يكون هو بعينه وقتاً آخر متناهياً . وهذا المعنى ، من معنى غير المتناهي هو الذي نريد أنْ نبحث عنه ، وهو الذي أي شيء أخذت منه ، وأي أمثال أُخذت لذلك الشــيء منه ، وجدت شــيئاً خارجاً عنه . والثاني أنْ يكون من شأنه أنْ تعرض له نهاية ،

would be the circle, since it has no endpoint. I do not mean that the circumference does not limit the surface of the circle; rather, I mean only that the circumference [is without an actual endpoint], since there is no actual point in it at which the line terminates. Instead, it is continuous, with no division in it. Still, [the circumference] is of such a character that some point along it could be posited as that point that is [the circle's] limiting point. [That] is because within the circle there are as many potential points as you like having this description, [and they can] emerge into actuality either by severing [the continuity of the line] or by [one's merely] positing them, since there is no point that does not have this description (I mean as a limit of a line; and, again, there is no actual line here save the circumference). So these are the ways in which an infinite is spoken of literally. As for [the infinite] that is spoken of metaphorically, it is said of that whose endpoint cannot be reached by motion, nor is it delimited by motion. An example is the distance between Heaven and Earth, [which is said] to be infinite, even though it is finite. Also, [*infinite*] is said [metaphorically] in those cases where doing that is extremely difficult, even though it is possible, where being extremely difficult is likened to being impossible.[4] So these are the ways that *infinite* is understood.

(3) Now, our purpose in inquiring into the infinite concerns whether among bodies (whether through their magnitude or number) some are such that, anything you take from them, you always find something outside of them; for some people made the existence of that necessary.[5] There are a number of reasons for [believing] that. One of them is the truth of the claim that numbers can be added to or multiplied infinitely,

4. Literally, "the absence [of being possible]."

5. For the various views and arguments presented in this paragraph, see Aristotle, *Physics* 3.4.

لكنها غير موجودة بالفعل، مثل الدائرة فإنّها لا نهاية لها. لستُ أعني أنَّ سطح الدائرة غير محـــدود بحدّ هو المحيط، بل إنّما أعني المحيط، فإنّـــه ليس فيه نقطة بالفعل ينتهي عندها الخـــط، بل هو متصل لا فصل فيه، لكنه من شـــأنه أنْ تُفرض فيه نقطة تكون تلك النقطة حدّاً لها. فإنَّ في الدائرة نقطاً بالقوة على هذه الصفة – كم شـــئت – تخرج بالفعل بقطع أو فرضٍ، إذ لا نقطة إلاّ وهي بهذه الصفة، أعني طرف خطٍ، ثم لا خطّ هناك بالفعل إلاّ المحيط. فهـــذه هي الوجوه التي يقال عليها لا نهاية بالحقيقة. وأمّا الذي يقال بالمجاز؛ فإنّه يقال لما لا يقدر على أنْ ينتهي ويحدّ بالحركة، كالطريق بين الأرض والسماء، إنّه لا نهاية له، وإن كان له نهاية. وقد يقال أيضاً لما يعْســـر ذلك فيه – وإنْ كان ممكناً – تشـــبيهاً للعسير بالمعدوم، فهذه وجوه مفهوم لا نهاية.

(٣) وغرضنا أن نبحث عمّا لا نهاية له، من جهة أنّه هل يكون من الأجسام أجسامٌ هـــي بمقدارها أو بعددها؛ بحيث أي شـــيء أخذت منها دائماً وجدت شـــيئاً خارجاً عنه؛ فإنّه قد أوجب قومٌ وجود ذلك. والسبب في ذلك أمور منها صدق قول القائل إنَّ الأعـــداد تذهب في الازدياد والتضعيف إلى ما لا نهاية لـــه، أو أنّها لا تتناهى في ذلك.

or that there is no end to that. Consequently, something infinite belongs to them. The same holds for magnitudes with respect to divisibility. Another [reason] is what is supposed concerning time—namely, that it must extend infinitely into the past and future, [and] is not merely adding to some starting point in the finite [past] or some [finite] section. They say that, whenever time terminates at some first past [moment] or some last future [moment], its past must have some [moment] before and its future some [moment] after, saying that all of that is time, as we noted earlier.[6] Generation and corruption, which are supposedly uninterrupted, provide a further [reason], [for] there are those who suppose that [these] require infinite matter. So some of them made [the matter] one of the simple bodies, whether fire, air, or water. Others made it a body intermediate between two of [the simple] bodies, like those who made it the vapor intermediate between water and air. In short, they made it the body from which everything is believed to be generated. Others made [the matter] many infinite bodies, from which is combined a single body called a *mixture.* Still others made bodies infinitely many in number that are not joined together, but are separate and spread throughout an infinite void; [and] some of [these theorists] make [these bodies'] forms (which, in their view, are their shapes) infinite in species, while others stipulate that their species' forms are finite in number. They were driven to their belief that this is inevitable only because infinite generation requires that there be enough matter that it not run out. Some of them make the infinite a principle because there is the nature of the infinite, not because anything happens to be infinite.

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6. See 2.11.4–5, where Avicenna discusses time's essential relation to *before* and *after;* and 2.12.1, where he argues that there cannot be an ultimate first or last moment of time, since there would either be a *before* it or an *after* it, respectively, and so a time.

فإذا كان كذلك، فقد وجد لها معنى أنّها لا تتناهى، وكذلك للمقادير في الانقسام. ومن ذلك ما يظنّ من أمر الزمان أنّه يلزم أنْ لا يتناهى فيما مضى ولا فيما يستقبل، امتداداً لا تضعيفاً فقط، مبتدأً من متناهٍ، ولا قسمة فقط. قالوا؛ لأنّه كلّما انتهى الزمان إلى أوّل ماضٍ أو آخر مستقبلٍ وجب أنْ يكون لماضيه قبْل ولمستقبله بعْد - أو على ما أشرنا إليه قبل - قالوا وذلك كله زمان. ومن ذلك أمر الكون والفساد، الذي يظنّ به أنّه أمرٌ غير منقطع، وهناك مَنْ يظنّ أنّه يجب أنْ تكون له مادة غير متناهية. فبعضٌ يجعلها جسماً من الأجسام البسيطة؛ ناراً أو هواء أو ماء، وبعضٌ يجعلها جسماً متوسطاً بين جسمين منها، كمَنْ يجعلها البخار المتوسط بين الماء والهواء، وبالجملة يجعلها الجسم الذي يعتقد أنّه يتكون منه كل شيء. ومنهم مَنْ يجعلها أجساماً كثيرة بلا نهاية يجتمع منها جسمٌ واحدٌ يسميه خليطاً. ومنهم مَنْ يجعلها أجساماً كثيرة بلا نهاية في العدد، لكنها ليست متلاقية بل منفصلة، مبثوثة في خلاء غير متناه. فمنهم مَنْ يجعل صورها التي عندهم أشكالها بلا نهاية في النوع، ومنهم مَنْ يجعل لأنواع صورها عدداً متناهياً. وإنّما ألجأهم إلى هذا ظنّهم أنّه لا بُدّ من ذلك، فإنّه يجب أنْ يكون للكون غير المتناهي مادة وافرة لا ينقطع إمدادها. ومن هؤلاء مَنْ يجعل غير المتناهي مبدأ؛ لأنّه طبيعة غير المتناهي، لا لأنّه شيء عرض له أنْ لا يتناهى.

(4) One of the ways in which the estimative faculty has led people to affirm that something is infinite is the imagination that every finite thing necessarily terminates at something similar to what is immediately observed. From that, it necessarily follows that every body terminates at a body and that the amassing and piling up[7] of bodies goes on infinitely. An imposition and judgment of the act of the estimative faculty plays a part in these ways [of proving the existence of the infinite], for the act of the estimative faculty does not impose upon a given thing some determinate limit; rather, the estimative faculty can always imagine something greater than it. So these are the ways prompting one to affirm that there is something infinite.

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7. Reading *intiḍād* with **Z**, **T**, and the Latin (*ordinationem*) for **Y**'s *intiẓār* (expectation).

(٤) ومن الوجوه التي تدعو قوماً إلى توهم إثبات ما لا يتناهى، ما يتخيل من أنَّ كل متناهٍ فيلحقه أنْ يكون تناهيه إلى شيء على نحو المشاهدات، فيلحق من ذلك أنْ يكون كل جسمٍ يتناهى إلى جسم، وأنْ يذهب ارتكام الأجسام وإنتضادها إلى غير النهاية. ومن هذه الوجوه مقتضى التوهم وحكمه؛ فإنَّ التوهم لا يضع لشيءٍ من الأشياء حدّاً يتعين عليه، بل دائماً للوهم أنْ يتوهم أزيد منه. فهذه هي الوجوه الداعية إلى إثبات ما لا يتناهى.

Chapter Eight

On the impossibility that either a body or magnitude or number in an ordered series is infinite, and that it is impossible that there be some infinite body that is moved either in its entirety or partially

(1) The first thing we say is that it is impossible that there exist as wholly actualized some unlimited magnitude, number, or [set of] numbered things having an ordered position either in nature or in position. That is because any infinite magnitude, as well as any of the infinity of numbered things possessing an order, would proceed toward an actual infinite either in [all of] their directions or in a single direction. If they are [infinite] in all of their directions, then let us posit a certain limiting point among them—such as a point in a line, or a line in a surface, or a surface in a body, or some unit in a numeric total and make it a limiting point—and our discussion will focus on it[1] inasmuch as we mark it off as a limiting point. Now, [starting] from it, we take some determinate part—for instance, AC, from AB, where [AB] is infinite in the direction of B. So, if some amount equal to CB were superimposed or laid next to AB (or you were to consider some other analogous relation between them), then either [CB] will proceed infinitely in the way AB does, or it will fall short of AB by an amount equal to AC. If, on the one hand, AB exactly corresponds with CB [in proceeding] infinitely, and CB is a part or portion of AB, then the part and the whole exactly correspond [with one another], which is a contradiction. If, on the other hand, CB falls short of AB in the direction of B and is less than it, then

1. Reading *natakallamu ʿalayhi* with **Z**, **T**, and the Latin (*loquamur*) for **Y**'s *nuʿallimu ʿalayhi* (we designate it).

<الفصل الثامن>

في أنه لا يمكن أن يكون جسمٌ أو مقدار أو عددٌ ذو ترتيب غير متناهٍ. وأنه لا يمكن أنْ يكون جسمٌ يتحرك بكليته أو جزئيته غير متناه

(١) فنقول أوّلاً إنّه من المستحيل أنْ يكون مقدارٌ أو عددٌ أو معدوداتٌ لها ترتيب في الطبع أو في الوضْع، حاصلاً موجوداً بالفعل، غير ذي نهاية: وذلك لأنَّ كل مقدار غير متناهٍ، وكل معدودات ذوات ترتيب لا نهاية لها، إمّا أنْ يكون ذهابها إلى ما لا نهاية له بالفعل في جهاتها، أو في جهةٍ واحدة. فإنْ كانت في جهاتها كلّها، فلنا أنْ نفرض حدّاً فيها كنقطةٍ في خط، أو خطٍ في سطح، أو سطح في جسم، أو واحد في جملة عددٍ ونجعله حدّاً، ونتكلّم عليه من حيث نحدّه حدّاً، ونأخذ منه جزءاً محدوداً مثلاً (آ ج) من (آ ب) غير المتناهي منه من جهة (ب) - فلا يخلو إمّا أنْ يكون (آ ب) لو أُطبق عليه مساوٍ لـ(ج ب) أو حوذي به، أو اعتبرت مناسبة بينهما؛ أن يكون ذاهباً فيما لا نهاية مذهب (آ ب) أو يقصر عن (آ ب) بمساوٍ لـ(آ ج). فإنْ كان (آ ب) مطابقاً لـ(ج ب) إلى غير النهاية و(ج ب) جزء أو بعض من (آ ب)، فالكل والبعض متطابقان، هذا خُلْف. وإنْ كان يقصر (ج ب) من جهة (آ ب) في جهة (ب) وينقص عنه فـ(ج ب)

CB is finite and AB exceeds it by the finite [amount] AC, in which case AB is finite; but it was infinite. So it becomes evidently clear from this that the existence of an actual infinite with respect to magnitudes and ordered numbers is impossible.

(2) Let us take up the other topic and say that no infinite body is subject to motion. That is because motion is intellectually understood only in one of two ways: either involving an exchange of place, or not. Now, it would be impossible for the infinite body to move so as to exchange place. On the one hand, if [the body] is infinite in every direction, there is no vacant place such that there [could] be an exchange. On the other hand, if it is infinite in one direction to the exclusion of another, then perhaps we can conceptualize some empty space; but, when [the purportedly infinite body] moves toward [that empty space], it must either vacate the opposite side or not. Now, if it does not vacate [the opposite side], there is no motion but, rather, increase and augmentation. If it does move and vacates [the opposite side], then the infinite side was finite. Furthermore, this motion cannot be natural or forced. It is not natural because [what moves] naturally is that which seeks its natural place,[2] and, as we have already concluded earlier,[3] every natural place is a limiting point. Now, every limiting point is something delimited, but what has no limit neither moves toward nor joins with what is delimited. As for forced [motion], we shall soon show that what is infinite is not subject to force.[4] Also, forced [motion] is away from the natural place, and so, when there is no natural [motion], neither is there forced [motion].

2. Literally, its "where."
3. See 2.8.9–10.
4. See 3.10.

متنـــاهٍ، و(آ ب) يفضل عليه بـــ(آ ج) المتناهي. فـ(آ ب) متناهٍ، وقد كان غير متناهٍ. فبيّن من هذا بياناً واضحاً أنَّ وجود ما لا يتناهى بالفعل في المقادير والأعداد المرتبة مستحيل.

(٢) ولنبتـــدىء في نمطٍ آخر ونقول: إنَّه لا يكون جرْم لا نهاية له متحركاً؛ وذلك أنَّ الحركة لا تعقل إلاّ على أحد وجهين: حركة يكون فيها اســـتبدال مكان، وحركة لا يكون فيها اســـتبدال مكان. فأمّا الحركة التي يكون فيها استبدال مكانٍ فذلك ممّا يستحيل على الجرْم غير المتناهي، أمّا إنْ كان غير متناهٍ من جميع الجهات، فلأنّه لا يخلو عنه مكان حتى يســـتبدله، وأمّا إنْ كان غير متناهٍ من جهةٍ دون جهـــة، فربّما أمكن أنْ نتصور عنه فراغ. لكنـــه إذا انتقل إليه لم يخلُ إمّا أنْ يخلى عن الجهة المقابلة لها أو لا يخلى، فإنْ لم يخلُ فما انتقـــل، لكنه ربا ونما؛ وإنّ انتقل وأُخلي فالجهة غير المتناهية متناهية. وأيضاً هذه الحركة لا يجـــوز أنْ تكون طبيعية ولا قســـرية. أمّا أنها لا تكـــون طبيعية فلأنَّ الطبيعي هو الذي يطلـــب أيْناً طبيعياً، وكل أيْن – كما قد فرغنا منـــه قبل – حدٌّ، وكل حدّ فهو محدود والمحدود لا ينتقل إليه ما لا حدّ له، ولا ينحاز إليه. وأمّا القســـري، فإنّا سنبيّن عن قريبٍ أنَّ ما لا يتناهى لا ينقســـر. وأيضاً فإنَّ القســـري يكون إلى خلاف الأين الطبيعي، فإذا لم يكن طبيعي لم يكن قسري.

(3) Moreover, how could the simple body or its like be finite in one direction but infinite in another when its nature is identical throughout? In this case, either the boundary that splits it must be something that its [own] nature imposes on it, or it is some accidental force (that is, something outside of nature) that has taken hold of it. If it is something that its nature imposes, and [if] its nature is simple and identical throughout, then the effect it produces as a result of its nature must not vary so as to delimit one side while not delimiting another. If it is by force [that the simple body is finite in one direction but not another], then the nature of this body requires that it be infinite. In that case, it might have been that some agent just so happened to mark off [the simple body's] boundary and split it so as to make it finite, and so the infinite part of it would exist but would be delimited and split off from it. In that case, it would not terminate at some empty space or void, but [it] would terminate at what was split off, which is of its [same] genus and nature, and so, again, it would have no place into which it could undergo this manner of motion. Alternatively, [the agent] might have delimited it without separating certain things from it but, rather, with respect to making its quantity one that has a boundary in one direction but not another, such as when the finite body is accidentally made smaller when there is condensing and larger when there is rarefaction. In this case, however, this body would be of such a character that it could be [both] finite and infinite, where that would be through the effect of some active influence. Later, when we show that the body is not acted upon in this way, whether by a finite or an infinite active influence, we'll expose what is false about that.[5] As for the composite [body], it would be impossible that one area be infinite and another finite. [That] is because, were our

5. See 3.10.

(٣) وأيضاً فإنّه كيف يكون الجسم البسيط، وما يجري مجراه، متناهياً من جهة، وغير متناهٍ من جهة، وطبيعته متشابهة؟ فلا يخلو إمّا أنْ يكون الحدّ القاطع له أمراً تقتضيه طبيعته، أو يكون إنّما عرض له قسرٌ وأمرٌ، خارج عن الطبع، قد أدركه. فإنْ كان مقتضى طبيعته – وطبيعته متشابهة بسيطة – فمن الواجب أنْ لا يختلف تأثيره عن طبيعته حتى يتحدّد منه جانب ولا يتحدّد منه جانب. وإنْ كان بالقسر فتكون طبيعة هذا الجسم توجب أنْ يكون غير متناه. فإمّا أنْ يكون قد عَرضَ أنَّ حادّاً حدّه وقاطعاً قطعه فجعله متناهياً؛ فيكون غير المتناهي منه موجوداً لكنه حُدّ دونه وقُطع عنه، فلا يكون تناهيه إلى فضاء أو خلاء. ولكن تناهيه إلى مقطوع من جنسه وطبيعته، فلا يكون له أيضاً مكانٌ يتحرك إليه هذا النوع من الحركة. وإمّا أنْ يكون حدّده من غير أَنْ أبان منه أشياء، بل من جهة أنّه جعل كمّه كمّاً ذا حدّ في جهةٍ دون جهة، كما لعارضٍ أنْ يجعل كمّ الجسم المتناهي أقلّ عند التكاثف وأكثر عند التخلخل. فيكون حينئذ من شأن هذا الجسم أن يقبل تناهياً وغير تناهٍ، وذلك بتأثير مؤثّرٍ، وذلك ممّا سنوضّح بطلانه بعد؛ حيث نبيّن أنَّ الجسم لا ينفعل هذا النحو عن مؤثّرٍ متناهٍ أو غير متناه. وأمّا المركب فلا يجوز أنْ يكون غير متناهٍ من جهة؛ ومتناهياً من جهةٍ، فإنّا لو توهمنا كل واحد من أجزائه قد تحرّك

estimative faculty to imagine that each one of its parts has moved to the finite area, then either the whole has ended up moving out of the infinite side (but that is absurd) or [else] [the whole] has not moved from there, but some parts have moved but not others (but this contradicts what was posited). So this is [what results] when you believe that the motion [of an infinite body can occur] through exchange of place.

(4) The other motion, which is not through exchange of place, is circular motion. Now, it must be such that either the rotation is completed or it is not altogether completed. In the case where the rotation is completed, there arises the impossibility of circular motion in something infinite that we mentioned in the chapter on the void.[6] If the rotation is not completed, then its completion is either impossible or not. If it is not [impossible], there is no absurdity in positing it and no absurdity necessarily follows from [positing] it; but, as we noted,[7] an absurdity does necessarily follow from it. If [the completion of the rotation] is impossible, then some posited part of it can move through a certain arc but cannot move through another arc, where what is moved, the distance it covers (if it does), the arc, and all the states are exactly identical. It is impossible, however, that this should be the case, for it is impossible that there should be two things that are formally identical [and yet] one is possible and the other is impossible. From this it becomes clear that an infinite body simply cannot undergo circular motion; and, equally, a finite body within an infinite body cannot undergo it, just as we made clear in the chapter on the void.[8]

6. See 2.8.8.
7. Ibid.
8. Ibid.

إلـى جهة التناهي؛ لم يخلُ إمّـا أنْ يحصل للكل انتقال من الجانب غير المتناهي – وذلك محـال، وإمّا أنْ لا يكون له انتقال مـن هناك، فتكون بعض الأجزاء تحركت دون بعض، وهذا خلاف ما فُرض. فهذا إذا جعلت الحركة باستبدال المكان.

(٤) وأمّا الحركة الأخرى التي لا يستبدل بها المكان فهي المستديرة، فلا يخلو إمّا أن تتمّ الدورة وإمّا أنْ لا تتمّ البتة. فإنَّ تتمّ الدورة عرض ما قلناه في باب الخلاء من استحالة الاسـتدارة فـي أمرٍ غير متنـاه. وإنْ لم يتمّ الدورة فلا يخلو إمّـا أنْ يكون تتميم الدورة مسـتحيلاً أو لا يكون. فإنْ لم يكن، كان فرضه غير محالٍ ولا يلزم منه محال. لكنه يلزم منه كما قلنا محال. وإنْ كان تتميم الدورة مستحيلاً؛ فيكون – لجزءٍ منه – مفروض أنْ يتحرك قوساً، ولا يكون له أنْ يتحرك قوساً آخر والمتحرك والمسافة فيه، إنْ كان، والقوس والأحوال كلها متشـابهة. وهذا مستحيل أنْ يكون؛ فمن المستحيل أنْ يكون أمران متفقا الصورة لأمرٍ واحد؛ أحدهما جائزاً والآخر مسـتحيلاً. فبيّنٌ من هذا أنَّ الحركة المستديرة ممّا لا تعرض البتة للجسم غير المتناهي، وأيضاً لا تعرض لجسمٍ متناهٍ في جسمٍ غير متناهٍ، على نحو ما أوضحنا في باب الخلاء.

(5) Now, it is said[9] that, if [an infinite body] were to move circularly, it would have a circular shape; also, its two radii would both be infinite, in which case what is infinite would be doubled; also, then, the interval between the line extending from the center that is posited as moving and the stationary line toward which or away from which the [first line] moves would become infinite, and, moreover, [that interval] would be traversed in a finite period of time [all of] which would be absurd.

(6) All of this, however, is something that I don't truly understand to the point of feeling confident in its soundness. That is because it has not been demonstrated to me during the course of their argument that whatever is moved circularly must have a circular shape or that what is infinite in one direction cannot be doubled. If they prove this by showing that what is infinite is not susceptible to increase, as well as why it is not so susceptible, and [if] thereafter [they] busy themselves with talk about the circle, then they have unduly burdened themselves with something they do not need. [That] is because showing that that is not susceptible to increase is sufficient and does not require that they use as a middle term the *half* and its double with regard to halving the diameter. It also might just be that the half is nothing but what is delimited, and the same holds for the double.[10] As for the report about the interval, it does not seem necessary to me that that interval between the two lines should become

9. Cf. Aristotle, *De caelo* 1.5.

10. Here, Avicenna is relying on one of the points he made in par. 1 above: that, if there were a magnitude infinite in all directions, we could still posit some limiting point within it. For example, imagine a line AB, which extends infinitely toward both A and B. Now, posit some point C within AB. Both CA and CB would be infinite, even though either is only "half" of the whole AB. Similarly, AB would be "double" either CA or CB. Avicenna's point, then, is that there is no demonstrative absurdity in assuming infinities of different sizes.

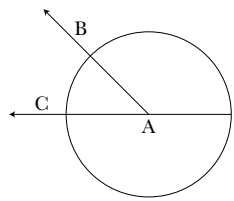
(٥) وأمّا الذي يقال إنّه لو كان يتحرك على الاستدارة لكان له شكلٌ مستدير، أو كان نصف قطريه كلاهما لا نهاية له، فيتضاعف ما لا نهاية له، ولكان البُعْد بين الخط المتحرك المفروض خارجاً عن المركز، والخط الساكن المنتقل إليه أو عنه يصير غير متناهٍ، ثم يلزم أنْ يقطع في زمانٍ متناهٍ، وذلك محال.

(٦) فجميع ذلك ممّا لم أفهمه حق الفهم حتى أومن بصحته. وذلك أنّه لم يتبرهن لي، في تعليمهم، أنَّ كل متحركٍ على الاستدارة يجب أنْ يكون له شكلٌ مستديرٌ، ولم يتبرهن لي من تعليمهم أنَّ ما لا نهاية له في جهةٍ لا ضعف له. فإنْ بيّنوا هذا بإبانةٍ أنَّ ما لا يتناهى لا يقبل الزيادة، وبينوا أيضاً أنّه لِمَ لا يقبل الزيادة، ثم اشتغلوا بحديث الدائرة، فقد تكلفوا شططاً لا يلزمهم تكلّفه. فإنَّ إبانتهم أنَّ ذلك لا يقبل الزيادة يكفيهم، وغير محوجٍ إياهم إلى أنْ يوسّطوا أمر النصف والضعف فيه من جهة تنصيف القطر، وعسى أيضاً أنْ لا يكون النصف إلاّ المحدود وكذلك الضعف. وأمّا حديث البُعْد، فإنّه ليس يجب عندي أنَّ ذلك

infinite at all. How could it be, when two lines enclose it?[11] Even if that were true [namely, that the interval is infinite], I would do away with mentioning that it would be traversed in a finite period of time and, rather, raise a quick contraction—namely, [that the interval] is infinite, but [that] two lines limit it, which is a contradiction. The reason it is not necessary is because when the interval is always increased, it is not the case that an infinite interval must occur there; rather, the increase will proceed infinitely, where every increase will involve one finite [amount] being added to another, in which case the interval will be finite. This is just like what you learned concerning number—namely, that [number] is susceptible to infinite addition, and yet, any number that occurs is finite without some number actually being infinite, since any given number in an infinite sequence exceeds some earlier number [in that sequence] only by some finite [number].

(7) So this is what I think; but perhaps someone else has some well-established way to prove that. At any rate, should someone want to prove that an infinite interval occurs, then the proof that they mention does not get it right as it should, and I wouldn't bet that anyone else will get it right. The fact is that they ought to say this: Let us posit a certain interval between two opposite points on two lines extending infinitely. Now, let us connect the [points] by a line that is a chord of the intersecting angle. So, because the extension of the two lines, which is infinite, is proportional to the increase of the interval [that is, the length of the chord], the increases to that interval are infinite. [Those increases] can also exist together equally, because the increases that are below will actually be

11. In Aristotle's original objection, the claim was that the interval—for example, the arc between the lines AB and AC in the diagram below—would become infinitely large if the two lines extended infinitely. Avicenna's point is that, no matter how far one extends the lines—even infinitely, the interval represented by the arc BC is always going to be limited by the lines AB and AC and so, strictly speaking, will be finite.



البُعْد بين الخطّين يصير البتة بلا نهاية؛ وكيف ويحيط به الخطّان الخارجان؟ ولو صحّ ذلك لا ستغنيتُ عن ذكر قطْع في زمانٍ متناه، بل كنتُ أُقيم خُلْفاً عن قريب، وهو أنّه غير متناهٍ ويحدّه خطّان، وهذا خُلْف. وأمّا أنه لِمَ ليس يجب ذلك؛ فلأنّه ليس إذا كان البُعْد دائماً يزيد يجب أنْ يحصل هناك بُعْدٌ غير متناهٍ، بل يكون التزيُّد ذاهباً إلى غير النهاية، وكل زيادة فهي بمتناهٍ على متناهٍ، فكل بُعْدٍ يكون متناهياً. وهذا كما تعرفه في أمر العدد، أنّه يقبل الزيادة إلى غير النهاية، ويكون كل عددٍ يحصل متناهياً، ولا يتحصل عددٌ لا نهاية له؛ لأنّه لا يزيد عددٌ في النظام غير المتناهي على عددٍ قبله إلاّ بمتناهٍ.

(٧) فهذا ما عندي، وعسى أنْ يكون عند غيري وجهٌ محقّقٌ لبيان ذلك. فإنه اشتهى أحدٌ أنْ يبيّن أنّه لا بُدّ من بُعْدٍ غير متناهٍ يقع، فليس طريق البيان ما يقولون ممّا لَمْ يحصّل فيه على وجهه، ولا نقدّر أنَّ غيرنا يحصله، بل يجب أنْ يقولوا هكذا؛ لنفرض بُعْداً بين نقطتين من الخطّين الذاهبين إلى غير النهاية متقابلتين، ولنصل بينهما بخطٍ يكون وتراً لزاوية التقاطع. فلأنَّ ذهاب الخطّين في زيادة البُعْد هو إلى غير النهاية، فإنَّ الزيادات على ذلك البُعْد موجودة بغير نهاية. ويمكن أنْ توجد متساوية؛ لأنَّ الزيادات التي توجد

joined to those that are above. For instance, the [amount that] the second increases the first will belong to the third, together with any other increase. So the infinite increases must actually exist in one of the intervals, and that is because the increases actually exist, and every actual increase will exist and so will belong to a certain one [of the intervals]. In that case, it necessarily follows that some interval will exist in which there is an actual infinity of equal increases. So that interval would increase the first finite [interval] by an infinite [amount], in which case there would be an infinite interval. Still, when this way is preferred, the contradiction obviously does not require [the introduction] of motion, because this infinite can exist only between two lines, in which case it is finite and infinite, which is absurd.

(8) We further note what is said about the parts of the infinite having to be at rest at every location while they are moved toward every location because every location belongs to it naturally.[12] This, however, is also something that I could not independently verify nor understand, for it is not necessary that when a single thing has [several] locations, each one of which belongs to it by nature, it must rest in and move away from each one of them. Indeed, instances of these locations, in any one of which the body might by chance occur, are between [the limits of] the whole of its universal location, where it naturally comes to rest and does not flee. A case in point is one of the parts of air in the whole of the region of air, and one of the parts of earth in the whole of the region of earth. Were this not the case, there would be no natural rest and motion, for the region [as a whole] always exceeds that which the parts [taken individually] occupy. Perhaps, however, there is some explanation of this way [of arguing against an infinite body] that I do not understand.

12. The argument seems to refer to that of Aristotle's *Physics* 3.5.205a12ff.

مـــا تحت تجتمع بالفعل فيما هو فوق، مثـــلاً أنَّ زيادة الثاني على الأول موجودة للثالث مع زيـــادة أخرى، فيجب أنْ تكون الزيادات غير متناهية موجودة بالفعل في بُعْدٍ من الأبعاد، وذلك لأنَّ الزيادات بالفعل موجودة وكل زيادةٍ بالفعل موجودة فهي توجد لواحد. فيلزم أنْ يكون بُعْدٌ موجودٌ فيه زيادات غير متناهية بالفعل متساوية، فيكون ذلك البُعْد زائداً على المتناهي الأول بما لا نهاية له، فيكون بُعْداً غير متناه. لكنه إذا فَضُل على هذا الوجه كان الخُلْف ظاهراً لا يحتاج فيه إلى الحركة، وذلك لأنَّ هذا غير المتناهي لا يمكن أنْ يوجد إلاّ بين الخطّين؛ فيكون متناهياً وغير متناهٍ، هذا محال.

(٨) ونقول أيضاً إنَّ ما يقال من أجزاء غير المتناهي يجب أنْ يســـكن في كل موضع وَتتحرّك إلى كل موضع، لأنَّ كل موضع له طبيعي، فهذا أيضاً ما لَمْ أتحقّقه ولَمْ أفهمه. فإنّه ليس يجب إذا كان لشيءٍ واحدٍ مواضع كل واحدٍ منها له بالطبع أنْ يلزمه، أنْ يسكن في كل واحد منها وأنْ يتحرك عن كل واحدٍ منها. فإنَّ أمثال هذه المواضع – أيّها اتفق للجسم الحصـــول فيه – من بين جملة الموضع الكلّي له، وقف بطبعه فيه ولم يهرب، كحال جزءٍ مـــن أجزاء الهواء في جملة حيّز الهواء، وجزء من أجزاء الأرض في جملة حيّز الأرض. ولولا هذا لما كان ســـكونٌ ولا حركةٌ بالطبع؛ فإنَّ الحيّز دائماً يفضل على مُشْغل الأجزاء، فعسى أنْ يكون لهذا وجه بيانٍ لم أفهمه.

(9) It is true, however, that that body's parts would not have a natural motion. That is because, on the one hand, should the body be infinite in every direction, there would be no location for its parts to seek by moving that is different [from the one] at the time the motion began. On the other hand, if it is [infinite] in one direction to the exclusion of another, such that the part is moved when it is outside the limiting point that is in the delimited direction, then the part inevitably will be moved to some place that is sought by nature. Still, that which the part seeks must be the very [place] that the whole seeks, whereas the whole will not naturally seek a place, since there is no place for it either generically like itself or unlike itself. By *generically like itself* I mean that there would be some surface similar to its surface, while by *generically unlike itself* [I mean] that there would be some surface dissimilar in its nature from its surface, just as, for us, [the surface] belonging to air [differs] from the surface of fire. So, when the nature of the whole does not seek some place that is proper to it and specified,[13] then neither does the part seek some place, because the region of the whole is homogeneous throughout [and, instead, the part] rests at any location where it, by chance, happens to be, and there is no region outside the region of the whole. That is [so] unless we stipulate that the whole is finite in one direction, in which case the region of the whole would necessarily be that which the part seeks—namely, that [region] where the whole is at rest—and so this region would either be some interval or something that is surrounded; but the doctrine of the interval is vacuous,[14] and what is infinite cannot be surrounded. Perhaps the part would then seek the whole by means of its natural motion so as

13. Reading *yataʿayyanu* with two MSS consulted by **Y**, **Z**, **T**, and the Latin (*specificat*) for **Y**'s preferred *yataʿallaqu* (to be associated), which, if retained, should include the preposition *bi* as part of its syntactical regimen, but which is, in fact, absent.

14. See 2.7.

(٩) وأمّا أنّه لا تكون لأجزاء ذلك الجسم حركة طبيعية فذلك صحيحٌ، لأنّه لا يخلو إمّا أنْ يكون الجسم غير متناهٍ في جميع الجهات، فلا يكون موضع مطلوباً لأجزائه بالحركة مخالفاً لمبدأ الحركة؛ وإنْ كان في جهة دون جهة حتى يكون الجزء يتحرك إذا كان خارجاً عن الحدّ الذي في الجهة المحدودة، فلا محالة أنَّ الجزء يتحرك إلى مكانٍ يطلبه بالطبع. ولكن الذي يطلبه الجزء يجب أنْ يكون هو بعينه الذي يطلبه الكل؛ والكل لا يطلب مكاناً بالطبع، إذ لا مكان له مجانسٌ ولا غير مجانسٍ؛ أعني بالمجانس أنْ يكون سطح شبيه بسطحه، وغير المجانس أنْ يكون سطح غير شبيه بسطحه في طبيعته؛ كما للهواء عندنا من سطح النار. فإذا كانت طبيعة الكل لا تطلب مكاناً ولا يختص لها ولا يتعّين، فطبيعة الجزء أيضاً لا تطلب مكاناً، لأنَّ حيّز الكل الذي هو متشابه يسكن في أي موضع اتفق، ولا حيّز خارجاً عن حيّز الكل، اللّهم إلاّ أنْ نجعل الكل متناهياً في جهة. فيجب حينئذ أنْ يكون حيّز الكل هو الذي يطلبه الجزء وهو الذي يسكن فيه الكل، فيُرى أنْ هذا الحيّز بُعْدٌ أو محيطٌ، والقول بالبُعْد باطل، ولا محيط لغير المتناهي. فعسى أنْ يكون

to come into contact with it, the first [place] of which would be along the nearest of the Heavens. This, however, is not the situation with natural bodies, which will, at some point, become clear to you from what we will teach you.[15] So, then, the part will not seek some place by nature; and whatever does not seek some place by nature does not move by nature, for the erroneous view that natural motion is not toward the natural place but toward the universal [place] or the like is something whose falseness has been explained to you.[16] So, from this, you know that bodies whose parts have a natural motion in delimited directions, the number of which is denotable, are all finite, and it is all that more obvious in the case of the body to which that [namely, having a natural motion in delimited directions] belongs entirely.

(10) We additionally say that bodies cannot be delimited in magnitudes while unlimited in number, for they must either be contiguous with one another or distinct and scattered with respect to place. On the one hand, if they are distinct from one another, then, were the estimative faculty to imagine them [all] contiguous with one another, the volume [occupied] by all of them in every direction would become smaller and closer to the center than the volume of what surrounds. In that case, the [occupied] volume would be finite and fall short of the initial volume by the amount that [the bodies] cover, up to the point where they [all become] contiguous with one another. So the initial volume would have been finite. Thus, the number of [bodies] in the finite volume containing them is finite, because the actual parts exiting in what is delimited is numerically delimited. From this you also know that it is impossible for a rectilinear motion to proceed infinitely, since you have learned that intervals are finite[17] and the preceding [showed] you that directions are finite. Also, [you know] that it would be impossible for some motion to

15. The reference would appear to be to 4.10.2–4.
16. The reference appears to be to 2.9.10.
17. See pars. 6–7.

الجزء يطلب الكل بحركته الطبيعية حتى يتصل به، وأوّلاه على أقرب السماوات، وليس الحال في الأجسام الطبيعية. هذا قد يتضح لك مما نعلّمه إياك. فإذن الجزء لا يطلب مكاناً بالطبع، وما لا يطلب مكاناً بالطبع فهو لا يتحرك بالطبع: فإنَّ الذي يُظنّ أنَّ أمر الحركة بالطبع هو إلى غير المكان الطبيعي، بل إلى الكلّية أو غير ذلك، أمرٌ تبين لك بطلانه. فتعلم من هذا أنَّ الأجسام التي لأجزائها حركة طبيعية إلى الجهات المحدودة العدد المشار إليها كلّها متناهية، فالجسم الذي ذلك لكليته أظهر.

(١٠) ونقول أيضاً إنّه لا يجوز أنْ تكون الأجسام محدودة المقادير غير محدودة العدد، فإنّها لا تخلو إمّا أنْ تكون متماسّة أو تكون متباينة مبثوثة في المكان. فإنْ كانت متباينة، فلو توهمناها متماسّة متلاقية صار حجم جملتها - من جميع الجهات - أصغر وأقرب إلى الوسط من حجم ما يحويها، فتكون متناهية الحجم وقاصرة عن الحجم الأول بمقدار ما قطعت من مقامها إلى التماس، فيكون الحجم الأول أيضاً متناهياً، فيكون عدد الموجود منها في حجمٍ متناهٍ منها متناهياً؛ لأنَّ الأجزاء الموجودة بالفعل في كل محدودٍ محدودة بالعدد. ومن هذا تعلم أنّه لا يجوز أنْ تكون حركة ذاهبة إلى غير نهايةٍ في الاستقامة، إذ قد علمتَ تناهي الأبعاد، وسلف لك تناهي الجهات، وأنه يستحيل

move downward, for instance, when *down* is not delimited. The same would hold in the case of *upward.* For when *downward* can be delimited,[18] then its opposite must be able to be delimited; and, likewise, if *upward* can be delimited, then its opposite must be able to be delimited. Otherwise, neither it nor its opposite would exist. In that case, downward would have no opposite, and so downward would not be downward, since downward is such relative to upward.

(11) Also impossible is the claim of those who make the infinite *qua* infinite an element and principle, but not that *qua* some other nature, like [that] of water or of air, where that nature is accidentally infinite.[19] The proof that this claim is impossible is that that which is infinite is either divisible or not. If, on the one hand, it is indivisible, then it would not, in fact, be infinite[20] in proceeding in some direction, but [would be infinite] only by way of negation, just in the way that the point is said to be *infinite*—but this is not what they were getting at. Instead, they intended *infinite* in the sense that we can take whatever we want. On the other hand, if it is divisible, while not being divisible into some other nature (since there would be no nature other than the nature of the infinite *qua* infinite), then every part should have the nature of the whole, and the part that is surrounded and delimited by the division should also be infinite, which is absurd. So, from what we said, it has become clear that no body exists as infinite, nor is there any infinite body that is moved naturally, nor is there any elemental body that has some influence whose effect is infinite. Likewise, there are no numbers having a natural ordered position that are actually infinite.

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18. **Y** has omitted by homeoteleuton the lines *ka-dhālika ḥāl al-ᶜalūw. Fa-idha kāna al-sufl mutaḥaddid,* which occur in **Z**, **T**, and the Latin, corresponding with "The same would hold in the case of upward. For when downward can be delimited. . . ."

19. Aristotle attributes this position to the Pythagoreans; see Aristotle, *Physics* 3.4.203a4–8.

20. Reading *ghayr mutanāhin* with both **Z**, **T**, and the Latin (*infinitum*) for **Y** *mutanāhin* (finite).

أنْ تكون حركة إلى السُـــفْل مثلاً ، والسُـــفْل غير متحدد ، وكذلك حال العلو . فإذا كان السفل متحددا فمقابله لا محالة متحدّد . وكذلك إنْ كان العلو متحدّداً ؛ فمقابله لا محالة متحدّد ، وإلاّ لم يكن موجوداً ؛ ولم يكن مقابلاً ، فلم يكن للسُـــفْل مقابل ، فلم يكن السُفْل سُفْلاً ، لأنَّ السُفْل سُفْلٌ بالقياس إلى العلو .

(١١) ومن الكلام المستحيل قول مَنْ جعل غير المتناهي ، من حيث هو غير متناهٍ ، أُسْطُقُسّـــاً ومبدأ . وليس ذلك من حيث هو طبيعة أُخرى ، كمائيةٍ أو هوائيةٍ تلك الطبيعة يعرض لها أنْ لا تتناهى . والدليل على استحالة هذا القول أنَّ هذا الذي هو غير متناهٍ ، إمّا أنْ يكون منقسماً أو يكون غير منقسم . فإنْ كان غير منقسم فليس هو غير متناهٍ من الجهة التي يذهب إليها ، بل على ســـبيل الســـلب ؛ كما يقال للنقطة إنّها غير متناهية ، وليس إلى هذا يذهبون ، بل يريدونه غير متناه ، ليكون لنا أنْ نأخذ منه ما شئنا . وإنْ كان منقسماً ، وليس ينقسم إلى طبيعةٍ أُخرى ، إذ ليست هناك طبيعة غير طبيعة ما لا نهاية ، من حيث هـــو لا نهايـــة ، فيجب أنْ يكون كل جزءٍ في طبع الـــكل ، وأنْ يكون الجزء المحاط المحدود بالقســـمة منه أيضاً غير متناهٍ ، وهذا محال . فقد وضح ممّا قلناه إنّه لا وجود لجســـم غير متناهٍ ، ولجسم متحركٍ بالطبع غير متناهٍ ، ولجسم أُسْطُقسيّ مؤثّر متأثر غير متناهٍ ، وكذلك لا أعداد لها ترتيبٌ بالطبع غير متناهية بالفعل .

(12) It remains, then, that we consider some other way that the infinite might exist in bodies and whether, in fact, it does or does not—namely, in the case of their augmentation. So we say that some of the Ancients believed that, just as one affirms of the body that it can be progressively divided without there having to be some minimal limiting point of which nothing is smaller, so, likewise, that holds on the part of largeness. [That] is because, just as those divisions do not occur together actually, but only as one after another such that they do not terminate at some limiting point of which none is smaller, so, likewise, the situation is the same concerning largeness. They said: Indeed, while it is impossible for an infinitely large body to exist actually, it is not impossible for it to proceed toward it, just like in the case of adding numbers.

(13) Since we maintain that in one sense this school of thought is right and in another it is not, let us then inquire into how it is and how it is not right. The sense in which this school of thought is right is because, in the estimative faculty, you can[21] imagine that a finite body is divided without stopping, and you can imagine yourself continually taking a part from what is divided and adding it to some other part or body so that [the other part or body] becomes bigger than it was. Moreover, you can take a part from what remains that is smaller than the remainder and add it to the first increase, and then continue doing that, so that each subsequent addition is smaller than the first. Now, the body increased by those additions will not reach the point at which the sum of the additions that make up [the body] equal all of the divided body. This manner of addition does not make the body reach every [degree of] largeness that

21. Reading *li-ka* with **Z**, **T**, and the Latin (*tu*) for **Y**'s (inadvertent) *dhālika* (the demonstrative "that").

(١٢) فبقي أنْ نتأمل نحواً آخر من وجود ما لا يناهى في الأجسام؛ أنّه هل هو ممّا يصحّ أو لا، وذلك حال نموّها، فنقول: قد ظنَّ، بعض المتقدمين أنَّه كما أنَّ للجسم أنْ يمعن ذاهباً في الانقسام من غير أنْ يقتضي حدّاً في الصغر لا أصغر منه؛ كذلك له ذلك في جانب العِظم. فإنّه كما أنَّ هذا الانقسام ليس يحصل بالفعل معاً، ولكن يحصل شيئاً بعد شيء، فلا ينتهي إلى حدّ لا أصغر منه، كذلك الحال في العِظم. قال: فإنّه، وإنْ استحال وجود عظمٍ للجسم غير متناهٍ بالفعل، فليس يستحيل السلوك إليه، كما الحال في تزايد الأعداد.

(١٣) فلننظر في هذا المذهب؛ ولنتأمل كيف يصحّ وكيف لا يصحّ. فنقول: إنّه يصحّ من وجهٍ ولا يصحّ من وجه. أمّا الوجه الذي به يصحّ هذا المذهب، فذلك لأنَّ لك - في التوهم - أنْ تقسم جسماً متناهياً قسمة لا يقف، ولك في التوهم أنْ لا تزال تأخذ جزءاً من المقسوم وتضيفه إلى جزء آخر أو جسم آخر، فيصير أكبر ممّا كان. ثم تأخذ جزءاً آخر من الباقي، أصغر من الباقي، وتضيفه إلى زيادةٍ أُولى، فلا يزال يرداد ذلك زيادة كل تالٍ منها يكون أصغر من الأول، ولا يبلغ الجسم المزيد عليه تلك الزيادات أنْ يساوي جملة

can by chance be; rather, [the body] will have a delimiting point that it will never reach, let alone exceed.[22] The manner of addition, however, by which the body could be augmented until every limiting point in largeness arises or is exceeded is impossible and is not analogous to smallness, for division does not need something outside of the body, whereas [this is not so for] augmentation and increase. [That is because] augmentation and increase, on the one hand, might occur through joining some matter to the original stock, where this would require that the materials of the bodies be infinite. On the other hand, [augmentation and increase] might occur though rarefaction and spreading out without stopping. This is impossible, because everything that undergoes rarefaction does so in some void or plenum, all of which is finite, as you have already learned.[23] Also, specifically, the void has no existence. Again, [it is also impossible] because there cannot be some motion, which necessarily entails some direction, unless it has some limiting point.

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22. An example of Avicenna's point is given in Aristotle's *Physics* 3.6.206b4ff, where, for example, one imagines some magnitude ABC that is divided in half. Then BC, for instance, is divided again in half, and, half of BC is added to AB. One then continues in this fashion, such that progressively smaller divisions of BC are made and those divisions are, in turn, added to AB. In this manner, AB can be infinitely augmented, but it never actually becomes as large as the initial magnitude ABC, let alone larger.

23. See par. 3.

الزيادات التي يحصل منه، جميع الجسم المقسوم. وهذا الضرب من الزيادة لا يبلغ بالجسم كل عظم اتفق، بل له حدّ لا ينتهي إليه البتة، فضلاً عن أنْ يزيد عليه. وأمّا الضرب من الزيادة، التي من شأنها أنْ تنمّي الجسم حتى توافي كل حدّ في العِظم أو يزيد عليه؛ فذلك متعذرٌ وليس على قياس الصغر، فإنَّ القسمة لا تحتاج إلى شيءٍ خارجٍ عن الجسم. والنمو والتزيّد يكون إمّا بمادةٍ تنضمّ إلى الأصل، وهذا يوجب أنْ تكون موادّ الأجسام بلا نهاية، وإمّا بتخلخلٍ وانبساطٍ لا يقف، وهذا يستحيل لأنّه يحتاج كل متخلخلٍ أنْ يتخلخل في حيّز خلاءٍ أو ملاء؛ وكل ذلك متناهٍ كما قد عُلم، والخلاء خاصة لا وجود له، ولأنّه لا يجوز أنْ تكون حركة تقتضي جهة إلاّ ولها حدّ.

Chapter Nine

An explanation of the way that the infinite does and does not enter into existence, and a refutation of the arguments of those who defend the existence of an actual infinite

(1) Since all of this has become clear, we are ready to learn how the infinite can exist with respect to divisibility and numerical increase. So we say that *infinite* sometimes includes within its meaning [(1)] the things that that [term] describes, while at other times we mean by it [(2)] the very reality of what is infinite. It is just like when we speak of twenty cubits[1] and sometimes mean by it the timber that is twenty cubits [in length] and at other times the nature of this quantity. We likewise speak of this very nature that it is infinite, by which we mean that it is such that anything you take from it, you will find, without repetition, some part of it existing outside. When we say that, we mean that [the infinite] never reaches some limiting point at which it stops, so as to terminate at it. So, therefore, it is not later limited—that is, it does not reach some limit that cuts it short.

(2) As for those things belonging to the natures we mentioned that are said to be infinite, it is correct for us to say that they exist potentially, although not altogether, but each one [individually]. So each one of the things whose number is infinite exists potentially one after another; but the whole [infinite] *qua* a whole does not exist, either potentially or actually, except accidentally owing to its parts (if something like that can

1. Approximately 30 U.S. feet, or 9 meters.

<الفصل التاسع>

في تبيين كيفية دخول ما لا يتناهى في الوجود وغير دخوله فيه، وفي نقض حجج مَنْ قال بوجود ما لا يتناهى بالفعل

(١) وإذ قد تبين هذا كله، فبالحري أنْ نعلم أنّه كيف يمكن أنْ يكون لما لا يتناهى في انقسام الجزء وفي تزيّد العدد، وفيما يجري مجرى ذلك وجود؛ فنقول إنَّ قولنا ما لا نهاية له، تارة يتناول الأمور التي توصف بذلك، وتارة نعني بها نفس حقيقة غير المتناهي، كما إذا قلنا هو عشرون ذراعاً؛ فتارة نعني به الخشبة التي هي عشرون ذراعاً، وتارة نعني بـه طبيعة هذه الكميّة. وأيضاً نقول لنفس هذه الطبيعـة أنّها لا تتناهى، ونعني بذلك أنّها بحيث أيّ شيءٍ منها أخذتَ وجدتَ منه موجوداً من خارج من غير تكرير. ونقول ذلك ونعنـي به أنّها لم تصل عند حدّ تقف عليـه فتتناهى عنده؛ فإذن هي غير متناهية بعد، أي غير واصلة إلى نهاية الموقف.

(٢) فأمّـا الأمور التي يقال لها أنّهـا غير متناهية من الطبائع التي ذكرناها، فصحيح أنْ نقـول إنّهـا موجودةٌ في القوة لا في الجملة، بـل كل واحد. فتكون الأمور التي لا نهاية لعددهـا كل واحدٍ واحدٍ منها موجوداً بالقوّة؛ والكل بمـا هو كل غير موجود، لا بالقوة

be said). Concerning the nature of the infinite itself, the first sense is not something that belongs to these things, either potentially or actually. That is because, if it exists, either it is a certain accident belonging to something else (but we have explained that there cannot be something that is accidentally infinite),[2] or, insofar as it is infinite, it is in itself a subsisting nature or even principle that actually exists (a view held by a certain group, that we have already refuted).[3] The second sense, however, is something that actually always exists, for we always find divisibility to be actually such that it does not terminate at some limiting point beyond which there is no [other] limiting point that [can] come to exist. So you have now learned how something is potentially infinite and how it is actually infinite, and how it is neither in potency nor in actuality. Now, what is actual about it is not free of a certain potential nature. [That] is because the sense of that [namely, what is actual about the infinite] is that it does not lead to the disappearance of the potential's nature, but, instead, the nature of the potential is always preserved in it. So the permanence and reality of what is infinite is associated with a potential existence, and so it is associated with the nature of matter rather than the nature of form, which is in actuality.[4] Now, the whole either is a form or possesses a form, and so what is infinite is not a whole. From the things that we have explained, you know that what is infinite has a privative nature and does not encompass everything, as some have supposed,[5] but, instead, is [itself] encompassed by the form because it is the power of the material.

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2. See 3.8.11.

3. Ibid.

4. Reading *bi-fiʿl* with **Y** and the Latin (*in actu*). In **Z** and **T**, the preposition *bi* is omitted, which gives the sense that the form simply is the actuality.

5. Cf. Aristotle, *Physics* 3.4.203b10–13, where he identifies this position with that of the majority of earlier natural philosophers.

ولا بالفعل إلاّ بالعرض من جهة أجزائه، إنْ كان قد يقال مثل ذلك. وأمّا طبيعة ما لا نهاية له نفسها؛ فالمعنى الأول منه غير موجود لهذه الأشياء لا بالقوة ولا بالفعل، وذلك لأنّه إنْ كان موجوداً فإمّا أنْ يكون عارضاً لشيءٍ آخر - وقد بيّنا أنّه لا يجوز أنْ يكون شيء عرض له أنْ يكون بلا نهاية - وإمّا أنْ يكون بنفسه طبيعة قائمة من حيث هو لا نهاية، هو الموجود بالفعل أو المبدأ أيضاً، على ما يراه قومٌ، وقد أبطلناه. والمعنى الثاني موجودٌ بالفعل دائماً، فإنَّ الانقسام دائماً نجده بالفعل لم يتناه إلى حدّ لا حدّ بعده في حدوث الوجود. فقد علمتَ أنَّ ما لا نهاية له كيف هو بالقوة وكيف هو بالفعل، وكيف هو لا بالقوة ولا بالفعل، والذي منه بالفعل فغير خالٍ عن طبيعة ما بالقوة، فإنَّ معنى ذلك أنَّه لم يتناه إلى زوال طبيعة القوة، بل طبيعة القوة محفوظة فيه دائماً. فيكون ما لا نهاية له، ثباته وحقيقته، متعلقة بوجودٍ ما بالقوة، فهو متعلّق بطبيعة المادة دون طبيعة الصورة التي هي بالفعل - والكل صورة أو ذو صورة - فما لا نهاية له ليس بكل. وتعلم من الأشياء التي بيّناها أنَّ ما لا نهاية له طبيعة عدمية، وليس هو محيطاً بكل شيء؛ كما ظنَّ بعضهم، بل هو محاطٌ بالصورة لأنَّه قوة الهيولى.

(3) Should someone say that being infinitely divisible is a property that follows upon quantity (which is a form), the response is that *divisibility* is said in two ways. One of them is [in the sense of literally] *becoming separated* and *discontinuity,* which follows upon quantity, owing to the preparedness of the matter. The other sense of *divisibility* is that it is in the nature of the thing that one thing in it is *posited* as different from some other thing and so on without coming to an end, which essentially follows upon magnitude. Now, the first [sense] inevitably involves some motion, whereas the second does not require motion. The first is true divisibility—namely, what changes the state of the thing—whereas the second is only a function of the estimative faculty. Now, the magnitude does not essentially receive the first [that is, true divisibility] at all, because that which receives something must remain together with that which is received. When that [true divisibility] happens, the initial magnitude ceases to exist, for the initial magnitude is nothing but that determinate continuity, not something that that determinate continuity is in. In fact, the magnitude, as you have learned repeatedly,[6] is the continuity itself, not some continuous thing resulting from a continuity in it. So, when the continuity is fragmented [into two parts], the initial magnitude is done away with, and two different magnitudes come to be; and two other delimited continuous things come to be actual after having been potential. [Otherwise], if the two were actual, then, in a single continuous thing, there would be two actual continuous things *ad infinitum.*

6. See, for example, 3.2, pars. 8-10.

(٣) فإنْ قال قائل: إنَّ الانقسام غير المتناهي خاصة يلحق الكميّة وهي صورة؛ فالجواب أنَّ الإنقسام يقال على وجهين: أحدها الافتراق والانقطاع، وهذا يلحق الكمّ، لأجل استعداد المادة، والآخر الانقسام بمعنى أنَّ في طبيعة الشيء أنْ يُفرض فيه شيءٌ غير الآخر، ولا يزال كذلك، وهذا يلحق المقدار لذاته. والأول لا بُدّ فيه من حركة، والثاني لا يحتاج إلى الحركة، والأول هو الإنقسام الحقيقي؛ وهو الذي يغيّر من حال الشيء، وأمّا هذا الثاني فهو أمرٌ موهوم. والأول لا يقبله المقدار لذاته البتة، لأنَّ القابل يجب أنْ يبقى مع المقبول: وذلك إذا عرض أبطل وجود المقدار الأول؛ فإنَّ المقدار الأول لم يكن إلاّ ذلك الاتصال المعيّن، ليس شيئاً فيه ذلك الاتصال المعيّن. فإنَّ المقدار - كما علمته مراراً - هو نفس الاتصال، ليس الشيء المتصل باتصالٍ فيه. فإنّه إذا عرض الإنفصال المفكّك أبطلَ المقدار الأول وأحدث مقدارين آخرين، وحدث متصلان محدودان آخران بالفعل بعد أنْ كانا بالقوة. ولو كانا بالفعل لكان في متصلٍ واحدٍ متصلان بالفعل بلا نهاية.

(4) Now, no one denies that the matter receives the divisibility that it does precisely because of the quantity belonging to it. [Still], there are people who apparently believe that the material has some form (namely, [the form of] corporeality) that disposes [the material] to always being divisible in the sense of becoming separated, while some other form prevents that or, at least, does not make it incumbent when it occurs. For example, they say that when the body is perpetually divided, no flesh will remain and, in fact, the [form] of flesh will cease, while [the form of] corporeality will remain. We'll need to consider this. Now, again, when we say that the quantitative form disposes the matter to the divisibility that is proper to it, that preparedness need not belong to a form, for it is not the case that what acts must do so in itself. Likewise, that form does not[7] have to remain together with the emergence of that which disposes it to act, for motion is that which brings the body to its natural rest and disposes it to it, but it does not remain together with that [rest]. [That] is because that activity of [the motion] is to produce a disposition, and so it must exist together with the production of the disposition. The same holds for the activity of the quantitative [form] that produces a disposition, whereas the division results from something else.

(5) The way that the infinite exists has now been made known. It occurs in numbers in being multiplied, whereas they are finite on the part of the unity. In magnitude, it occurs in being halved and decreased, whereas it is finite on the part of being multiplied. [That follows], since its being halved *qua* magnitude is a halving of it insofar as there is a number whose first part is the unit, whereas the unit is the principle [that is, the starting point] of numbers, since [numbers] begin from a unit and become two. Infinite divisibility belongs to motion because of the magnitude over which it [crosses].

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7. Correcting **Y**'s *L-Dh-Ā* (?) to *lā*, following **Z**, **T**, and the Latin (*nec*).

(٤) ولا ينكر أنْ يكون الانقسام الذي تقبله المادة؛ إنّما تقبله بسبب وجود الكمّ لها، ويشبه أنْ يكون الناس يرون أنَّ للهيولى صورة تهيئها للانقسام الدائم المفرّق وهو الجسمية، وصورة أخرى تمنع ذلك، أو لا تثبت عليه إذا وقع. كما يقولون إنَّ الجسم إذا قسّم دائماً فإنّه لا يبقى لحماً، بل تبطل اللحمية وتبقى الجسمية، وهذا يجب أنْ ننظر فيه. ثم ليس إذا قلنا إنَّ الصورة الكميّة تُهيء المادة للانقسام الذي يخصّ المادة؛ وجبَ أن يكون ذلك الاستعداد للصورة، فليس ما يفعل فعلاً يجب أنْ يكون في نفسه يفعل، ولا أيضاً يجب أنْ تكون تلك الصورة باقية مع خروج ما تُهيّئه له إلى الفعل. فإنَّ الحركة هي التي تقرّب الجسم من السكون الطبيعي وتُهيّئه له، ولا تبقى مع ذلك؛ لأنَّ فعلها هو التهيئة، فيجب أنْ توجد مع التهيئة، وكذلك فعل الكميّة المُهيّئة. وأمّا القسمة فهي عن شيءٍ آخر.

(٥) فقد علم نحو وجود ما لا يتناهى؛ فالعدد يعرض له ذلك في التضعيف، ويتناهى من تلقاء الوحدة. والمقدار يعرض له ذلك في التنصيف والنقصان، ويتناهى من قبل التضعيف؛ إذ كان تنصيفه – من حيث هو مقدار – تضعيفاً له من حيث هو عددٌ أوّله واحد؛ والواحد مبدأ عددٍ، فإنّه يبتدىء من واحد ويصير اثنين. والحركة يعرض لها الإنقسام غير المتناهي بسبب المقدار الذي هي عليه.

(6) As for time, there is the preparedness of the division that the estimative faculty imagines in it, and so [the division] belongs to it precisely, inasmuch as it is a magnitude, and essentially, whereas what is actually determinate belongs to it on account of motion. Now, there is a difference between, on the one hand, what occurs actually and, on the other hand, the product of the estimative faculty and the preparedness. [That] is because magnitudes are essentially subjects, owing to the fact that the infinite divisibility produced by the estimative faculty and their having a preparedness is accidental to them, while the emergence of that into act is on account of something else. Wherever it is said that that [namely, infinite divisibility and being so prepared] accidentally belongs to time because of its motion, we mean the accidental thing that actually occurs as one thing after another infinitely. The nature of the preparedness belongs to time inasmuch as [time] is a magnitude; the motion does not provide it with that, but, rather, it makes the time to exist in such a way that it entails that preparedness. It is like when one counts, for example, [and] by counting (or in some other way) makes ten exist. In that case, he does not make [ten] so that it is even, but, rather, he makes it to exist, and its existence entails that it is even. As for motion *qua* traversal, just as being infinitely divisible is accidental to it, so, likewise, being multiplied and increasing are accidental to it. Since the property of finitude, as well as the absence thereof, do not follow upon the motion merely because it is essentially a quantity, they follow upon it because of some other quantity. Now, it is not the case that they follow on it because of the quantity of distance, since the distance is finite. So, therefore, they follow upon it because of some yet other quantity, which is time. So motion is the cause of time's existence, while time is the cause of motion's being either a finite or infinite magnitude. The mover, however, is the

(٦) وأمّا الزمان فإنَّ استعداد الموهوم من القسمة فيه، فإنّما يعرض له من حيث هو مقدار ولذاته. وأمّا المعيّن بالفعل فيعرض له بسبب الحركة، وفرقٌ بين الواقع بالفعل، وبين الموهوم والاستعداد، فإنَّ المقادير موضوعة بذاتها لأنْ تعرض لها القسمة الوهمية إلى غير نهاية ومستعدة لها. وأمّا خروج ذلك إلى الفعل فيكون بسبب شيء آخر؛ وحيث يقال إنَّ الزمان يعرض له ذلك بسبب الحركة، فنعني العارض الذي يوقع بالفعل شيئاً بعد شيءٍ بلا نهاية. وأمّا طبيعة الاستعداد فهي للزمان من حيث هو مقدار، والحركة لا تفيده ذلك، بل توجد الزمان وهو على نحوٍ من الوجود يلزمه ذلك الاستعداد. كما أنَّ العادّ مثلاً إذا أوجد بالتعديد، أو بعمل آخر، عشرة فليس هو الذي يجعله زوجاً، بل يوجده ويلزم وجوده أنْ يكون هو زوجاً. أمّا الحركة، من حيث هي قَطْعٌ، فإنّها كما يعرض لها أنْ لا تتناهى في القسمة، كذلك يعرض لها أنْ لا تتناهى في التضعيف والزيادة. وإذ خاصّية التناهي وعدم التناهي، ليس إنّما تلحق الحركة بسبب كميّةٍ لذاتها، فتلحقها بسبب كميّةٍ أخرى. وليس تلحقها بسبب كميّة المسافة، إذ المسافة متناهية؛ فتلحقها إذن بسبب الكميّة الأخرى التي هي الزمان. فالحركة علّة لوجود الزمان، والزمان علّة لكون الحركة

cause of the motion's existence and so is the primary cause of time's existence as well as the cause of the motion's persistence, which is a first perfection. So, given that [the mover] persists, there will be an increase in the extension of its quantity, which is time. [The mover] is in no way the cause of time's *being prepared* to extend infinitely; but it is a cause of time's *extending infinitely* so that the motion will go on infinitely, for that [preparedness] belongs to time essentially, just as it did in the case of divisibility. Still, the actual existence of this formal aspect of the time is on account of the mover by means of the motion, just as its actually being divided is on account of some external agent that divides [it].

(7) So motion is the cause of this accident's belonging to time, while time is the cause of this accident's belonging to motion, except one is in one way and the other is in another. As for motion, after the motive cause it is a cause of this accident's really belonging to time, since the mover does not render motion discontinuous but is continuous with it, whereas time is a cause of motion's possessing an infinite magnitude, for time is a cause of motion's being measured. So, when it accidentally happens to be infinite primarily through that requirement of the motion, and the time makes it to exist in that way, then it is accidentally said of the motion by means of [the time]—not primarily, but, rather, owing to the fact that something accidental to it, which is time, is like that. So the motion accidentally makes itself to be like that. In other words, it makes something accidental to it to be like that; and, on account of that accidental thing, that [namely, being infinite] is said of [the motion]. That is something that occurs frequently, for many things [for instance, *y*] exists as *x,* where *x* has some primary description, and, due to that, [*y*] has that description as a secondary description and by secondary intention, where [the description] is not primary. So this is what we have to say concerning the manner in which the infinite exists.

متناهية المقدار أو غير متناهية، والمحرّك علّة لوجود الحركة، فهو علّة أُولى لوجود الزمان، وعلّة لثبات الحركة التي هي كمالٌ أوّل، فيتبع ثباته إزدياد امتداد كميّته التي هي الزمان، وليس بعلّةٍ بوجهٍ لكون الزمان مستعداً لأنْ يمتد إلى لا نهاية. وعلّة كون الزمان ممتداً بلا نهاية حتى تصير الحركة بلا نهاية، فإنَّ ذلك للزمان لذاته؛ كما كان في الانقسام أيضاً. لكن وجود هذا المعنى بالفعل للزمان؛ فهو بسبب المحرّك وبوساطة الحركة، كما كان وجود الإنقسام له بالفعل بسبب شيء من خارج قاسم.

(٧) فالحركة سببٌ لوجود هذا العارض للزمان، والزمان سببٌ لوجود هذا العارض للحركة، لكن هذا بوجهٍ وذلك بوجه. أمّا الحركة فهي علّة بعد العلّة المحركة لوجود هذا العارض للزمان بالحقيقة؛ إذا كان المحرّك لا يقطع الحركة بل يصلها. وأمّا الزمان فهو علّة لكون الحركة ذات مقدارٍ غير متناه، فالزمان علّة لتقدّر الحركة؛ فإذا عرض له أنْ لا يتناهى عروضاً أولياً بإيجاب الحركة ذلك، وإيجاده الزمان على ذلك، عرض بوساطته انْ قيل على الحركة ليس عروضاً أولياً، بل لأجل أنَّ عارضه الذي هو الزمان كذلك. فالحركة جعلت نفسها بالعرض كذلك؛ أي جعلت عارضها كذلك، ولأجل العارض يقال لها ذلك. وذلك ممّا يكون كثيراً؛ فإنَّ كثيراً من الأشياء يوجد أمراً، لذلك الأمر صفة أولية، ويكون له من جهة ذلك تلك الصفة صفة ثانية وبالقصد الثاني، وليست أوّلية. فهذا ما نقوله في تحقيق كيفية وجود غير المتناهي.

(8) Concerning the proofs mentioned to establish [the existence of an infinite] that involved multiplying, division, generation and corruption, time, and the like,[8] know that we do not require that the infinite exist except[9] in the way we noted. What they say about every finite thing's terminating only in something else[10] is not sound. [That] is because, when it is further agreed that a single thing was finite and its endpoint is at something else, then it is finite *and* something that encounters another. Now, insofar as it is finite, it merely has an endpoint, where that is the sense of *being finite,* whereas, insofar as it is something encountering another, it terminates at something else; but its terminating at another is something that the encounter requires, not something that its being finite requires. [That] is because its being finite requires only that it possess an endpoint, while its terminating at something else means something additional to being finite. So, were it necessary that every finite thing encounter something else, either generically like itself or not, then perhaps their account would be valid, and every body would terminate at a body. As it stands, however, it is not necessary that every finite thing must encounter something generically like itself such that the body inevitably encounters a body; for you know that motion terminates at rest, which is either simply a privation or a contrary. As for the account of the operation of the estimative faculty,[11] that is something granted; but from that it does not necessarily follow that existing things are infinite in reality, but only in the act of the estimative faculty.

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8. See 3.7.3.

9. Reading *ʿalá ghayr* with **Z**, **T** and the Latin (*nisi*) for **Y**'s simple *ʿalá* (according to).

10. See 3.7.4.

11. See 3.7.4.

(٨) فأمّا الحججُ المقولة في إثباته؛ فما قيل فيها من أمر التضعيف وأمر القسمة وأمر الكون والفساد والزمان وغير ذلك، فمعلومٌ أنّه لا نوجب لغير المتناهي وجوداً على غير النحو الذي نقوله. وأمّا ما قالوه من أمر أنَّ كل متناهٍ فإنّما يتناهى إلى شيءٍ آخر؛ فإنّه ليس بمسلّم، لأنَّه إذا اتفق أيضاً أنْ كان شيءٌ واحدٌ متناهياً ونهايته عند شيء آخر فهو متناهٍ وملاقٍ، ومن حيث هو متناهٍ فله نهاية فقط، ومعنى أنّه متناهٍ هو ذلك. وأمّا من حيث هو ملاقٍ فنهايته عند شيء آخر، فتكون نهايته عند شيء آخر أمراً تقتضيه الملاقاة وليس هو مقتضى تناهيه، فإنَّ مقتضى تناهيه هو أنَّه ذو نهاية فقط، وأمّا أنَّ نهايته عند شيء آخر فهو معني أزيد من معناه. فلو كان كل متناهٍ يلزمه أنْ يكون ملاقياً لشيء من جنسه أو غير جنسه، كان ربّما يصحّ قولهم، وكان كل جسمٍ يتناهى إلى جسم، ولكن ليس يجب أنْ يكون كل متناهٍ ملاقياً لجنسه حتى يلاقي الجسم - لا محالة - جسماً؛ فأنت تعلم أنَّ الحركة تتناهى إلى السكون، وهو عدم فقط أو ضد. وأمّا حديث التوهم فليكن ذلك مسلّماً، لكن لا يلزم من ذلك أنَّ الموجودات لا تتناهى في الوجود، بل أنَّ الموجودات لا تتناهى في التوهم.

Chapter Ten

That bodies are finite with respect to influencing and being influenced

(1) We say that there cannot be an infinite body that either temporally acts on or temporally is acted upon by another body. It is impossible that one body act upon another in that way, because the body that is acted upon must be either finite or infinite. On the one hand, if it is finite, it is undoubtedly the nature that brings about the acting and being acted on between each one of them, not because it is finite or infinite. Now, if it is on account of the natures of the two that the patient is acted upon by the agent, then a part of one of them—namely, the patient—will tend to be acted upon by a part of the other. So, when, in a given period of time, some part of the infinite acts upon the finite (or some part thereof), then the ratio of that time to the time that it takes for the [whole, rather than a part of] the infinite to do that is proportional to the ratio of the power of what is finite [namely, a part of the infinite] to the power of what is infinite [namely, the whole of the infinite]. So [for example] the more massive the bodies are, the greater their power becomes, and the more effectively they act, and the time it takes for them [to act] decreases. It follows from that, however, that the action of something infinite should take no time at all; but it was assumed that it did take some time. If, on

<الفصل العاشر>

في أنَّ الأجسام متناهية من حيث التأثير والتأثّر

(١) ونقول، إنَّه لا يجوز أنْ يكون جسمٌ فاعلٌ في جسم، أو منفعلٌ عن جسم فعلاً وانفعالاً زمانياً؛ وهو غير متناه. أمّا أنّه لا يجوز أنْ يكون جسم فاعل في جسم كذلك. فلأنَّ ذلك الجسم المنفعل لا يخلو إمّا أنْ يكون متناهياً أو يكون غير متناهٍ. فإنْ كان متناهياً، فلا شك أنْ الفعل والانفعال يجري بينهما للطبيعة. كل واحدٍ منهما، لا لأنَّه متناهٍ أو غير متناه. فإنْ كان انفعال المنفعل عن الفاعل لطبيعتهما؛ فمن شأن جزءٍ من أحدهما - الذي هو المنفعل - أنْ ينفعل عن جزءٍ من الآخر، فإذا فعل جزء من غير المتناهي في المتناهي، أو في جزءٍ منه، في زمان، فتكون نسبة ذلك الزمان إلى زمان الذي يفعل غير المتناهي في ذلك بعينه، كنسبة قوة غير المتناهي إلى قوة المتناهي. فإنَّ الأجسام كلما كانت أعظم صارت قوتها أشدّ، وكانت أفعل، وزمانها أقصر. فيجب من ذلك أنْ يكون فعل غير المتناهي لا في زمان، وقد فُرض في زمان. وإنْ كان ذلك المنفعل

the other hand, the patient is infinite, then the ratio of some part of its being acted upon to the whole of its being acted upon is proportional to the ratio of two periods of time, in which case every part of it should be acted upon in no time. Now, the smaller part of it will be acted upon more quickly than a larger part is acted upon, since smallness of size is one of the factors that determines speed—and so something would occur more quickly than what comes to be in no time. Equally, when we assume that some part of the patient [call it *x*] is acted upon in no time, either what is adjacent to *x* [call it *y*] is acted upon together with *x*'s being acted upon (in which case all would be acted upon in no time) or *y* is acted upon afterward. In that case, let us assume another part [*z*] that is after *y*—but, then, that part [*z*] is either acted upon together with *y* (in which case what we already mentioned happens) or *z* is acted upon after *y* in no time (in which case instants would immediately follow upon one another, and the truth opposes this).[1]

(2) Since you have discovered this about acting, you are in a position to discover the counterpart of that about being acted upon. So, from this it is known that the elements—some of which temporally act upon others and in which, whenever they become more massive, there is an increase in power—are all finite. Now, one cannot object that the power of bodies is their forms and [that] forms do not become stronger and weaker. That is because, even though they do not become stronger in their substance, their influence does become increasingly stronger. I mean [that], although the form that is in *this* fire is neither stronger nor weaker in *this* fire and one like it, it is more powerful in twice the amount of fire; and also, a clod of earth that is twice as large [as another] is

1. See 2.11.6 and 3.4.3 for Avicenna's argument as to why instants—and, more generally, any indivisibles—cannot be adjacent to or immediately follow one another.

غيــر متناهٍ، فإنَّ نســبة إنفعال جزءٍ منه إلى إنفعال الكلّ كنســبة الزمانين، فيجب أنْ يقع إنفعــال كل جزء منه لا في زمان، ويكون إنفعال الجزء الأصغر من ذلك أســرع من انفعال الجزء الأكبر، إذا كان الصغر مقتضياً للسرعة، فيكون شيء أسرع من الكائن لا في زمان. وأيضاً إذا فرضنا للمنفعل جزءاً فانفعل لا في زمان؛ فلا يخلو إمّا أنْ يقع انفعالٌ ما يليه مع إنفعالــه، فيكون إنفعال الجميع واقعاً لا في زمــان، وإمّا أنْ يقع بعده. فلنفرض جزءاً آخر بعده، فلا يخلو إمّا أنْ يكون ذلك الجزء انفعل معه فيعرض ما قلناه، أو انفعل بعده أيضاً لا في زمان، فتكون الآنات تتتالى، والحقّ يمنع هذا.

(٢) وإذ قــد عرفت هــذا من جهة الفعل، فلــك أنْ تعرف مقابــل ذلك من جهة الإنفعال؛ فمعلومٌ من هذا أنَّ الأُسْطُقسّات التي يفعل بعضها في بعض فعلاً زمانياً، وتكون كلّما عظمتْ إزدادت قوة، كلّها متناهية. وليس لقائلٍ أنْ يقول إنَّ قوة الأجســام صورها؛ والصور لا تشــتد ولا تضعف؛ وذلك لأنّها - وإنْ كانت لا تشــتد في جوهرها - فإنّها تشــتد في تأثيرها في الزيادة؛ أعني أنَّه وإنْ كان لا يجوز أنْ تكون الصورة التي في هذه النار تشــتد وتضعف لا في هذه النار ولا في مثلها، فإنّها في ضعف النار تكون أقوى،

heavier. This does not mean that there is a greater increase *qua* substance. Instead, there is only an increase of the influence inasmuch as the form acts through certain accidents that do become stronger and weaker together with an increase in the number of forms, as well as [the accident's] becoming weaker as a result of the [increased] magnitude. (This kind of increase in the form is different from increasing the generable thing through[2] intensification, which you will learn about later.)[3] From this you also know that there is no infinitely strong power in any of the bodies to produce either forced or natural motion—as, for instance, the inclination [linked with] heaviness or lightness—for that would require that it act in no time. It is impossible, however, that there be some motion that takes no time. It would have to occur in no time precisely because the stronger the power becomes, the shorter the duration; and so, when [the power] is infinitely strong, [the duration] would become infinitely small.

(3) At this point, we need to consider the finitude and infinitude of powers; but before that, we note that there are differences between one power and another. These include [(1)] the variations in speeds, [(2)] the varying lengths of continual duration, and [(3)] the number of times [the power can] perform the action. An example of (1) is that the more powerful of two archers is the one who shoots the arrow so that it more quickly covers some designated distance. An example of (2) is that the more powerful archer is the one who, all things being equal, shoots the arrow so that it hangs in the air the longer period of time. Finally, an example of (3) is that the more powerful archer is the one who is capable of shooting one arrow after another the greater number of times. Since

2. Reading *bi* with **Z**, **T**, and the Latin (*per*) for **Y**'s *fī* (in, or with respect to).

3. The reference would seem to be to *Fī al-kawn wa-l-fasād* 6, where Avicenna discusses the difference between generation and alteration and uses the language of *ishtidād* (intensification) and *ḍuʿf* (weakening), or, in Latin, *intensio* and *remissio* respectively.

وفـي ضعف المدرة تكون أثقل، وليس هذا المعنى زيادة الشـدّة في الجوهر، بل في زيادة الأثر على أنَّ الصورة تفعل بأعراضٍ تشتد وتضعف مع تكثّر الصور وتضعُّفها تبعاً للمقدار، وهذا نوعٌ من الزائد في الصور غير الزائد الكائن بالاشتداد، وأنت تعلم هذا بعد. ومن هذه الأشـياء تعلم أنّه لا يكون في جسـم من الأجسام قوة على التحريك القسري أو الطبيعي غير متناهية الشـدّة، كالميل الثقيل أو الخفيف؛ فإنَّ ذلك يوجب وقوع فعله لا في زمان، ويستحيل أنْ تكون حركة لا في زمان، وإنّما يجب أنْ يقع لا في زمان، لأنَّه كلّما اشتدت القوة قصرت المدّة، فإذا لم تتناه في الاشتداد بلغت من الصغر ما لا نهاية له.

(٣) فيجـب أيضاً أن ننظر في حال القوى وتناهيها ولا تناهيها، وقبل ذلك نقول إنَّ القوة يقع بينها وبين قوة أخرى تفاوتٌ في أُمور منها: سـرعة ما تفعله وبطؤه، ومنها طول مدة اسـتبقاء ما تفعله وقصرها، ومنها كثرة عدّة ما تفعله وقلّتها. مثال الأول؛ إنَّ أشـدّ الراميين قوة هو أسرعهما في الرمي لمسافةٍ معينة قطعاً، ومثال الثاني أنَّ أشدّ الراميين قوة هو أطولهما زمان نفوذ الرمية في الجو مع تسـاوي المعاني الأُخر، ومثال الثالث إنَّ أشـدّ الراميين قوة هو أكثرهما قدرة على رمي بعد رمي. وإذا كان التفاوت يقع من هذه الوجوه،

these are the ways that [powers] differ, increase will occur in these ways. Also, in these ways there will be a greatest increase. So what goes on infinitely will occur in these ways, since powers in themselves have no quantity. Its quantity is only accidental, either relative to the thing in which there is the power or the thing over which there is a power. Now, the thing in which there is the power is always finite, since bodies are finite, whereas, if they were infinite, the power due to them would be infinite. Thus, it remains that a power is finite or infinite only relative to the quantity of that over which there is the power. So, when that thing can be infinite in the way that something can be infinite, the power relative to it will be infinite. Assuming, then, that there were some body that has power in one of the three ways and is infinite, let us consider whether its power would also be infinite with respect to that one of the three [ways in which powers differ].

(4) We say that if the more massive the body is, the more abundant and the greater the power is with respect to whichever of the three it is related, then, when it is infinite, its power must be infinite. Now, you know that two movers or agents (whatever the action might be) collectively have more power than one of them. [That] is because, collectively, they inevitably have the power over what one alone has power, as well as something more beyond that, since they have a power beyond the power of the one alone. Thus, the power of the more massive [body] is larger and more intense. So, necessarily, whenever [a body] becomes more massive, the power becomes greater and increases more. Now, the power of that which is infinitely massive must likewise increase infinitely with respect to that thing to which the power is related. Now,

فالتزايد يقع على هذه الوجوه، والأزيد يقع على هذه الوجوه. فالذاهب في الزيادة إلى غير النهايــة يقع على هذه الوجوه، لأنّ القوة في نفســها لا كميّة لها ، وإنّما كميّتها بالعرض؛ إما بالقياس إلى الشــيء الذي فيه القوة، وإمّا بالقياس إلى الشيء الذي عليه القوة. والشيء الذي فيه القوة يكون أبداً متناهياً؛ إذ الأجســام متناهية، ولو كانت غير متناهية لكانت القوة تكون بســببها غير متناهيــة. فبقي أنْ تكون القوة إنّما هــي متناهية وغير متناهية بالقياس إلى كميّة ما عليه القوة. فإذا كان ذلك الشيء جائزاً فيه أنْ يكون غير متناهٍ على نحو الجواز الذي لغير المتناهي، كانت القوة بالقياس إليه غير متناهية. فلننظر أنّه هل يجب لو كان جســم يقوى على أمرٍ من الثلاثــة – وكان غير متناهٍ – أنْ تكون قوته أيضاً غير متناهية بالقياس إلى ذلك الأمر من الأمور الثلاثة .

(٤) فنقــول: إنّه إنْ كان يجب أنْ يكون الجســم الأعظم أوفــر قوة وأكبر في الأمر المقيــس إليه مــن الأمور الثلاثة، فيجب إذا كان غير متنــاهٍ أن تكون قوته غير متناهية. وأنت تعلم أنَّ جملة محركين وفاعلين اثنين – أي فعلٍ كان – أكثر من قوة أحدهما ، فإنَّ الجملــة تقوى على مــا يقوى عليه الواحد وعلى أمرٍ خارج عن ذلك لا محالة؛ إذ لها قوة خارجة عــن قوة الواحد ، فلذلك قوة الأعظم أكثر وأشــدُّ ، فيجب أنْ يكون كلّما صار أعظــم صارت القــوة أكثر وأزيد . والذي يذهب إلى غير نهايــةٍ في العِظم، فكذلك قوته تزداد إلى غير نهاية في الأمر المقيس إليه القوة، ولو كان المقيس إليه القوة متناهياً لكان لقوة

should that thing to which the power is related be finite, the power of some part of the body would stand in some ratio to a part of that over which there is the infinite power. So, when one part of the patient and one part of the agent are taken multiple times until [all the parts of] the finite patient are exhausted, where some finite collection of parts taken from the infinite body will be paired up with [the finite patient], then the ratio of one part of that which has the power to the powers of all those finite parts is proportional to the ratio of part of the patient to the whole of the patient. That, however, will be proportional to the ratio of the power of part of the supposedly infinite body to the power of the whole of the infinite body. In that case, a power of some finite part of the infinitely powerful body is equivalent to the whole of the body, which should exceed it by its power existing in the parts beyond that body. This is a contradiction, for [the whole] must be greater than [the part] in accordance with the ratio, but perhaps collectively it requires some greater power above that which the ratio necessitates. Clearly, then, if there were an infinitely massive body, the power would be infinite relative to what is subject to the power; but, since an infinite body is impossible, it is impossible that there be an infinite power of this sort.

(5) Let us now consider whether an infinite power can exist in a body that is not infinite, and whether there can exist an infinite[4] power relative to the speed of the action. We say that this does not exist. Otherwise, with respect to the speed, its action would take place in no time. Every speed, however, takes some time, because *speed* is a certain distance traveled (or the equivalent of some distance),[5] the whole of which is

4. Reading *ghayr mutanāhīyah* with **Z**, **T**, and the Latin (*infinita*) for **Y**'s *mutanāhīyah* (finite).

5. The "equivalent of distance" is rotations of a spinning object that does not leave its place, and so, strictly speaking, covers no distance. For Avicenna, traveling a certain distance would be motion with respect to the category of place, but, as he argued in 2.3.13–16, there is also motion with respect to the category of position, as is observed in the rotations of the celestial spheres.

جزءٍ ما من الجسم نسبة إلى جزءٍ ما من الذي عليه القوة غير متناهية. فإذا ضوعف من المنفعل جزءٌ ومن الفاعل جزءٌ إلى أنْ يفنى المنفعل المتناهي، وتحصل بإزائه من الجسم غير المتناهي جملة أجزاء متناهية، فكانت نسبة قوة الجزء الواحد من ذي القوة، إلى قوى جميع تلك الأجزاء المتناهية؛ كنسبة الجزء من المنفعل إلى جميع المنفعل، وذلك كنسبة قوة الجزء من الجرم المفروض غير متناهٍ إلى قوة جميع غير المتناهي، فتكون قوة جزء متناهٍ من هذا الجسم القوي غير المتناهي، مساوية لقوة الجسم كلّه الذي يفضل عليه بقوته الموجودة في الأجزاء غير المتناهية الخارجة عن ذلك الجسم، هذا خُلْف؛ فالواجب أنْ يكون أزيد منه بحسب النسبة، بل ربّما أوجب الاجتماع اشتداد قوةٍ فوق الذي توجبه النسبة. فبيّنٌ أنّه لو كان جسمٌ غير متناهي العِظم؛ لكان غير متناهي القوة بالقياس إلى المقوى عليه. ولمّا لم يجز أنْ يكون جسمٌ غير متناهٍ، لم يجز أنْ تكون قوة غير متناهية من هذا القبيل.

(٥) فلننظر هل يجوز أنْ توجد قوة غير متناهية لا في جسم غير متناه ولننظر هل يمكن وجود قوة غير متناهية بالقياس إلى سرعة الفعل؟ فنقول: إنَّ هذا لا يوجد؛ وإلاّ لكان فعلها في السرعة واقعاً لا في زمان، وكل سرعةٍ في زمان؛ لأنَّ كل سرعة هي قطْعٌ لمسافةٍ أو نظير مسافة، وكل ذلك في زمان. فلو كانت حركة لا نهاية لها في السرعة،

[divided] by time. So, were there an infinitely fast motion, there would be an infinitely small time; but this, as we know, is absurd. In short, speed applies only to things that exist in time. As for things that occur at an instant, [terms like] *fast* and *slow* are not said of them. Someone might say that infinite power acts at an instant, whereas the rest of the powers take time to act. So let us just posit that speed does not apply to the action of an infinite power. The response to that is that, in this chapter, we are concerned with instances[6] of local motions, which require that some distance be traversed and with respect to which the speeds vary. Now, [such a traversal] would be impossible unless it took some time, since it is impossible to traverse some distance in an instant unless the instant has been divided to correspond with the division of the distance. The same holds for whatever is analogous to local motions that vary in speed, because the occurrence of that necessarily requires time. So, [even] if something can take place at an instant and in time, our present discussion is not about it. Instead, [we are concerned] about things that do vary in speed and whose occurrence is never free of time and, indeed, as their power increases, their time decreases. So, if something pertaining to them occurs as a result of an infinite power, it will either take place at an instant—but that is absurd, since distance and its analogues are not traversed in an instant—or it takes some period of time. In that case, it would have a certain ratio to a given period of time that it takes for an action that results from a finite[7] power to occur. So it comes back to the fact that the ratio of the two times is proportional to the ratio of the two powers; and so the power that is infinite with respect to the proper object of its power will stand in a certain ratio to something finite that is finite[8] with respect to the proper object of its power.

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6. Reading *amthāl* with two of the MSS consulted by **Y**, **Z**, and **T** for **Y**'s preferred *ithbāt* (establishing). There is nothing in the Latin that corresponds with either of these, although the sense of the Latin is simply "we are concerned with local motions."

7. Reading *mutanāhīyah* with **Z** and **T** for **Y**'s *ghayr mutanāhīyah* and the Latin's *infinita*.

8. Omitting **Y**'s *lā*, as in **Z**, **T**, and the Latin (*finitum*); if retained, the translation's "finite" should be "infinite."

لـكان زمانٌ لا نهاية له في القِصَر، وهذا محالٌ كما نعلم. وبالجملة إنّما تعتبر السـرعة في الأمور التي لها وجودٌ في زمان، وأمّا الأمور الواقعة في الآن فلا يقال فيها سرعة وبُطْء. فـإنْ قـال قائل إنَّ القوة غير المتناهية تفعل في آن، وسـائر القوى تفعل في زمان. فلنضع القوة غير المتناهية – على أنْ يكون فعلها لا سـرعة فيه. فالجواب عن ذلك إنّا نعتبر في هذا الباب إمثال الحركات المكانية التي توجب قطع مسافةٍ ما، وتختلف فيها في السرعة والبُطْء، ولا يمكن إلاّ في زمان، إذ لا يمكن قطع مسـافةٍ في آنٍ وإلاّ لانقسـم الآن بإزاء انقسام المسافة، وكذلك ما يجري مجرى الحركات المكانية ممّا يقع فيه سرعةٌ وبُطْء لضرورة حاجه وقوع ذلك إلى زمان. فإنْ كان شيءٌ يحتمل أنْ يقع في آنٍ وأنْ يقع في زمانٍ فليس كلامنا الآن فيه؛ بل كلامنا في الأمور التي تختلف بالسرعة والبُطء، ولا تخلو في وقوعها عن زمانٍ، فإنَّها كما تشـتدّ قوتها يقصر زمانها. فإنْ كان شـيء منها واقعاً عن قوةٍ غير متناهيـةٍ كان إمّا في آن – وذلك محال – لأنَّ المسـافة وأمثالها لا تقطع في آن، أو في زمانٍ فتكون له نسـبة مّا إلى زمان فعلٍ واقعٍ عن قوة متناهية، فيعود إلى أنْ تصير نسـبة الزمان إلى الزمان كنسبة القوة إلى القوّة، فيصير للقوة التي لا تتناهى ما تقوى عليه، نسبة إلى المتناهية التي يتناهى ما تقوى عليه.

(6) Hence, if there is an infinite power, then that over which it has power will be in one of the two other ways [in which powers differ]—I mean duration and multiplicity [that is, the length and number of times the power can perform the actions]. Let us consider, then, whether this power that is infinite with respect to the proper object of its power—whether [with respect to] duration or multiplicity—can exist in some body such that, by dividing the body, [that power itself] would be accidentally divided. [First], however, *multiplicity* might [refer to] the multiplicity [of events] that follow one another successively from some determinate starting point according to some determinate order of position, which exactly mirrors duration; or it might [refer to] the multiplicity that is a mixture of different events in various orderings. For now, we need to set aside an inquiry into the infinite power that involves mixed multiplicity, since our discussion is not about it. Let us focus on power that involves a multiplicity that continuously follows a single order that parallels the duration, and then investigate whether there can be in bodies some power that involves multiplicity with this description and infinite duration.

(7) We say that that is impossible because this body can inevitably be divided into parts, and, with it, the power is also divided. Now, a part of this power must, at some given instant, either have or not have the [same] power to do what the whole has the power to do with respect to multiplicity and duration. [If the part has the same power as the whole], the power in both of them to do that thing would be [exactly] the same, and so the whole would not exceed the part in what it has the power to do; but this absurd. [If the part does not have the same power as the whole], either [the part] has a power over something generically like [what the whole has power over], or it simply does not. Now, it would be absurd that it not have power over something generically similar, for

(٦) فـإذن إنْ كانت قوة غير متناهية، فيكون ما تقوى عليه أحد الأمرين الآخرين؛ أعني المدّة والكثرة. فلننظر؛ هل يمكن أنْ يكون لهذه القوّة التي لا تتناهى ما تقوى عليه؛ كثرة أو مدة وجودٍ في جسـمٍ حتى يعرض لها انقسـامٌ بانقسام الجسم لكن الكثرة إمّا كثرة متوالية من مبدأ محدود على ترتيب محدود يحاذي المدّة، وإمّا كثرة مختلطة من أشـياء مختلفـة، وفي تراتيب مختلفة. فيجب أنْ نترك الآن النظـر في القوة على كثرةٍ مختلطةٍ غير متناهية – فلا كلام لنا فيها – ولنبحث عن قوةٍ على كثرةٍ متصلةٍ من ترتيبٍ واحد، محاذية للمدة. فلننظر؛ هل يجوز أنْ يكون في الأجسام قوة على كثرةٍ بهذه الصفة، وعلى مدةٍ غير متناهية؟

(٧) فنقـول إنَّ ذلك لا يمكن، لأنَّ هذا الجسـم لا محالـة يتجزأ وتتجزأ معه القوة، وجـزء هـذه القوة لا يخلو إمّا أنْ يقوى على ما يقوى عليـه الكل في الكثرة والمدّة في آنٍ معين، فيكون المقوى عليه فيهما جميعاً في القوة شيئاً واحداً، فيكون لا فضل للكل على الجـزء في المقوى عليه، وهذا محال، وإمّا أنْ يكون لا يقوى عليه، فحينئذ إمّا أنْ يقوى على شـيءٍ من جنسـه أو لا يقوى على شيءٍ من جنسه البتة. ومحالٌ أنْ لا يقوى على

the power pervades the body that has it. So the part will have a power generically like that of the whole, and the object of the [part's] power will be of that genus that belongs to the whole. So, either both of them have the power, for example, to move one and the same thing, or the part has a power over something smaller than that thing. If, on the one hand, [that over which they have power] is one and the same, and the sum total of the power (the multiplicity and duration of which is infinite at a given instant) is over that which each one of them [is over], then they are equal with respect to that which they have the power to do; but this is absurd. On the other hand, if the part has the power to move something smaller, and the whole likewise has the power over that smaller thing, then either they are equal at a given instant in that over which there is power with respect to multiplicity and duration—which is absurd—or [the power of the part] is less and falls short [of the whole]. Now, when that over which the part has power falls short, its falling short with respect to its continuation will not be at the instant at which we assumed it began, but at some other limit. So, when, with respect to its being infinite, it falls short of the infinite, then, in that respect [namely, being infinite], the infinite exceeds it; but, to the extent that something exceeds it in a given respect, it is finite in that respect. Hence, the posited part is of a finite power relative to the duration of the action. The whole of the finite body, however, is related to the posited part by some determinate ratio, and so the power that is in the whole is related to it by some determinate ratio, where this ratio is relative to what the power does. So that over which the whole has power is related by some determinate ratio to that over which the part has power; but, then, the period of time that the whole [takes to perform the action related to its power] would be determinate [that is, limited], and the same would hold for the number of times [it performs that action].

شـــيءٍ من جنســـه . فإنَّ القوة تكون سارية في الجســـم ذي القوة ، فيكون للجزء قوة من جنس قوة الكل ، ومقوى عليه من ذلك الجنس الذي للكل . فلا يخلو إمّا أنْ يكون ، مثلاً ، المقوى عليه الذي يُحرّكانه شـــيئاً واحداً ، أو يكون ما يقوى عليه الجزء أصغر من ذلك . فـــإنْ كان شـــيئاً واحداً ، وكان جميع ما في القوة ، ممّـــا لا نهاية له ، كثرة ومدّة من آنٍ معيّنٍ يقوى عليه كل واحد منهما ، فهما سواء في المقوى عليه ، وهذا محال . وإنْ كان ما يقوى الجـــزء على تحريكه أصغر ، والكل أيضاً يقوى علـــى ذلك الأصغر ، فإمَّا أنْ يكون المقوى عليه في الكثرة والمدّة من آنٍ معيّنٍ فيهما سواء – وذلك محال ، أو يكون أقلَّ وأنقص ، وإذا كان مـــا يقوى عليه الجزء أنقص ، لم يكن نقصانه في اتصاله من الآن الذي فرضنا الاعتبار منـــه ، بل من الطرف الآخر . فإذا نقص عـــن غير المتناهي – في جهة كونه غير متناه – زاد غيـــر المتناهـــي عليه في تلك الجهة ، وما زاد عليه شـــيء في جهةٍ فهو متناهٍ في تلك الجهة . فيكون إذن الجزء المفروض متناهي القوة بالقياس إلى مدة الفعل ، لكن جملة الجسم المتناهي تناســـب الجزء المفروض مناسبة محدودة ، فالقوة التي في الجملة تناسبها مناسبة محدودة ، . وهذه المناســـبة بالقياس إلى المقوى عليه ، فالمقوى عليه الذي للجملة يناسب المقوى عليه الذي للجزء مناســـبة محدودة ، فزمـــان الجملة أيضاً محدود وكذلك عدده .

(8) Now, the discussion of these suppositions is just like the one involving the suppositions posited about the makeup of the plenum and the void.[9] That is because we do not need to consider whether these ratios actually exist. Instead, we say, in the way that geometers use suppositions, that, whenever the supposition that something stand in some ratio necessarily entails this status, it is finite. In short, it is not the nature of the power that prevents that, but the nature of things that don't exist. So we say that, if things were to exist in some given way, to that extent their nature would require such and such, whereas, if this power were an infinite power in a finite body, it would not be such that, were the things to exist as such, their nature would require such and such; and [yet] that is necessary for it to be.

(9) From this it is clear that, within a finite body, there cannot be an infinite power relative to the duration and the number of like-ordered events previously mentioned, whereas, relative to the number of mixed events, the case is perhaps not as straightforward, and so the same proof cannot be used for it. That is because the number of non-existent future events is not necessarily finite, when [those events] fall short of some other number. It is possible, then, that future[10] events are infinite, and yet some fall short of others. An example is infinite motions that are faster and infinite motions that are slower, for the faster rotations will inevitably be greater than the slower ones. Likewise, the infinitely many multiples of ten are less than the infinitely many multiples of one, while [the multiples of ten] are greater than the infinitely many multiples of one hundred and one thousand.

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9. See 2.8.12.

10. As a result of dittography **Y** has repeated the phrase *fa-yajūzu an takuna fī al-mustaqbal idhā kānat anqaṣ min ʿiddah ukhrá an takuna mutanāhīyah* (when future events are less than some other number that it is finite). The phrase is not repeated in **Z**, **T**, or the Latin.

(٨) والكلام في هذه التقديرات كالكلام في التقديرات التي فرضناها في قوام الملاء والخلاء، وذلك لأنّا لسنا نحتاج إلى اعتبار وجود هذه المناسبات بالفعل، بل نقول إنَّ ما تقدير مناسبته يوجب هذا الحكم فهو متناه، على التقديرات التي يفعلها المهندسون، وبالجملة ليس العائق في ذلك من طبيعة القوة، ولكن من طبيعة الأُمور التي ليست توجد. فنحن نقول إنَّ هذه القوة – بحيث لو كانت الأمور توجد على نحومّا – لكانَ ‹ت› طباعها توجب كذا وكذا، ولو كانت قوة غير متناهيةٍ في جسم متناهٍ لما كانت تكون؛ بحيث لو كانت الأمور توجد كذا ‹لكانت› طباعها توجب كذا وكذا، وذلك أوجب لها أن تكون.

(٩) بيّنٌ من هذا أنّه لا يجوز أنْ تكون في جسم متناهٍ قوة غير متناهية بالقياس إلى المدّة والعدّة المنتظمة المذكورة. وأمّا بالقياس إلى العدّة المختلطة فعسى الأمر أنْ يشكل فيه، فلا يمكن استعمال هذا البيان بعينه فيها؛ وذلك لأنّه لا يلزم أنْ تكون العدّة المعدومة التي في المستقبل إذا كانت أنقص من عدّةٍ أُخرى أن تكون متناهية. فيجوز أن تكون في المستقبل أُمور بلا نهاية، ولكن بعضها أنقص من بعض، كحركاتٍ بلا نهايةٍ هي أسرع، وحركات بلا نهاية هي أبطأ، فإنَّ دورات الأسرع لا محالة أكثر من دورات الأبطأ، وكذلك العشرات غير المتناهية أقل من الوحدات غير المتناهية وأكثر من المئين والألوف غير المتناهية.

(10) With respect to the time reaching up to now, a given period of time beginning now that is less than the infinite [time] beginning now can only be finite. Still, when there is that which has power over infinitely many mixed events for all of their ordered series, then it may have power over one of their ordered series, whether beginning at some designated unit or instant. When, however, the body does not have power over even a single infinite ordered series, it likewise does not have power over some mix of varying ordered series, and it is clear from what we [already] said that it does not have power over an infinite ordered series. (In this science, however, we do not discover why [that] is impossible in the case where the whole multiplicity of events completely lacks any order or that multiplicity is a certain genus in which there is no order.)[11] So it has become clear that a body cannot have an infinite power with respect to strength, duration, or number of times [the action is performed]. Should someone say that, in the celestial sphere closest to us, there is the power to rotate fire forcibly without discontinuity and that it is corporeal, we say, initially, that (as you will learn in its proper place)[12] that motion is an accidental motion because it is being moved by what is [itself] being moved; but, nevertheless, [the rotation of fire] perpetually results[13] from the motive cause belonging to the celestial sphere by means of the celestial sphere's motion.

(11) Now, we ourselves are not opposed to some infinite power moving a body and, by means of [that body], moving another one infinitely many times, when the infinite power is not something residing in either of the two bodies. We are opposed only to an infinite power's being in a body that moves that body or some other one. As for when [the power]

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11. See, for instance, *Ilāhīyāt* 8.1, where Avicenna argues that the order of existing things must terminate at a First Principle of all existence.

12. See, for instance, *Ilāhīyāt* 9.5.

13. Reading *ʿan* with three of the older MSS consulted by **Y**, **Z**, **T**, and the Latin (*per*) for **Y**'s preferred *ghayr* (different from).

(١٠) وأمّا في الزمان المتصل من الآن، فلا يجوز أن يكون زمانٌ يُعتبر من آنٍ أقل من غيــر المتناهي المبتديء من الآن، إلاّ متناهياً ولكنه إذا كان ما يقوى على كثراتٍ مختلطة غير متناهيةٍ، <ل> كلِ ترتيبٍ منها، فقد يقوى على ترتيبٍ واحدٍ منها، مبتدئاً من وحدةٍ معيّنةٍ أو آنٍ معيّن. فإذا كان الجسم لا يقوى على ترتيبٍ واحدٍ غير متناهٍ؛ فكذلك لا يقوى علــى خلْــطٍ من ترتيباتٍ مختلفة – وأمّا أنّها لا تقوى على ترتيبٍ غير متناه فذلك بيّنٌ بما قلناه، وأمّا إذا كان كل كثرةٍ منها غير منتظمة في ترتيب، أو تكون الكثرة جنســاً واحداً لا ترتيب فيه، فلا يتبيّن لنا من هذا العلم امتناعه. فقد بان أنّه يستحيل أنْ يكون لجسم قوة بلا نهاية في الشدّة وفي المدّة وفي العدّة. فإنْ قال قائل إنَّ القوة التي في الفلك الأقرب إلينا تقوى على تحريك النار على الدور قســراً من غير انقطاعٍ وهي جسمانية، فنقول: أولاً، إن تلك الحركة – كما ســتعلمه في موضعه – حركة بالعرض لتحرّك ما المتحرّك به فيه، ومع ذلك فهو عن السبب المحرّك للفلك دائماً بتوسط حركة الفلك.

(١١) ونحن لا نمنع أنْ تكون قوة غير متناهية تحرّك جســماً، وتحرّك بتوسطه شيئاً آخر حركاتٍ غير متناهية، ولا تكون القوة غير المتناهية مســتقرة في أحد الجسمين. إنّما نمنع أنْ تكون قوة غير متناهية هي في جســمٍ تُحرّك ذلك الجســم أو جسماً آخر؛ فأمّا إنْ

is not in a body but it moves some body, and that body, on account of its being moved by [that power], moves another body infinitely, that is indisputably found to be the case. [That] is because nothing prevents there being an infinite power, wholly unmixed with bodies, that moves some body; then, owing to [that moving body], a number of large interconnected bodies are moved; and, from them, there is produced a system involving numbers of continuously generated things. What we are talking about precisely is the infinite power that is the foundation and principle of the system of an infinitely ordered series, whether [in] duration or number with respect to generation, or continuous motion, whether mediately or immediately; for we are quite adamant that that principle is never in a body.

(12) Someone might say that it is not impossible for the body to have some power over that which entails the existence of that [first] body, and [that] thereafter that [first] body is of a character that it perpetually continues on, and [that] then, from it, there perpetually results that production of motion or that number. The answer to this is that it is impossible on account of what we have [already] explained. The fact is that it necessarily follows from what we explained that none of the bodies has a power by which it perpetually acts on what is contiguous with it; rather, the power of every body is one by which it acts upon what is contiguous with it so as to produce discontinuous motions by bringing [the body] closer or farther away. In no body can there be some power—whose action is one, continuous, and homogeneous—that perpetually continues together with the continuation of the body. Instead, the power of

كانت لا في جسم، وتُحرّك جسماً، ويحرّك ذلك الجسم - بسبب تحرّكه عنها - جسماً آخر حركة غير متناهية؛ فذلك ممّا هو موجود وليس عليه كلام. فإنّه لا مانع أنْ تكون قوة غير متناهية، بريئة عن مخالطة الأجسام، تحرّك جسماً فتتحرّك له أجسام كبيرة ملتحمة بـه، ويتوّلـد عنها نظام في أعداد متكونة لا تنقطع - إنّمـا كلامنا في القوة غير المتناهية التـي هي أصل ومبدأ لنظام الترتيب غير المتناهي، مدّة كان أو عدّة في التكوّن أو حركة متصلة، وكان بواسطة أو بغير واسطة. فإنّا نجزم أنَّ ذلك المبدأ لا يكون في جسم دائماً.

(١٢) فإنْ قال قائل: إنّه ليس من المستحيل أنْ يكون للجسم قوة على ما يلزم وجود ذلك الجسم، ثم يكون ذلك الجسم ممّا من شأنه أنْ يبقى دائماً، فيصدر عنه ذلك التحريك أو ذلك العدد دائماً - فالجواب عن هذا أنَّ ذلك من المستحيل لما بيّناه، بل يلزم لما بيّناه أنْ لا يكون لجسـم من الأجسام قوة يفعل بها فيما يماسّه دائماً؛ بل قوة كل جسم قوة يفعل بها فيما يماسّـه تحريكاً منقطعاً من تقريب وتبعيد. ولا جسم من الأجسام يمكن أنْ تكون فيه قوة تبقى دائماً مع بقاء الجسـم؛ يكون فعلها واحداً مستمراً متشابهاً، بل يجب أنْ تكون

the body must be one from which there results only some action that must itself be finite. Even if the body does perpetually continue, it will be something that, for instance, pushes or pulls or transmits, or something analogous.

(13) Should someone say that it is a matter of observation that if earth were to continue [to exist] perpetually and nothing accidental were to happen to it, then, as a result of its nature, it would be found continually resting in its natural place, we would say [that] rest is a privation of some action, not an action. Additionally, the perpetual continuation of earth and bodies subject to generation and corruption (as well as the continuation of their powers) is something whose alteration we will explain later.[14]

(14) One might also object that this infinite power can belong only to the whole body, so [that] when the body is divided, [the power] passes away. In that case, none of that infinite power will belong to the part. So the part will not have power over some part of that over which the whole has power, because the substrate of this power is the whole. It is just like the powers that exist in composite bodies after mixture, where [those powers] are not found in any of the underlying elements that were mixed together in it, [or] similar to rowers of a ship, for one of them [alone] would not move it at all. We say that the situation is not as you have supposed. [That] is because, even if the power belongs to the body in virtue of the combining of the parts and its mixture, it nonetheless permeates the whole of [the body], unless a given power

14. See *Fī al-kawn wa-l-fasād* 6. Alternatively, the text's *istiḥālah* might more naturally be read as "impossibility." In that case, the sense of the text would be, "Still, we will explain later that it would be impossible for earth and bodies subject to generation and corruption to continue forever, and the same will hold for their powers." Since, in the next chapter, Avicenna will argue for the eternity of the world, this reading seems unlikely; however, he may merely mean here that the individual instances of generable and corruptible things must ultimately pass away, even though the species does not (see *Ilāhīyāt* 6.5).

قوة الجسم قوة إنّما يصدر عنها فعلٌ يقتضي نفسه التناهي، وإنْ بقي الجسم دائماً فيكون مثلاً دافعاً أو جاذباً أو محيلاً أو شيئاً مما يجري هذا المجرى.

(١٣) فإنْ قال قائل إنّا نشاهد الأرض لو بقيت دائماً ولم يعرض لها عارضٌ لكان يوجد عن قوتها سكونٌ متصل في مكانها الطبيعي، فنقول: أمّا السكون فعدم فعلٍ لا فعل، ومع ذلك فبقاء الأرض والأجرام القابلة للكون والفساد دائماً، وبقاء قواها كذلك، ممّا سنبيّن استحالته.

(١٤) ثم لقائل أنْ يقول: إنّه يجوز أنْ تكون هذه القوة غير المتناهية إنّما توجد لجملة الجسم، فإذا قُسّم الجسم بطلت فلم يوجد من تلك القوة المتناهية شيء للجزء، فلم يقوَ الجزء على شيءٍ ممّا يقوى عليه الكل، لأنَّ محل هذه القوة الكل؛ كما يوجد من القوى في الأجسام المركبة بعد المزاج، ولا تكون موجودة لشيءٍ من الأركان التي امتزجت عنه، كما أنَّ المحركين للسفينة فإنَّ الواحد منهم لا يحرّكها البتة. فنقول إنَّ الأمر ليس على ما قدّرت، فإنَّ القوة – وإنْ كانت للجسم بحال اجتماع أجزائه وبحال مزاجه – فإنّها مع ذلك تكون سارية في جملته، وإلاّ لكانت قوّة لبعض تلك الجملة دون الكل. فإذا كانت

belongs to some of the whole but not all. So, when it does permeate the whole of it, then some of the power belongs to part of [the whole]. So, once there is the mixture, the simple [body] does harbor the power permeating the whole that occurs after the mixture, whereas, when taken alone, it does not. Now, our supposing that the body has some part does not necessarily force us to take that part with the condition that it [actually] be cut off and separated [from the whole], such that one could then object that the separated part does not harbor any of the power. Instead, it is enough that we designate some part of it as it is so that we can recognize, in the way that was supposed, the state of that which results from that part and from the power that is in it. Also, even though one of the rowers of the ship cannot move the whole ship, he inevitably can move something smaller than it, which necessarily follows from what we have said.

(15) One might also object that the incorporeal mover of infinite power that moves some body must either provide a certain motion or provide some power by which [the body] is moved. On the one hand, if it provides some power, it would have provided an infinite power to the body. In that case, it would follow that [that power] is divisible, necessarily entailing what we have mentioned. On the other hand, if it provides only motion while not providing it with some inherent desire or inclination, [the body] would be forcibly moved; but you believe that forced motion is not perpetual. The answer is that if it provides a certain inclination, then, even though the inclination is the proximate

سـاريةٍ في جملته، كان لبعضها بعض القوة، فيكون البسيط إذن في حال المزاج؛ حاملاً للقوة الحاصلة بعد المزاج السّارية في الكل، وإنّما لا يحملها في حال الانفراد. وليس يجب أنْ يكون فرضنا للجسم بعضاً يلجئنا إلى أنْ نأخذ ذلك البعض بشرط قطْعه وإبانته، حتى يكون للقائل أنْ يقول إنَّ البعض المباين لا يحمل من القوة شيئاً، بل يكفينا أن نعيّن بعضاً منه وهو بحاله، فنتعرّف حال ما يصدر عن ذلك البعض وعن القوة التي فيه وحدها؛ التعرّف المفروغ منه على سـبيل التقدير. والمحرّكون للسـفينة فإنَّ الواحد منهم – إنْ لم يمكنه أنْ يحرك كل السفينة – فيمكنه أنْ يحرك أصغر منها لا محالة، ويلزم ما قلناه.

(١٥) ولقائـل أنْ يقول فالمحـرّك ‹غير› المتناهي القوة غير الجسـماني الذي يحرّك جسماً؛ لا يخلو إمّا أنْ يفيد حركة، وإمّا أنْ يفيد قوة بها يتحرك، فإنْ أفاد قوة؛ فقد أفاد قوة غير متناهية للجسـم فيلزمها أنْ تنقسم ويوجب ما ذكرتم. وإنْ أفاد حركة فقط؛ ولم يفد شـوقاً غريزياً وميلاً لها فهو قَسْـرٌ، وعندكم أنَّ القسري لا يدوم، فالجواب أنّه إنْ أفاد ميلاً؛ فإنَّ الميل – وإنْ كان مبدأ قريباً للحركة – فليس مبدأ قريباً لها من حيث هي غير

principle of the motion, it is not its proximate principle insofar as it is infinite, but insofar as it is that motion. So inclination alone is not such that there results from it actions of an infinite power; rather, [they] are the results of the influence of that which makes [the inclination] to continue perpetually and by which it is perpetual, whereas, in itself, it is finite with respect to that over which it has power (if it can have power over it). Also, even if [the incorporeal mover of infinite power] does not provide an inclination, the motion won't be forced, as they reckoned, since forced motion is that which is contrary to the natural inclination in the thing, whatever it might be. So, when that which was provided with the motion has no inclination, but only motion, then [the motion] is not forced. It has thus become clear that it is simply impossible for there to be some power in a body that, of itself, necessitates infinitely many things.

(16) Again, one might say that your professed demonstration deals only with an infinite power that moves some foreign body that is external to it, whereas it does not deal with infinite powers internal to the bodies that they move, for you cannot say that the entire power moves something smaller, which we assume that part of the power does move. [That] is because part of the power moves that in which it is and the entire power moves that in which it is, but at any given moment that entire power won't be moving what the part moves, because it is not in it; but, in that case, the account is not driven into the contradiction. The response is to recall what we stipulated at the onset of the account[15]—[namely, that] this depends upon a hypothetical, conditional proposition based upon a supposition, not upon an existence claim.

15. See par. 8.

متناهيــة، بل من حيث هي تلك الحركــة – فالميل وحده ليس بحيث تصدر عنه الأفعال غير المتناهية القوة، بل عن تأثير من مســتبقيه على الدوم ويدوم به، وهو في ذاته متناهي المقوي عليه إنْ كان له مقوي عليه – وإنْ لم يفد ميلاً فليســت الحركة بقســريةٍ أيضاً كما حسبوا، إذ القسرية هي التي تخالف الميل الطبيعي في الشيء ما كان، فإذا لم يكن ميلٌ لما أُفيد من الحركة، بل الحركة لم تكن بالقســر، فقد اتضح أنّه من المستحيل أنْ تكون قوة في الجسم هي التي تقتضي لذاتها أُموراً بلا نهاية.

(١٦) ولقائــلٍ أنْ يقول: إنَّ البرهان الذي ادعيتم إنّما قام على قوةٍ غير متناهيةٍ تحرّك جســماً غريباً خارجاً عنها، ولم يقم على قوةٍ غير متناهية تحرّك الجســم الذي هي فيه. فإنّه ليس لكم أنْ تقولوا إنَّ جميع القوة تحرّك الشــيء الأصغر الذي فرضنا أنَّ بعض القوة تحرّكه، لأنَّ بعض القوّة تحرّك ما هو فيه، وجميع القوة تحرّك ما هو فيه، وليس جميع القوة محــرّكاً – في وقتٍ مــن الأوقات – لما يحرّكه الجزء لأنّه ليس فيه. وإذا كان كذلك، لم ينسق الكلام إلى الخُلْف، فيكون الجواب عنه أنْ تتذكر ما اشترطناه من حديث في اعتبار هذا على حسب قضيةٍ شرطيةٍ متصلةٍ تقديرية، لا بحسب الوجود.

(17) We have now examined this topic of investigation in the right way, explaining it in a way different from the simple-minded one that those who prattle on about the sciences use and who take infinite power as if it were something infinite in itself and derive some contradiction inasmuch as that [the power] will be necessarily multiplied or doubled or have some other ratio. They just don't understand that power in itself is neither finite nor infinite; rather, what *infinite powers* means is that that which is correlated with [that power], as that over which there is the power, is potentially, not actually, infinite, and that the potentially infinite might happen to become bigger and smaller. Indeed, there are many things, each one of which is in the class[16] of infinite, in whose case the infinite [can be multiplied by] two, three, four, or even more than that, where these might belong to a single genus as well as different genera. So it is not impossible to multiply the potentially infinite. So it is not impossible to multiply the power that is over that which is not impossible. The fact is that one ought to come around to what we have proven. Having explained that, let us consider whether there can be an infinite number of continuous motions and instances of generation, and, if they are infinite, whether they have a temporal beginning that is an [extreme] limit before which there is no before.

16. Reading *tabaqa* with four of the MSS consulted by **Y**, with **Z**, and with the Latin (*ordine*) for **Y**'s and **T**'s *tabiʿah* (nature).

(١٧) وإذ قد فتشنا عن هذا البحث حقّ التفتيش، وبيّناه على غير الوجه السخيف الذي يذكره مَنْ يخرّف في العلوم، ويأخذ القوة غير المتناهية كأنها في نفسها شيء غير متناهٍ ويُخرج خُلْفاً بأنّها يلزم أنْ تتضعّف أو تتنصّف، أو يكون لها نسبة أخرى؛ ولا يعلم أنَّ القوة في نفسها لا متناهية ولا غير متناهية، بل معنى قوة غير متناهية أنَّ مقابلها من المقوي عليه غير متناهٍ في القوة لا بالفعل، وأنَّ غير المتناهي في القوة قد يعرض له ما يصير أكثر وأقل. وأنْ تكون أشياء كثيرة، كل واحد منها في طبقة غير متناهية، فيكون غير المتناهي مرتين وثلاثة وأربعة وأكثر من ذلك، ويكون ذلك من جنسٍ واحدٍ ومن أجناسٍ مختلفة، فلا يستحيل تضعيف غير المتناهي في القوة، فلا يستحيل تضعيف القوة التي هي قوة على ما لا يستحيل، بل يجب أن يُحامَ حول ما بيّناه. وإذ بيّنا ذلك، فلننظر هل من الممكن أنْ تكون حركاتٌ وأكوانٌ متصلة بلا نهاية؟ وهل - إنْ كانت بلا نهاية - فلها بداية زمانية هي طرف لم يكن قبلها قبْل؟

Chapter Eleven

That nothing precedes motion and time
save the being of the Creator (may He be exalted)
and that neither of the two
has a first [*moment*] *of its being*

(1) Let us investigate whether motion can begin at some moment of time before which there was nothing, or whether motion is an atemporal creation, where every limit of time has some before and, in fact, [only] the being of the Creator is before anything. We say that, before the existence of any nonexisting thing, it was something whose existence was possible. So the possibility of its existence existed before its existence. [That] is because, if the possibility of existence were not to exist, it would be nonexistent and there would be no possibility of its existence, in which case its existence would be impossible. So the possibility of [a thing's] existence exists before [the thing] exists. Now, the possible existence of what exists must be some determinate thing, not merely nonexistence, for how many nonexisting things are different from [the thing's] possible existence?[1] So [possible existence] is either a substance subsisting in itself or some factor existing in something. If it were something subsisting in itself, which is neither in a substrate nor in a subject, then, as such, it would not be a correlative; however, as possible existence, it is correlative

1. Avicenna's point is that the *possibility to be x* cannot simply be identified with *not being x;* so, for example, while elephants, pinecones, stones, and galaxies are all *not* human, none, as such, is *possibly* a human.

<الفصل الحادي عشر>

في أنه ليس للحركة والزمان شيء يتقدم عليهما إلاّ ذات الباريء تعالى وأنهما لا أول لهما من ذاتهما

(١) فلننظر أنّه هل يمكن أنْ تبتديء الحركة من وقتٍ ما من الزمان لم يكن له قبل، أو الحركة إبداعية؟ وكل طرفٍ من الزمان فله قبل، وأنَّ ذات الباري <هي> قبل كل شيء. فنقول: إنَّ كل معدومٍ فإنّه قبل وجوده جائز الوجود، فجواز وجوده موجود قبل وجوده. فإنّه لو لم يكن موجوداً أنّه جائز الوجود، كان معدوماً أنّه جائز الوجود، وكان ليس بجائز الوجود، فكان ممتنع الوجود. فجواز الوجود موجود قبل الوجود، وجواز الوجود للموجود أمرٌ محصل لا محالة، ليس هو نفس العدم، فكم من معدوم غير جائز الوجود، فهو إمّا جوهرٌ قائم بنفسه، وإمَّا أمرٌ هو موجود في شيء. ولو كان أمراً قائماً بنفسه لا في محلٍ ولا في موضوعٍ لكان - من حيث هو كذلك - هو غير مضافٍ لكنه من حيث هو جواز وجودٍ هو مضاف إلى شيءٍ، ومعقول بالقياس، فليس هو جوهراً قائماً

to something and intelligible by the comparison. So it is not a substance subsisting essentially. Perhaps instead it is a certain relation or accident belonging to a substance. Now, possible existence cannot be a substance that has a relation, because that relation is associated with something assumed to be nonexistent. Also, it is impossible that[2] that relation be simply a certain association,[3] however it might by chance be; rather, it is a determinate association, where that association is not determinate save only in that it is possible. Therefore, possibility is itself the relation, not some substance upon which a relation other than possibility follows, where the two, taken together, would be possibility. Also, its existence in reality is not in that whose existence is possible while it is still nonexistent, for the existing description is not some accident of what does not exist. It is also not a description of the efficient principle so as to be a power, for the power or possibility to bring something into existence is not [the same as] possible existence. Thus, one rightly says that power over what is impossible and over what, in itself, does not possibly exist are absurd. That, however, is not [the same as] our saying that the power over that which cannot bring something into existence or the possibility to bring into existence that which cannot bring something into existence are absurd. The first of the two sayings leads to a concept different from the second. Again, if the first speaker conveys something that is not laughable, while the second speaker conveys something that is laughable (namely, when he says "that which cannot be brought into existence cannot be brought into existence"), then the laughable statement is not the same as that of the one who says "that whose existence is not possible in itself cannot be brought into existence by another." Indeed, this is a true and well-received statement used in making inferences.[4] It is also for

2. Reading *lā yumkinu an takūna* with **Z** and **T** for **Y**'s preferred *yumkinu an lā takūna* (it is possible that it is not).

3. The term "association" here is translating the Arabic *nisba*, which I have frequently rendered "relation." In the present context, however, I have reserved "relation" for the Arabic *iḍāfa*, which is the technical Arabic vocabulary for the Aristotelian category of relation (*pros ti*).

4. Alternatively, *qiyās* may be a reference to Avicenna's syllogistic; see, for instance, *Kitāb al-qiyās* 3.4, where he speaks about the definition of the possible (*mumkin*).

بذاته؛ بل عسى أنْ يكون إضافة ما وعرضاً ما لجوهر. ولا يجوز أنْ يكون جواز الوجود جوهراً له إضافة؛ لأنَّ تلك الإضافة تكون نسبة إلى الشيء المفروض معدوماً، ولا يمكن أنْ تكون تلك الإضافة نسبة مطلقة كيف اتفقت، بل نسبة معيّنة؛ لا تتعين تلك النسبة إلاّ بأنها جواز فقط، فيكون إذن الجواز نفس الإضافة لا جوهراً تلزمه إضافةٌ هي غير الجواز؛ ومجموعهما هو الجواز. وليس وجوده بالحقيقة فيما يجوز وجوده وهو معدوم بعد؛ فإنَّ الصفة الموجودة لا تعرض لمعدوم، ولا هو صفة للمبدأ الفاعلي حتى تكون هي القدرة، فإنّ القدرة على الإيجاد أو جواز الإيجاد، ليس هو جواز الوجود. ولذلك يصحّ أنْ يقول القائل إنَّ القدرة على الممتنع محال، وعلى ما ليس في نفسه جائز الوجود محال، وليس يكون ذلك هو قولنا إنَّ القدرة على ما ليس جائز الإيجاد محال، أو جواز إيجاد ما ليس بجائز الإيجاد محال. فإنَّ الأول من القولين يؤدي مفهوماً غير مفهوم القول الثاني: فإنْ قال قائلٌ القولَ الأول يفيد معنى غير هذر، وقائل القول الثاني يفيد هذراً؛ أي إذا قال إنَّ ما لا يجوز إيجاده لا يجوز إيجاده فإنَّ قوله قولٌ هذر لا كقول مَنْ يقول: إنَّ ما لا يجوز وجوده في نفسه لا يجوز إيجاده عن غيره. فإنَّ هذا قول صحيح مستعمل في القياس مقبول.

that reason that theoreticians inquire into whether things are possible or not, so as to judge whether their being brought into existence is possible, whereas it is impossible for them to inquire into whether their being brought into existence is possible or not in order to infer from that and so learn whether their being brought into existence is possible or not.[5]

(2) It remains, then, that the possibility of existence—that is, the potential to exist—subsists in a substance other than the mover and its power. The substance in which there is the possibility of motion's existence is that which is of the character to be moved. From this, it is obvious that what has not been moved but is of the character to be moved precedes the beginning of its motion's existence. So, when that thing exists but is not moved, then there cannot [presently] exist the motive cause or states and conditions on account of which the mover moves the mobile, but thereafter they will exist. In that case, there will be a change of state before that motion, for the motion and whatever [previously] did not exist and then does [call it *x*] has some cause that necessitates its existence after its nonexistence. If there were no [such cause], [*x*'s] nonexistence would be no more fitting than its existence, nor would one of the two [states (namely, existence or nonexistence)] be essentially preferred over the other. So one [state] must be preferred because of some factor. Now, if that factor equally confers and does not confer a preference for that existence that results from it over the nonexistence, then the situation remains the same. The factor, instead, must be something with respect to which the preference for existence over nonexistence is selectively determined, where the selective determination is either such as to

5. While Avicenna's point here is not as clear as one might wish, he does make it more clearly at *Ilāhīyāt* 4.2, where he again argues that what is possible cannot simply be reduced to the power of the agent to do something. That is because, if these were equivalent terms, then one should be able to replace one term with another *salva veritate*—that is, in a way that is truth preserving. Avicenna begins by observing that no agent has the power over that which, in itself, is impossible. In that case, consider, for example, the meaningful statement "God's omnipotence means that God has the power to do everything possible," and replace "possible" with "the power of an agent to do something." The seemingly meaningful statement then becomes the vacuous tautology, "God's omnipotence means that God has the power to do everything that God has the power to do." Conversely, consider the empirically false claim, "I [(that is, some finite agent)] have the power to do everything possible." Under the present interpretation of *possible,* that false statement would turn out to be true, since I do have the power to do everything that I have the power to do.

ولذلك فإنَّ الناظرين ينظرون في الأُمور ؛ هل هي جائزة الوجود حتى يحكموا أنّها جائز إيجادها ، أو هل هي غير جائزة الوجود حتى يحكموا أنّها غير جائز إيجادها ، ويستحيل أنْ ينظروا أنّها هل هي جائز إيجادها أو غير جائز إيجادها ؛ ليتعرفا من ذلك على سبيل الإنتاج أنّها جائز إيجادها أو غير جائز إيجادها .

(٢) فبقي أنْ يكون جواز الوجود ؛ وهو القوة على الوجود ، قائماً في جوهر غير المحرّك وغير قدرته ، والجوهر الذي فيه جواز وجود الحركة ، هو الذي من شأنه أنْ يتحرك . وظاهرٌ من هذا أنَّ الذي لم يتحرك - ومن شأنه أنْ يتحرك يسبق ابتداء وجود حركته . فإذا كان ذلك الشيء موجوداً ولا يتحرك ، وجب أنْ لا تكون العِلّة المحرّكة ، أو الأحوال والشرائط التي لأجلها يصدر التحريك من المحرّك في المتحرّك موجودات ثم وجدت ، فيكون قد تغيّر حالٌ قبل تلك الحركة . فإنَّ الحركة ، وكل ما لم يكن ثم كان ، فله علّة توجب وجوده بعد عدمه ، ولولاها لم يكن عدمه ليس بأولى من وجوده ، ولا يتميّز له أحد الأمرين لذاته ، فيجب أنْ يتميّز لأمرٍ ، وذلك الأمر إن كان يميّز ذلك الوجود عنه عن العدم ولا يميّزه سواء - كان الأمر بحاله ؛ بل يجب أنْ يكون الأمر يترجّح فيه تمييز الوجود عن العدم . والترجُّح إمّا أنْ يكون ترجّحاً يوجب ، أو ترجّحاً لا يبلغ أنْ يوجب ،

necessitate [the effect] or such as not to reach the level of necessitating [the effect], in which case the same issue would remain. The fact is that it must inevitably necessitate [the effect]. Whatever the case, there must some selectively determining or necessitating cause that has come to be, and the discussion concerning its coming to be is the same as the former one. So its coming to be has an infinite number of essentially ordered natural causes either [all] existing together or existing successively. If they exist together, something impossible would have existed [namely, there would exist an actual infinity]. If they exist in succession, then either each one of them endures for a period of time, or instants follow successively upon one another. If, on the one hand, they endure for a period of time, then one motion would be after another, such that there will be no discontinuity in between, and before the first motion there will be a motion. The motion, however, would be eternal; but we stipulated that it had a starting point, which is a contradiction. If each one remains [only] an instant, they follow successively upon each other without any intervening period of time; and that also is absurd. Clearly, then, when something that [previously] did not exist comes to be in a body, the cause of that thing has then come to have a certain relation to that body that [previously] did not exist, where that relation is one of existing after not existing (whether belonging to an entity or some state). [That relation] will be either as some motion that necessitates some proximity, remoteness, juxtaposition, or some variation thereof, or as the coming to be of some motive power that [previously] did not exist,[6] or as some temporal act of volition. The coming to be of all of that will have some continuous cause, one thing following another. That is possible, however, only through some motion that temporally orders one

6. **Y** has (inadvertently) omitted the line *wa-imma ḥudūth qūwa muḥarrika lam takun* (or as the coming to be of some motive power that [previously] did not exist), which appears in **Z** and **T**.

فيكـون الكلام بحاله، بل يجب – لا محالـة – أنْ يوجب، وعلى كل حال فيجب أنْ يكون سببٌ مرجّح أو موجبٌ قد حدث، والكلام في حدوثه ذلك الكلام بعينه. فإمّا أنْ يكون لحدوثه أسبابٌ ذات ترتيب بالطبع لا نهاية لها موجودة معاً، أو موجودة على التتالي، فـإنْ كانت موجودة معاً فقد وجد المحال، وإنْ كانت موجودة على التتالي، فإمّا أن يكون كل واحدٍمنهـا يبقى زماناً أو تتالـى الآنات، فإنْ بقيت زماناً كانت حركة بعد حركة على التشافع لا تنقطع، وكان قبل الحركة الأُولى حركة، وكانت الحركات قديمة؛ وقد جعلنا لها مبدأ، هذا خُلْف. وإنْ بقيت آناتٌ؛ فتتالت الآنات بلا توسط زمانٍ، وذلك أيضاً محال. فتبين أنّه إذا حدث في جسـم أمرٌ لم يكن فقد حصل لعِلّة ذلك الأمر إلى الجسـم نسبة لم تكن، وتلك النسـبة نسبة وجودٍ بعد عدمٍ لذاتٍ أو لحالٍ؛ إمّا حركة توجب قرباً أو بُعْداً أو مـوازاة، أو خلافها، وأما حدوث قـوةٍ محركة لم تكن، وإمّا إرادة حادثة. وكل ذلك فلحدوثه سـببٌ على الاتصال، شيئاً بعد شـيء. وذلك لا يمكن إلاّ بحركةٍ تنظّم الزمان

thing after another and that preserves the continuity, because it is impossible for instants to follow one another successively and because, if there is no motion undergoing transition from one thing to another, the causes and effects would necessarily occur simultaneously. Indeed, if the temporally originated cause (whether a necessitating or selectively determining one) has a fixed existence, then it necessitates and selectively determines [the effect] either through its nature or owing to some accidental factor belonging to it. If that is due to its nature—and, moreover, that which is its cause is distinct from it (even if it is something accidental)—it is not a cause owing to itself, but only together with that accident. So, necessarily, if [the cause] has a fixed existence, the effect must be simultaneous with it without delay, whereas, if it is something temporally originated that is renewed and not fixed, then the original issue arises once again. So, when the causes or conditions by which causes are causes have a fixed existence (whether temporally originated or not), then the existence is not brought to completion by something coming to be through them alone at some time. [That] is because, if what has a fixed [existence] always exists, then what it necessitates [as its effect] will not be delayed such as to be something coming to be at some time, whereas, if it comes to be [a cause] at some time, there is another cause of its being a temporally originated cause. Therefore, among the causes and conditions of causes, there must be some cause having an unfixed existence. Indeed, its existence involves exchange and transition from certain things to others, where this is nothing but motion or time. Now, time in itself does not act as a [cause], whereas motion produces proximity and remoteness. So [motion] is, in a certain way, a causal explanation, since it brings the cause into proximity.

شيئاً بعد شيء ، وتحفظ الاتصال – لامتناع تتالي الآنات ولأنه إنْ لم تكن حركة تنقل أمراً إلى أمر ، وجب أنْ تقع العلل والمعلولات معاً . فإنَّ السبب الحادث ، الموجب أو المرجّح ، إنْ كان قار الوجود فإنّه إمّا أنْ يكون بطبيعته يوجب ويرجّح ، أو يكون لأمرٍ يعرض له . فإن كان ذلك لطبيعته – ثم تميّز عنه ما هو علّته – وإنْ كان لعارضٍ ، فليس هو لذاته علّة بل مع ذلك العارض ، فيجب إنْ كانت قارة الوجود أنْ يجب معها المعلول بلا تأخر ، وإنْ كانت حادثة متجدّدة غير قارّة لزم بعينه الكلام الأول . فإذا كانت العِلل أو الأحوال التي بها العلل عِللاً قارّة الوجود – حادثة أو غير حادثة – لم يتم للحادث بها وحدها وجود ، فإنَّ القارّ إنْ كان دائماً ، كان موجبه لا يتأخر فيصير حادثاً ، وإنْ كان حادثاً ، كان لكونه علّة حادثة ؛ عِلّة أُخرى . فيجب إذن أنْ يكون في العِلل وأحوال العِلل عِلّة غير قارّة الوجود ، بل وجودها على التبدّل وعلى النقل من أُمور إلى أُمور ، وليس هذا غير الحركة أو الزمان ، والزمان في نفسه لا يفعل فعلها ، والحركة تقرّب وتُبعد ، فتكون سبباً وعِلّة بوجهٍ ما ، إذْ تُقرّب العِلّة .

(3) It has become clear that if, whenever we assume that motion has some starting point with this description, some motion is before it, then motion, considered absolutely, does not have a starting point but involves an atemporal creation, where nothing is before it save the being of the Creator, preceding essentially [and] not temporally. How could [anything] be before it except the being of the Creator when we have shown that it is impossible that time in itself have some first instant or first thing that precedes it except the being of the Creator?[7] Thus, motion has no temporal beginning, but exists in the manner of an atemporal creation, where nothing precedes it save the being of the Creator.

(4) Someone cannot say: You have made motion something existing necessarily, whereas what exists necessarily does not need something that makes it exist. The answer is that there are two ways that something exists necessarily. One of them is to exist necessarily absolutely and through itself, while the other is to exist necessarily conditionally and through another. An example would be angles that equal up to two right angles. That is not necessary absolutely, but it is necessary when the figure is a triangle. Similarly, daytime is necessary with the rising of the Sun (for it is necessary through a cause), whereas neither daytime nor the rising of the Sun is necessary in itself. We ourselves required that the motion's existence be eternal if it is supposed that motion has a beginning in some way other than as an atemporal creation, and that [other way] is absurd. So this [necessity] is conditional. We did not require that [motion] exist necessarily of itself, nor is it the case that, when something is thought to have necessary existence as something transmitted to it and conditionally, it has been deemed to have that of itself. So our saying that motion is necessary does not prevent that

7. See 2.12.1.

(٣) فقــد بانَ أنّه إنْ كان؛ كلما فرضنا للحركة مبدأ بهذه الصفة، كان قبلها حركة، فلا يكون للحركة المطلقة مبدأ إلاّ الإبداع، ولا قبلها شيءٌ إلاّ ذات المبدع؛ قبلية بالذات لا بالزمان. وكيف يكون قبلها إلاّ ذات المبدع، وقد منعنا أنْ يكون للزمان في نفســه آنٌ أول يتقدم عليه، أو شيء أوّل، إلاّ ذات المبدع؟ فلذلك لا يكون للحركة ابتداء زماني إلاّ على جهة الإبداع، ولا شيء يتقدم عليها إلاّ ذات المبدع.

(٤) وليــس لقائلٍ أنْ يقول إنكم قد جعلتم الحركة واجبة الوجود، وواجب الوجود لا يحتاج إلى موجد؛ فالجواب: إنَّ واجب الوجود على نحوين؛ أحدهما واجب الوجود مطلقاً ولذاته، والآخر واجب الوجود بشــرطٍ وبغيره، مثل كون الزوايا مساوية لقائمتين، وذلــك ليس واجباً مطلقاً، بل واجبٌ إذا كان الشــكل مثلثــاً. وكذلك وجوب النهار مع طلوع الشــمس، فإنّه واجبٌ بعِلّة؛ وليس وجوب النهار ولا طلوع الشمس واجباً بذاته. ونحــن أوجبنا قدم وجــود الحركة - إنْ فُرض للحركة ابتــداء - لا على نحو الإبداع، وذلك محال، فهذا بشرط، ولم نوجب لها وجوب الوجود لذاته، وليس إذا جُعل للشيء وجوب وجودٍ مرسلاً أو عند شرط، فقد جُعل له ذلك لذاته. فقولنا إنَّه يجب أنْ تكون

necessity from resulting from some beginning [principle], nor would our saying that motion necessarily emanates always from some mover (should we claim as much) require that the motion be thought to exist necessarily of itself. The fact is that, when we say that it is impossible that there be a motion, it is as if we said that it is impossible that there not be some mover who has caused the motion. [That] is because, when we say that it is impossible that there be some motion that comes to be in time unless there was some motion before that time, it is as if we said that it is impossible that there be[8] some mover causing motion in time unless some mover had caused motion before it itself or anything else.

(5) One might object, saying: The possibility you appropriate for God's power is like His creating a creation before every creation and a motion before every motion, like someone who wants to appropriate a certain possibility [for God], in that—if God does create a creation before creating—it would be possible for Him, in just the way that you made motion have no beginning. Now, this requires that you maintain that there have been an infinite number of motions in the past. In that case, the motions up to the Flood would be less, while those up to our time would be greater; but, undoubtedly, being less than infinite is to be finite, and so what is infinite would be finite. Again, the existence of the last motion would depend upon the existence of an infinite number of motions, whereas that whose existence depends upon an infinite does not exist. Moreover, you would have made an actually infinite number of motions exist, since each one of the motions would have inevitably existed actually. Finally, when every motion comes to be in time, the motions as a whole and their set come to be in time.

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8. **Y** seems to have inadvertently omitted the lines here corresponding with the translation "there not be some mover who has caused the motion. [That] is because, when we say that it is impossible that there be some motion that comes to be in time unless there was some motion before that time, it is as if we are saying that it is impossible that there is.…" The Arabic appears in **Z** and **T** and reads: *muḥrrik ḥarraka fa-innā idhā qulnā lā yumkinu an takūna ḥaraka taḥduthu fī al-zamān illā wa-qad kāna*.

حركة، لا يمنع أنْ يكون ذلك الوجوب عن مبدأ، ولا قولنا إنّه يجب أنْ تكون الحركة دائمة الفيضان عن محرّك - لو قلناه - توجب أنْ تجعل الحركة واجبة الوجود لذاتها. بل إذا قلنا لا يمكن أنْ لا تكون حركة، نكون كأنا نقول لا يمكن أنْ لا يكون محرّك حرّك. فإنا إذا قلنا: لا يمكن أن تكون حركة تحدث في الزمان إلا وقد كان في القبْل لذلك الزمان حركة، نكون كأنا قلنا لا يمكن أنْ يكون محرّك حرّك في الزمان إلاّ ويكون قد حرّك محرّك قبله هو أو غيره.

(٥) فإنْ قال قائلٌ تجويزكم في قدرة اللّه أنْ يكون كأن يخلق قبل كل خلْقٍ خلْقاً وقبل كل حركةٍ حركةَ، كمَنْ شاء تجويز بأنْ يكون اللّه جائزاً عليه - إنْ كان يخلق خلقاً قبل خلق - على وجهٍ جعلتم الحركة لا بداية لها؛ وهذا يوجب أنْ تقولوا بوجود حركاتٍ بلا نهاية في الماضي، فتكون الحركات التي إلى الطوفان أقل، والتي إلى زماننا أكثر، ولا شك في كون الأقل ممّا لا نهاية له متناهياً؛ فيكون ما ليس له نهاية متناهياً. وأيضاً فإنَّ الحركة الأخيرة يكون وجودها موقوفاً على وجود حركات بلا نهاية، وما توقّف وجوده على ما لا يتناهى لا يوجد. وأيضاً فإنكم تكونون قد أوجدتم بالفعل ما لا نهاية له في الحركات، إذ كل حركة منها فقد وجد بالفعل لا محالة، وأيضاً فإنّه إذا كانت كل حركة حادثة، فكل الحركات وجملتها حادث.

(6) The first skeptical doubt is [again] that, when we posit the [infinite number of] motions, God (powerful and glorious is He) would have already created [an infinite number of motions] now. The response to it is that, when [those motions] are considered now, they have absolutely no existence and, instead, are nonexistent. So, when they are said to be infinite, it is not as some actually existing infinite quantity, but, rather, as whatever number our estimative faculty imagines to belong to the motions, we find a number that was before it. Since [the motions] are nonexistent, then, necessarily, either it can be said of nonexistent things that they are *more* and *less* and *finite* and *infinite,* or it cannot. On the one hand, if it is not possible, then the objection disappears. If, on the other hand, it is possible, then, necessarily, there can be an infinite number of nonexisting things at the same time, with some of them being less than others—just like nonexistent future things, such as eclipses of the Moon, for they will be less than the periodic rotations of the Moon. Also, the orbital periods of a number of celestial spheres will be less than the orbital periods of one certain celestial sphere,[9] and those [motions counting forward] from the time of the Flood will be more than those [counting forward] from our time. Yet they will be infinite. (There is a group[10] that believes that nonexisting things are entities occurring distinct from one another and [that] one class of them, such as black and white, is numerically infinite.) Now, if its being such is not said about each one of these nonexisting things that are in the future (since they are nonexistent), then do not say it about each one of the nonexisting things that are in the past. If *each one* is predicated of what is future while not being required of the whole set, then, in the same way, let it be said about the past while not being required of some set.

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9. For instance, Mercury, Venus and the Sun make their apparent rotations around the Earth in one year, Mars in two years, Jupiter in twelve, while it takes Saturn nearly twenty-nine and one-half years to complete an orbit.

10. Robert Wisnovksy suggests that such a view was prominent among the Muʿtazilites; see *Avicenna's Metaphysics in Context* (Ithaca, NY: Cornell University Press, 2003), 148.

(٦) فالجواب عن التشكّك الأول أنَّ تلك الحركات إذا فرضناها قد خلقها اللّه عزَّ وجلَّ، فإنّها إذا اعتبرت من الآن كان لا وجود لها البتة، بل معدومة. فإذا قيل لها إنّها غير متناهية، فليس على أنَّ لها كمّاً حاصلاً غير متناهٍ، بل على أنّا أي عددٍ للحركات توهمناه وجدنا قبله عدّة كانت. وإذ هي معدومة فلا يخلو إمّا أنْ يجوز أنْ يقال في المعدومات إنّها أكثر وأقل، ومتناهية وغير متناهية أو لا يجوز. فإنْ لم يجز فقد زال الاعتراض، وإنْ جوّز فسيجوز ضرورة أنَّ المعدومات بلا نهاية معاً؛ وأنَّ بعضها أقل من بعض، كالمعدومات في المستقبل التي هي كسوفات القمر، فإنّها أقل من دورات القمر عودة، وعودات عدّة أفلاك منها أقل من عودات فلكٍ واحدٍ، والتي من زمان الطوفان أكثر من التي من زماننا، ومع ذلك فهي غير متناهية. وها هنا قومٌ يرون المعدومات ذواتاً حاصلة متميزة بعضها عن بعض، والصنف الواحد منها كالسواد والبياض غير متناهي العدد. وإنْ لم يقل في هذه المعدومات التي في المستقبل إنَّ كل واحدٍ منها كذا بسبب أنّها معدومة، فلا يقال في المعدومات التي في الماضي أن كل واحدٍ منها كذا، وإنْ قيل للمستقبل كل واحدٍ، ولم يوجب كل جملة، فكذلك ليقل في الماضي ولا يوجب جملة. وبالحري أنْ لا يقال جملة

Also, it is not appropriate to speak of a future or past set. [That] is because the set simply has no existence—[at least] not while it is past and future; neither is it more or less, finite or infinite, where [*infinite*] is not in the sense of *negation* but in the sense of *quantity*, so as not to have any endpoint. (Certainly, the past and future set is infinite [that is, indeterminate] in the sense of absolute negation, like the negation of what has no existence where it is like the negation of existence.) It is simply unforgivable of the apologist who says that the past entered into reality and, thus, it is impossible that it be infinite, while the future is not [similarly constrained]. In fact, we do not concede to him that the past is realized, but, rather, that each one of the past [events] has been realized, where the status of each one is not that of the whole of the past. Similarly, we might concede that each one of the future [events] can be realized, while the status of each one is not that of the whole of the future, such that the whole of the future is realized, possessing the whole of itself absolutely. The fact is that all the finite number of things that have been or will be realized are such that the second follows upon the first's ceasing to exist. Their set does not exist because what is understood by *set* is the collection. These are, however, simply not collected together in reality, even if each one of them exists individually at some moment during which the other does not exist. Certainly, they have been collected together in an intellectual depiction of them as existing, but the collection with respect to predication and intellectual depiction is different from the collection in existence. For there is the collection of *all humans* in that they are animal, which is decidedly not [the same as] some set of them [existing in reality].

مستقبلة ولا جملة ماضية، فإنَّ الجملة لا وجود لها البتة؛ لا فيما مضى ولا فيما يستقبل، ولا هي أكثر ولا هي أقل، ولا هي متناهية ولا غير متناهية ليس التي بمعنى السلب، بل بمعنى كمّ، فليس له نهاية. نعم، الجملة الماضية والمستقبلة غير متناهية بمعنى السلب المطلق؛ كما يسلب عمّا لا وجود له وكما يسلب الوجود. ولا عذر يقبل لمعتذرٍ يقول إنَّ الماضي دخل في الوجود؛ فلذلك يستحيل أنْ لا يتناهى، والمستقبل لم يدخل، فإنّه لا نُسلّم له أنَّ الماضي دخل في الوجود، بل كل واحدٍ من الماضي قد دخل في الوجود، وليس الحكم على كل واحدٍ حكماً على كلّية الماضي. كما أنّه قد نسلّم فيه أنَّ كل واحدٍ من المستقبل يجوز أنْ يدخل في الوجو وليس الحكم على كل واحدٍ حكماً على كلّيةٍ تكون للمستقبل حتى تكون كلّية المستقبل تدخل في الوجود، وتكون له كلّيته البتة، بل والمتناهيات التي دخل في الوجود كل واحدٍ منها أو تدخل، على أنَّ الثاني يعقب عدم الأول، لا توجد لها جملة لأنَّ الجملة يفهم منها الاجتماع؛ وهذه لم تجتمع في الوجود البتة، وإنْ كان كل واحدٍ موجوداً بانفراده وقتاً لا وجود للآخر فيه. نعم؛ قد اجتمعت في وصف العقل لها بأنّها كانت موجودة، والاجتماع في الحمْل وفي وصف العقل غير الاجتماع في الوجود؛ مثل اجتماع كل إنسانٍ في أنّه حيوان، ولا جملة لهم البتة.

(7) As for the second objection [namely, that any present motion would depend upon the existence of an infinite number of motions, which is purportedly impossible], the notion of *being dependent* used in it must be taken in either one of two ways. One may mean by it that, at some moment, there are two nonexisting things, and the condition for the future existence of one of them is that the second non-existing thing exist before [the other one], such that [the other's] existence depends upon it. In that case, if something in the past is nonexistent, and a condition for its existing is that an infinite number of ordered things exist, all of which are nonexistent, and then [all of them] begin to exist at some stipulated moment, then the existence of something that depends upon an infinite number of nonexisting things would be impossible. Alternatively, one may mean by [*being dependent* that] it does not come to exist unless certain things before have already come to exist, one before another *ad infinitum,* without there being some moment at which all of them are nonexistent. If they intend this, it is the very thing [we] sought to show, and so it cannot be a premise of a syllogism refuting itself.

(8) In the next objection, they show their ignorance of the precise difference between *each one* and *whole,* for, when each one of the things has a certain description, the whole need not have that description, nor must it have it as some determinate whole. Were that the case, the *whole* would be a part, since *each one* is a part. They do not see that each one of the future things is something that exists possibly, whereas the whole does not. It is just not true what they said—namely, that when each one passes into actual existence as something determinate, the whole does so as well—and so [they erroneously conclude that the things] do not go

(٧) وأمّـا الاعتراض الثاني فلا يخلو إمّا أنْ يعنـي بالتوقّف المذكور فيه، أنْ يكون أمران معدومان في وقتٍ، وشـرط وجود أحدهما في المسـتقبل أنْ يوجد المعدوم الثاني قبله؛ حتى يكون موقوف الوجود عليه. فإنْ كان الأمر على هذا، وكان أمراً في الماضي معدوماً، ومن شرط وجوده أنْ يوجد أمور بغير نهايةٍ في ترتيبها وكلها معدومة، فيبتديء في الوجود من وقت ما يشـترط، استحال أنْ يوجد أمرٌ موقوف الوجود على أمور غير متناهيـة لا موجود فيها. وإمّا أنْ يعني به أنّه ليس يوجد إلاّ وقد وجد قبله أمور، واحد قبـل آخـر، لا نهاية لها، من غير أنْ يكون وقتٌ كلها فيـه معدومة. فإنْ أرادوا هذا فهذا نفس المطلوب، فلا يجوز أن يكون مقدمه قياسٌ على إبطاله.

(٨) وأمّـا بعد هذا الاعتراض، فإنّما جهلوا فيه الفرق بين كل واحدٍ وبين الكل؛ فإنّه ليس إذا كان كل واحدٍ من الأشـياء بصفةٍ يجب أنْ يكون الكل بتلك الصفة، بل لا يجب أنْ يكـون له كل حاصل، ولو كان كذلك لكان الكل جزءاً، إذ كل واحد جزء. ولا يرون أنَّ الأمـور التي في المسـتقبل كل واحدٍ منها جائز الوجـود، والكلّ غير جائز الوجود، فليـس حقاً ما قالوه إنّه إذا خرج كل واحدٍ إلى الوجود بالفعل حاصلاً؛ فالكل قد خرج،

on infinitely. The fact is that the situation is as we stated it—namely, that if ten finite things were to come into existence one after another such that one [comes to exist only] after the other passes away, then, undoubtedly, each one of these ten would actually have existed at some moment, whereas the whole would never have existed as something actual, for something like this whole as a whole simply has no existence.

(9) Those who deny that that the Creator himself has infinite power are frequently forced into what I'll relate. They allow that, before the first motion, it was possible for the Creator to have made a number of finite motions—for instance, ten—each one of which has a certain state of occurring for some duration and not occurring for some other duration, one happening after another without interruption. So, on their view, simultaneous with the possibility to make the first of [those possible motions] exist, as well as the motions right up to the presently existing ones, there is either the possibility that twenty motions exist, one after another, in the aforementioned way, such that each one occurs and does not occur for some duration, like we posited for the earlier ten—or, on their view, that is not possible. On the one hand, if they allow that it is possible, it would not be impossible that these ten [motions] exist in certain bodies and those twenty in other bodies, such that during the duration of those ten [motions], these twenty would exist, but the state of each one with respect to occurring and not occurring for some duration is like that of the other; this is absurd. If, on the other hand, they do not allow that it is possible, it follows that, during the state of not existing, the possibility of the motions' occurring and being brought into existence

فليس في غير التناهي، بل الأمر على ما قلناه: إنّه لو كانت عشرة متناهية تتوالى في الوجود واحداً بعد بطلان الآخر، فلا شكّ أنَّ هذه العشرة يكون كل واحد منها موجوداً بالفعل وقتاً مّا، والكل غير موجودٍ بالفعل البتة، فإنّه لا يكون لمثل هذا الكُّل، من حيث هو كلّ، وجودٌ البتة.

(٩) وقد يلزم – هؤلاء الذين يمنعون أنْ يكون لذات الخالق هذا الاقتدار غير المتناهي – ما أقوله وهو أنّهم يجوّزون لا محالة أنْ يكون قبل الحركة الأُولى عدّة حركات متناهية يوجدها الموجد، لكل واحدٍ منها حالٌ من البقاء وغير البقاء محصّلٌ تتوالى عليه من غير انقطاع، وعددها عشرة مثلاً فلا يخلو إمّا أنْ يكون عندهم جائزاً، مع جواز إيجاد أولها إلى إيجاد الحركة الموجودة الآن، أنْ توجد عشرون حركة على التوالي المذكور، على أنَّ بقاء كل واحدٍ منها أو لا بقاءَه على نحو ما فرضناه لهذه العشرة؛ أو لا يكون ذلك جائزاً عندهم. فإنْ جوَّزوا لم يمتنع أنْ توجد تلك العشرة في أجسامٍ وهذه العشرون في أجسام أخرى، فيكون في مدّة تلك العشرة وجدت هذه العشرون، وحال كل واحدٍ في البقاء وغير البقاء كحال الآخر؛ وهذا محال. وإنْ لم يجوّزوا لزم أنْ يكون في حال العدم عددٌ لجواز وقوع الحركات وإيجادها مرتّبٌ، ويلزم لا محالة أنْ يكون ذلك ممّا لا يتناهى،

has a certain ordered numbering. Now, it inevitably follows that that [numbered ordering] is infinite, since there is no state that is the first one of possibility. In that case, there will be certain existing things, according to their system of thought, that are infinite in the past; but they forbid this. Other situations will also be forced [on them], one of which is what we pressed in the section on time—namely, that changes are successive, [for,] otherwise, one existence would not follow on another.[11] Also, [changes] have an existing subject, since there is no change unless it is in a subject; but, on their view, the subject would be the True One, since there is nothing else, but this is heresy! Keep yourself pure and renounce what the heretics say.

11. See 2.12.1.

إذ لا حـــالٌ هو حال أول جواز ؛ فتكون موجودات بالفعـــل على طريقتهم ، ليس لها نهاية في الماضي ، وقد منعوا هذا . وتلزم أُمور أخرى ممّا ألزمناه في باب الزمان أنْ تكون هناك تغيّـــرات متتالية ، وإلاّ لما كان وجود بعد وجود ، وأنْ يكـــون الموضوع لها موجوداً إذ لا تغيّر إلاّ بموضوع ، وأنْ يكون الموضوع ذات الأحد الحق عندهم ، إذ لا شيء غيره ، وهذا إلحادٌ ، تقدّس وتنزه عمّا يقول الملحدون .

Chapter Twelve

Following up on the claim that there is a point of smallness at which natural bodies are divested of their forms and that, in fact, each one of them has a certain limiting point less than which its form is not preserved;[1] *likewise, following up on the claim that no motion is the least, slowest, or shortest*[2]

(1) It is proper to add to these chapters an investigation into the continuous preservation of the forms belonging to bodies and whether they retain them while being divided infinitely. In other words, just as bodies are infinitely divisible with respect to smallness and yet preserve the form of corporeality, do they likewise preserve the rest of the forms that they have—as, for example, [the substantial forms of] being water, air, and the like?

(2) Forms that belong to [bodies] on account of mixture seem to be of a kind that decomposition reduces them to their simplest constituents, whose forms ceased to exist once the mixture was produced. Although the estimative faculty frequently imagines another sort [of decomposition], which, necessarily, is not accompanied by a reduction to the simplest constituents—and that is because the divisions have already reached the simplest constituents—[such an imagined decomposition] is not, in fact, a decomposition of [those bodies]. Still, for the sake of discussion it is fitting that we grant the division of the simple forms.

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1. For the earlier reference to this topic, see 3.6.4.
2. For the earlier reference to this topic, see 3.6.6.

<الفصل الثاني عشر>

في تعقّب ما يقال إنَّ الأجسام الطبيعية تُخْلَع عند التصغّر المفرط صورها ، بل لكلٍ منها حدٌّ لا تُحفظ صورته في أقل منه . وكذلك تعقّب ما قيل إنَّ من الحركات ما لا أخف وأبطأ وأقصر منه

(١) وممّا يليق إلحاقه بهذه الفصول النظر في حفظ الأجسام للصور خلال الاتصال ، وأنّها هل تبقى لها مع انقسامها إلى غير النهاية ، أي هل كما أنَّ الأجسام لا تتناهى في الصغر انقساماً ، وتحفظ صورة الجسمية ؛ أكذلك تحفظ سائر الصور التي لها مثل المائية والهوائية ، وغير ذلك؟

(٢) أمّا الصور التي لها بحسب المزاج ، فيشبه أنْ يكون ضَرْبٌ من التحليل يردها إلى بسائطها العادمة للصور المستفادة بالمزاج ، وإنْ كان قد يُتوهم ضَرْبٌ آخر لا يجب معه الرجوع إلى البسائط ، وذلك بأنْ تكون القسمة تتناول البسائط أيضاً ، لا أنْ تُحل إليها . لكن الأولى أنْ نجعل كلامنا في انقسام الصور البسيطة .

(3) We say that it appears, from the positions ascribed to the early periods [before] the Peripatetics, that these bodies terminate at parts that, when divided further, their forms cease to exist.[3] So they believed, then, that a certain amount of water is the smallest amount of water [possible], and the same for air and the rest of the [elemental] components. If that is their view about the simple constituents, then it would have been wisest if they then affirmed that about the composites that are thought to be the homoeomerous parts, such as flesh and bone. Now, a group of them had said that, if the situation is not like that, then, no matter how small any one of [the simple constituents] is, there can always be one smaller. Now, if that is possible for water, air, fire, and earth, as well as flesh, bone, and the like, then we should be able to take parts of the simplest components at whatever limit [of smallness we want]. In that case, what occurs from mixing [these indefinitely small simple components] would be like things that are generated from water, air, fire, and earth, and what [occurs] through the composition [of these minute mixtures] would be like animals, which are generated from flesh and bone; and so plants and animals of any given size could be generated. Thus, it would be possible for an elephant actually to be the size of a gnat. They can also say that it does not necessarily follow from the opposite of this that the gnat will be the size of an elephant, since the mixture requires that the parts be small, not large. So, when the parts are large and, while they are large, are brought into contact, then the action resulting from their mixture will not be what small [parts] would have produced. On account of this, whenever there are electuaries that are

3. The following discussion represents what might be called Avicenna's contribution to the theory of the *minima naturalia*. While the theory was certainly inspired by comments in Aristotle's *Physics* (see, for example, 1.4, which also seems to be the source for Avicenna's knowledge of the pre-Socratics on this topic), it was thought that advancements in the theory had to await Latin scholasticism. Recently, however, Ruth Glasner has shown that Ibn Rushd had made significant advances in the theory; see Ruth Glasner, "Ibn Rushd's Theory of *Minima Naturalia*," *Arabic Sciences and Philosophy* 11 (2001): 9–26. It would seem that Avicenna's contribution to this theory is still to be written.

(٣) فنقول: إنَّ الظاهر من المذاهب المنسوبة إلى صدور المشائين أنَّ هذه الأجسام تنتهي إلى أجزاء، إذا جُزئت بعد ذلك لم تكن الصورة فيها بموجودةٍ حتى يكون عندهم أنَّ للماء شيئاً هو أصغر صغيرٍ للماء، وكذلك للهواء ولسائر العناصر. وإذا كان قولهم في البسائط كذلك، فقولهم في المركّبات التي تُرى متشابهة الأجزاء كاللحم والعظم بذلك أحكم. وقد قالت جماعة منهم إنّه إنْ لم يكن الأمر كذلك؛ فجائزٌ أنْ يكون من كل صغيرٍ منها ما هو أصغر دائماً، وإذا كان يجوز ذلك في الماء والهواء والنار والأرض، واللحم والعظم وغير ذلك، فسيجوز أنْ نأخذ أجزاء البسائط بأي حدّ كان؛ فيكون منها ما يكون بالمزاج كالأشياء التي تتكون عن الماء والهواء والنار والأرض، وما يكون بالتركيب كالحيوانات التي تتكون عن تركيب اللحم والعظم، فجائز أنْ تكون المتكونات الحيوانية والنباتية على أي قدرٍ شئنا؛ فيكون من الممكن أنْ يحصل فيل في قدر البعوضة. ولهم أنْ يقولوا: ولا يلزم من مقابل هذا أنْ تكون بعوضة في قدر الفيل، إذ الامتزاج يقتضي صغر الأجزاء لا كبرها، فإن الأجزاء إذا كبرت وتلاقت وهي كبيرة، لم تفعل من الامتزاج ما يفعله الصغر، ولهذا ما كانت المعاجين التي تمزج قد يُعين على تكوينها حدّ من الدِّق،

mixed, and the larger parts in them prevent the infusion of the powers of some of them into others, a certain degree of mashing aids in bringing about [the electuaries]. They can say (or, perhaps, one of them even did say) that, if this possibility concerning the generation of animals from their elements were a real one, not only would it be an absolute possibility, but also it would be a possibility that, for the most part, refers to what exists. That is because the mixture of the lesser part precedes the mixture of the greater part, for the greater part takes in the lesser part. The same holds for the account concerning composition: It is more fitting that what is before should exist than what is after, and so it is more fitting that mixtures from the smallest parts should exist. In that case, elephants the size of cats (to say nothing of the size of gnats!) would not have been so rare as to verge on the impossible, albeit we would only equivocally call what is the size of a gnat an *elephant* (for the actions of elephants do not arise from this size). So this is what they say and why they say it. As for judging this claim, we will have to take on this role.

(4) This account necessarily follows in opposition to Anaxagoras and his account of mixture and belief that an aggregation of bodies that are homoeomerous parts and their being separated out in some way requires one sort of mixing to underlie another through which one thing will underlie another. He cannot escape it, for he associates the whole of generation with mixing and separating out. This, however does not necessarily follow on the basis of the principles of the Peripatetics. That is because, on their principles, it is not true that the mixture of the lesser part precedes the mixture of the greater part. That is because,

وكان أكبر الأجزاء فيها يمنع أنْ تنفذ قوى بعضها في بعض. ولهم أنْ يقولوا، أو عسى قائل منهم قال: إنَّ هذا الإمكان لو كان صحيحاً في تكوّن الحيوانات عن أُسْطُقساتها، لم يكن إمكاناً مطلقاً، بل كان يجب أنْ يكون إمكاناً أكثرياً بالقياس إلى الموجود. وذلك لأنَّ امتزاج الأقل قبل امتزاج الأكثر، فإنَّ الأكثر يحصل على الأقل. وكذلك القول في التركيب ووجود ما هو قَبْل أولى من وجود ما هو بَعْد، فتكون الامتزاجات عن أصغر الأجزاء أولى بالوجود. فكان يجب أن يكون وجود فيلة على قدر السنانير، فضلاً عن قدر البعوض، أمراً لا يندر ندوراً يلحق بالممتنع، وعلى أنّا كيف نسمي ما يكون على قدر البعوض فيلاً إلاّ باشتراك الإسم؛ فإنَّ الأفعال الفيلية لا تصدر عن هذا القدر، فهذا ما يقولونه ووجه ما يقولونه. وأمّا الحكم على هذا القول فيجب أنْ يكون منّا على هذه الصفة.

(٤) أمّا في مناقضة انكساغوراس وقوله بالخليط ورأيه أنّه مؤلفٌ من الأجرام المتشابهة الأجزاء، وأنَّ تميّزها على نحو ما يقتضي ضرباً من الاختلاط دون ضرب؛ يكون به شيء دون شيء، فهذا القول لازم لا محيص لانكساغوراس عنه، فإنّه ينسب التكوّن كله إلى الاختلاط والتميّز. وأمّا على الأصول التي للمشائين فإنَّ هذا غير لازم، وذلك لأنّه لا يحق على أُصولهم أنَّ امتزاج الأقل قبل امتزاج الأكثر، وذلك لأنَّ الأقل إنْ عنى به الأقل

if by *the lesser part* one means *numerically less,* then it does turn out true but is of no use to them, since their discussion concerns *what is less in magnitude.* Now, it is not necessarily the case, when the mixture of what is numerically less precedes the mixture of what is numerically greater, that the mixture of what is less in magnitude precedes the mixture of what is greater in magnitude. [That] is because the lesser magnitude exists in the greater magnitude in absolute potentiality, whereas the lesser number exists in the greater number in actuality. When what is less in magnitude ceases after being actual, no mixture is required of it at all. The fact is that, with respect to magnitude, it would be more fitting for the mixture of what is greater to precede the mixture of what is less, since the greater is what is bounded in the magnitude actually, whereas the lesser part is neither bounded nor actual, for every lesser magnitude is such [only] potentially.

(5) Moreover, it is not necessary, on the Peripatetics' principles, that the mixture resulting from the smaller part (should it result) be enough to bring about the species form, in which case size could well be a condition along with the mixture. That is because it is only on account of [for example] the soul—which, by actually being joined to a given body, produces a given species—that the body is perfectly prepared thereafter, being rendered such that [the soul] uses it as a tool for its [own] actions and motions. An example, then, is the fact that a human will be incapable of doing those things characteristic of a human unless his body is such as to perform human actions adequately. Not the least of [these human actions] are that he have the power and tool [that is, body] by means of which he can seek out and make a home (assuming there is no impediment), and by which he can fashion clothes, and [do] everything else a

فـــي العـــدد صحّ ولم ينفعهم؛ لأنَّ كلامهم في الأقل في المقدار، وليس يجب إذا كان الأقل فـــي العدد ‹امتزاجه› قبل امتزاج الأكثر في العدد أنْ يكون الأقل في المقدار امتزاجه قبل امتزاج الأكثر في المقدار، فإنَّ وجود الأقل مقداراً في الأكثر مقداراً وجودٌ بالقوة المطلقة، ووجود الأقل عدداً في الأكثر عدداً وجودٌ بالفعل. وإذا كان الأقل في المقدار معدوماً بعد بالفعـــل لم يجب له امتزاجٌ بتّةً، بل الأولى فـــي المقدار أنْ يكون الأكثر في المقدار امتزاجه قبـــل امتزاج الأقل، إذ الأكثر محصورٌ في المقـــدار محصّلٌ، وأمّا الأقل فغير محصورٍ ولا محصّل، فإنَّ كل أقل من المقدار أقل بالقوة.

(٥) وأيضـــاً ليس واجباً على أُصول المشـــائين أن يكون المزاج الحاصل على أجزاء صغار – إنْ حصل – كافياً في حصول الصورة النوعية، فعســـى أنْ يكون العِظم شرطاً مع المزاج. وذلك لأنَّ النفس الفاعلة بحصولها مقارنة لجســـم ما نوعاً إنّما يستعد لها الجسم تمام الاســـتعداد، بعد أنْ يكون بحيث يصلح اســـتعمالها إياه آلة لأفاعيلها وحركاتها مثلاً. فإنَّ الإنســـان لن يتخلّق إنساناً إلاّ أنْ يكون بدنه بحيث يفي بالأفعال الإنسانية، ولا أقل من أنْ تكون له قوة وآلة يتمكن بها – إنْ لم يكن عائق – من اتخاذ الكِنّ وإحداثه، ويتمكن بها من إعداد الملبوس وسائر ما لا بُدّ للإنسان من وجوده له، وأنْ لا يكون بحيث تسفيه

human must do to exist—as well as not being such that strong winds blow him about as so much dust and that the predominating lower qualities in him [namely, hot, cold, wet, and dry] do not change him. So it would seem that the human soul exists as a form only on account of a body whose like characteristically performs human motions (assuming that nothing impedes it). Consequently, the occurrence of the mixture itself is insufficient to bring about the human species; nonetheless, it is on account of the occurrence of the mixture so prepared for a certain species that [the species] occurs, and is engendered in the equivalent of a certain place and source of origin, and is engendered from the equivalent of a certain matter, as well as there being a certain psychological faculty that acts through a tool having the power to produce motion and rest. Now, were this matter, together with the preparedness that the mixture gives it, a negligible trifle, it would be affected all at once by the present quality, and it would not preserve the form that the mixture gives it until natural motions have brought it to its perfecting form, and, instead, the psychological power to which the mixture gave rise would not be dependent upon something like this matter. Clearly, this proof is useful in refuting Anaxagoras only.

(6) As for ourselves, we say that, on close investigation, the body is seen to be divisible in two respects (both of which you have already learned),[4] one of which is by way of discontinuity and fragmentation, whereas the second is not by way of discontinuity. The divisibility of that which is not by way of discontinuity, fragmentation, and the disconnection of the parts is, rather, due to some accident specific to part

4. See 3.9.3.

السوافي وتحيله أدنى الكيفيات التي تغلب عليه. فيشبه أنْ تكون النفس الإنسانية لا تحصل صورة إلاّ لبدنٍ من شأن مثله – إنْ لم يعقه عائق – أنْ ينهض بالحركات الإنسانية. وإذا كان كذلك، فالمزاج نفسه غير كافٍ حصوله في أنْ يحصل النوع الإنساني، على أنَّ لحصول المزاج المستعد لنوع ما مكاناً ومعدناً، في مثله يحصل ويتولد، ومادة عن مثلها يتولد، وقوة نفسانية تفعل بآلةٍ قوية على التحريك والتسكين. ولو كانت هذه المادة، مع استعدادها المزاجي؛ نزرة يسيرة لانفعلت عن الكيفية الحاضرة دفعة، ولم تحفظ صورها المزاجية ريثما تبلغها الحركات الطبيعية إلى صورتها الكمالية، بل مثل هذه المادة لا تتعلق بها قوة نفسانية مازجة. مبيّنٌ أنَّ هذا القياس إنما ينتفع به في الردّ على انكساغوراس لا غير.

(٦) وأمّا نحن فنقول إنَّ الجسم يمعن في الانقسام على وجهين: أحدهما على سبيل الإنفصال والانفكاك، والثاني لا على سبيل الإنفصال، وقد علمت كلا الوجهين. فالذي يكون انقسامه لا على سبيل الإنفصال والإنفكاك وتباين الأجزاء، بل لعرضٍ يختص ببعضه

of [the body] or some relation specific to it—as, for instance, being contiguous, parallel with, or the like. From that [sort of divisibility], it is not necessary that [when] the simple body is divided, it should reach some limiting point at which it loses its form. That is because the form is spread throughout the whole of [the body] with which it corresponds. If some parts of the body were not to have their fair share of its form on account of their smallness, there would be an interval[5] of parts alike in [that] status such that either the body would cease or parts smaller than they (and less likely to bear that form) would remain, in which case this body would be an ordered series of parts, none of which have this form. This form occurs only through the collection of [these parts], where the collection *qua* collection provides nothing but number and its properties, while *qua* a collection of bodies it provides nothing beyond what the collection provides absolutely, save magnitude and its concomitants of shape and position. Now, none of that is fiery or earthy, so that [being fiery and earthy] does not exist in the parts taken separately, but in the whole, owing to the collection.

(7) [A part below a certain threshold of size] will equally not be like the mixture, for that results[6] from the various kinds of natures. Moreover, the mixture also spreads throughout when it becomes settled in that in which it becomes settled, and what is judged of it will be the same as for the simple form. This is something whose explanation does not require much effort. When something has this description, then it is obviously clear that every part of water is according to the [form] of water and that being divided in this way does not make the small part different from the whole.

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5. Reading *buʿd* with one of the MSS consulted by **Y**, as well as with **Z** and **T** for **Y**'s *yuʿidd* (it predisposes).

6. Reading *ʿan* with three of the MSS consulted by **Y**, as well as with **Z** and **T**, for **Y**'s preferred *ghayr* (different from)

أو إضافــة ما تختص به. مثل مماسّــة أو موازاة أو غير ذلــك، فليس يجب من ذلك أنْ يكون الجسم البسيط يبلغ به الإنقسام إلى حدّ يكون في ذلك الحدّ فاقداً للصورة، لأن تلك الصورة فاشية في جميعه مطابقة له. ولو كان من أجزاء الجسم ما لا قسط له من صورته لصغره؛ لكان بعد أمثال له في حُكْمه، يفنى الجسم أو يبقى أصغر منه وأبعد من احتمال تلك الصورة، وكان حينئذ هذا الجســم منتظماً من أجزاء ليس ولا واحد منها على هذه الصورة. وإنّما تحصل هذه الصورة باجتماعها. والاجتماع بما هو اجتماع لا يفيد إلاّ العدد وخواصّه، وبما هو اجتماع أجسام لا يفيد زيادة على ما يفيده الاجتماع مطلقاً، إلاّ المقدار ولواحقه من الشــكل والوضْع، وليس شــيءٌ من ذلك ناريــاً ولا أرضياً حتى يكون غير موجودٍ في الأفراد، وموجوداً في الجملة للاجتماع.

(٧) ولا هــو أيضاً كالمــزاج؛ فإنَّ ذلك عن مختلفات الطبائع، ومع ذلك فالمزاج أيضاً فاشٍ عندما يســتقر فيما فيه يستقر، وحكمه حكم الصورة البسيطة، وهذا ممّا لا يحتاج في إيضاحه إلى كثير سعي. وإذا كان الأمر على هذه الصفة؛ فواضحٌ بيّنٌ أنَّ كل جزء من الماء ففي مائية، وأنَّ الانقسام، على الوجه، لا يجعل الجزء الصغير مخالفاً للكل.

(8) As for being divided in the other way—that is, by way of discontinuity and being disconnected—it would seem that to exceed a certain degree of smallness is a cause of the body's no longer preserving its form, for, whenever bodies become smaller, they are increasingly disposed to being more quickly acted upon by other [bodies]. (This is something that will be explained to you.)[7] So, apparently, when the body exceeds its degree of smallness and separates off from its collective kind,[8] it would be impossible for it to retain its form; but, rather, it will alter into the bodies surrounding it and become continuous with them. As such, it will not maintain its form until it is mixed. So, if the situation is like this, then what is said must not be true—namely, that the smallest body preserving the form of earth is larger than the smallest body preserving the form of fire.[9] That is because the smallest [amount] that can exist as air inevitably is susceptible to the sort of generation and corruption to which the nature of fire is susceptible (and perhaps it is even better suited to that). Consequently, it will be of a character that it undergoes alteration into earth; but when it is of the character that it alters into earth, the earth into which it alters will be of a smaller volume than the volume of the altered fire, since, when fire undergoes alteration into earth, it becomes smaller. This is one of the principles of the Peripatetics and it is true.

(9) That is unless it is said that that small amount of fire is not of a character to be altered into some independently existing bit of earth but, instead, is continuous in that it becomes, in that case, a part of earth that is not numerically discontinuous from it such that it would actually exist apart from it. Instead, it would be like a drop of water that is continuous with a sea of water such that its actual existence as

7. This issue is briefly treated throughout 4.12, but especially par. 2.

8. Avicenna's use of *kullīyah,* translated here as "collective kind," is his preferred locution when he speaks about the so-called spheres associated with the elements earth, water, air, and fire; see, for instance, 4.10.2 and following.

9. While Aristotle mentions the transformation of elements into one another in book 4 of *De caelo* and book 2 of *De generatione et corruptione,* as well as throughout the *Meteorology,* I have not been able to find mention of this exact ratio.

(٨) وأمّا الانقسام على النحو الآخر، وهو على سبيل الانفصال والتباين، فيشبه أنْ يكون الإفراط في الصغر يصير سبباً لأنْ لا يحفظ الجسم صورته، فإنَّ الأجسام كلما صغرت ازدادت استعداداً لأنْ يفعل فيها غيرها بسرعةٍ، وهذا شيء سيتضح لك. فيشبه أنَّ الجسم إذا أفرط صغره وباين كلّيته، استحال أنْ يبقى على صورته زماناً، بل يستحيل من الأجسام المحيط به إليها ويتصل بها، فلا يكون بحيث يثبت على صورته إلى أن يمتزج. فإنْ كان الأمر على هذا؛ فيجب أنْ لا يحقّ ما يقال من أنَّ أصغر جسم حافظ للصورة الأرضية، هو أكبر من أصغر جسم هو حافظ للصورة النارية، وذلك لأنَّ أصغر ما يمكن أنْ يوجد ناراً، لا محالة هو قابلٌ من الكون والفساد ما تقبله طبيعة النار، وعسى أنْ يكون هو أولى بذلك. وإذا كان كذلك فمن شأنه أنْ يستحيل أرضاً، وإذا كان من شأنه أنْ يستحيل أرضاً، كانت الأرض التي استحال إليها أصغر حجماً من حجم النار المستحيلة، إذ النار إذا استحالت أرضاً صارت أصغر، وهذا هو أصل المشائين، وهو الحق.

(٩) اللّهم إلاّ أنْ يقال إنَّ تلك النار الصغيرة ليس من شأنها أنْ تستحيل أرضاً مفردة، بل على نحو الاتصال بأن تصير حينئذ جزء أرضٍ لا منفصلاً بالعدد عنها، موجوداً بالفعل دونها، بل كما تتصل قطرةٌ من الماء بالماء الغمْر؛ بحيث يذهب وجودها بالفعل

an independently existing drop ceases. It consists in being only an addition to the whole of the sea; but it is such that we can posit it as independently existing, while it is not like that by being discontinuous and independently existing. Should one say this, they have been swept away by the sea of their own fancy. The alteration of [the smallest body of fire] need not necessarily occur wherever it encounter earth in its entirety, for many parts of the elements undergo alteration into one another in that very same region that is proper to its whole, while being a large part of appreciable size.[10] So imagine just how much more the fast-moving small body will alter! Moreover, it is not inevitably necessary that it be continuous; rather, it might perhaps alter into that nature, while remaining something contiguous.

(10) Let us now investigate the claim that, among motions, there is one that is so small that none smaller than it can be produced, and, relative to it, there would then also be a distance than which none is smaller, as well as a time. It is obvious from what preceded that it is impossible for some motion to exist of which none is smaller inasmuch as it is a part of some continuous motion,[11] and the same holds with respect to distance and time. As for [whether] there is a discontinuous and independently existing [smallest motion, distance, and time], it would not be odd to suspect that these things do have some claim to being limited in smallness. Now, it is most fitting—and the best case can be made [for the idea]—that the status of motion is like that of magnitude in that the smallness does not go beyond the nature of the magnitude, just as, in their opinion, it did not, for instance, go beyond[12] the nature of fire. [That] is because, when we posit some smallest distance, we ourselves know that, in itself, it is such that a certain division

10. For example, large quantities of air, while in the region of air, might undergo alteration so as to become rain, or water; or, conversely, large quantities of water, while in the region of water, might be heated so as to become steam, or air.

11. The reference is probably to 3.6.6.

12. **Y** seems to have inadvertently omitted the following phrase as a result of homeoteleuton, which occurs in both **Z** and **T**: *ʿan ṭabīʿat al-miqdārīyah ka-mā yakhrujuhu ʿindahuma mithlan.* The phrase corresponds with "the nature of the magnitude, just as, in their opinion, it did not, for instance, go beyond" in the translation.

قطــرة منفردة، وإنما يكون منها زيادة فــي جملة الغمْر، وتكون هي بحيث لنا أنْ نفرضها منفردة؛ ولا تكون كذلك بالانفصال والانفراد. فإنْ قال هذا قائل فقد أجحف في التحكّم. وليــس يجب – لا محالة – أنْ تقع اســتحالته حيث يصــادف كلّية الأرض، فإنَّ كثيراً من أجزاء العناصر يســتحيل إلى غيره لا في نفس ذلك الحيِّز الذي يخص كله، وهو جزء كبير محسوس القدر، فكيف الصغير السريع الاستحالة؟ ومع ذلك فلا يجب أن يتصل لا محالة، بل قد يجوز أنْ يستحيل إلى تلك الطبيعة ويبقى مماساً.

(١٠) فلننظــر الآن فيما يقال من أنَّ فــي الحركات حركة لا يمكن إيجاد الأقل منها، فتكون فيها مســافة أيضاً لا أقل منها وزمان كذلك، وأيضاً متحرك لا أصغر منه؛ فنقول: أمّــا امتناع وجود حركــةٍ لا أقل منها، على أنّها جزء من حركــةٍ متصلةٍ، فأمرٌ ظاهرٌ مما ســلف، وكذلك في المسافة والزمان. وأمّا على ســبيل الانفصال والانفراد فغير بعيد أنْ يظنّ بهذه الأشياء أنّها تستحق التناهي في الصغر، وأمّا الأوْلى والأحق فهو أنْ يكون حكم الحركــة حكم المقدار؛ في أنَّ الصغر لا يخرجه عن طبيعة المقدارية، كما يخرجه عندهم مثلا عن طبيعته النارية. فإنّا إذا فرضنا أصغر مسافة، فنحن نعلم في نفسه بحيث يمكن

can be posited of it without the area's being fragmented; and that a certain limiting point shared by two of its parts can be posited in it; and that, when some mobile begins to move at its starting point, it inevitably reaches that shared limiting point; and [finally] that it is not impossible that something just so happens to oppose it and to bring it to rest when it reaches that limiting point, since it is of a character that it rests. In that case, that [motion] would be smaller than the smallest of motions. Now, the possibility of this is greater than that the magnitudes should become fragmented. [That] is because it is quite likely that magnitudes reach some limiting point at which the agent becomes incapable of causing fragmentation owing to [the magnitude's] smallness and the agent's [limited] power to make a division of [the magnitude] that divides [it], even if [the magnitude] in itself is divisible. Still, it is not impossible that the previously mentioned division follows upon it (assuming that there is some spatial magnitude) and [yet], at the limiting point of division, [the motion] comes against some cause that brings it to rest, and so there will not be some instant, to the exclusion of another, at which that is impossible.

(11) One point of inquiry still remains for us—namely, whether, among natural motions there is one than which none is faster, and, likewise, [whether], among them, there is one actually existing that which none is slower, even if, in the estimative faculty, one can imagine one slower than it. We say, then, that if there is among natural motions something like this, [in the case of the fastest motion] it will be the motion of the smallest thing[13] that can preserve its form,[14] [while in the case of the slowest motion] it will be a motion from among the slowest bodies undergoing rectilinear motion.

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13. Reading with three of the MSS consulted by **Y**, as well as **Z** and **T**, *ḥarakat aṣghar mā* for **Y**'s preferred *juzʾ min ḥarakat aṣghar mā* (the smallest part of a motion).

14. Given Avicenna's earlier discussion about fire, the fastest motion would, then, correspond with the motion of the smallest amount of fire capable of independent existence.

أنْ تفرض له قسمة بغير جهة التفكّك، وأنّه يفرض فيه حدٌّ مشترك لجزئيه، وأنَّ متحركاً إذا ابتدأ يتحرك من ابتدائه؛ فإنّه لا محالة يوافي ذلك الحدّ المشترك، وأنّه لا يمتنع أنْ يعرض له مانعٌ ومسكّنٌ عند موافاة ذلك الحدّ؛ إذ من شأنه السكون. فتكون تلك أصغر من أصغر الحركات، وهذا أشـــدّ إمكاناً من تفكّك المقاديـــر. فإنَّ المقادير لا يبعد أنْ تبلغ حدّاً يعجز المفكّك عن تفكيكه لصغره وقوته أنْ يصيبه الفاصل بقسمته الفاصلة – وإنْ كان في نفسه منقســـماً – لكنه لا يمتنع، إذا كان مســـافة، أنْ تلحقه القسمة المذكورة، وأنْ تلحق عند حدّ القسمة عِلّة مسكّنة، فليس آنٌ يمتنع فيه ذلك دون آنٍ.

(١١) وقـــد بقي علينا من هذا الجنس بحثٌ وهو أنّه هل كما في الحركات الطبيعية حركة لا أسرع منها، فكذلك فيها حركة لا أبطأ منها في الوجود؟ وإنْ كان يمكن أنْ يكون في التوهم أبطأ منها؛ فنقول: إنّه إنْ كان في الحركات الطبيعية مثل هذا، فهو حركة أصغر ما يمكن أنْ تحفظ صورته، من أبطأ الأجرام المستقيمة الحركة حركة.

Chapter Thirteen

On the directions of bodies

(1) Now that we have learned how things stand for natural bodies and their finite and infinite powers, [both] with respect to increase and decrease, we should discuss the directions of bodies and the directions of their motions, since directions are among the set of necessary concomitants due to quantity.

(2) We say that, when we posit a certain interval, we posit it as either being rectilinear or in some other way [such as being circular or curved]. On the one hand, if we posit it as being rectilinear and it cannot proceed infinitely, then two extremities have been posited for it as well as two directions between them, one direction toward each extremity. If, on the other hand, it is circular or curved and then some division is posited in it, the common limiting point will formally[1] have a direction toward each one of the two divisions. By *interval* I mean any extension, whether some other extension can or cannot be posited in it. That [in which another interval] cannot [be posited] is the line, while that [in which] it can is a surface or body, for the surface has a single extension with respect to its being spread out, and the body has a single extension with respect to its being a solid. Now, the line is a single extension potentially and actually, whereas the surface can exist as this one [extension] alone as well as being considered as having two extensions. For example, if it is a square,

1. Reading *ʿalá hayʾah* with **Z** and **T** for **Y**'s *ʿalá hayʾatihi* (in the shape of it).

<الفصل الثالث عشر>

في جهات الأجسام

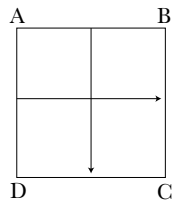
(١) وإذ عرفنا حال ما يعرض للأجسام الطبيعية وقواها من التناهي وغير التناهي، في الزيادة وفي النقصان، فحريٌ بنا أنْ نتكلم في جهات الأجسام وجهات حركاتها، إذ كانت الجهات من جملة اللواحق بسبب الكميّة،

(٢) فنقول: إنّا إذا فرضنا بُعْداً، فأمّا أن نفرضه على الاستقامة، أو على جهةٍ أخرى، فإنْ فرضناه على الاستقامة واستحال ذهابه إلى غير التناهي، اُفترضت له نهايتان، وافترض ما بينهما جهتان إلى كل نهايةٍ جهة، وإنْ كان مستديراً أو منحنياً ففُرض له قطعٌ، كان للحدّ المشترك إلى كل واحدٍ من القسمين جهة على هيئة. وأعني بالبُعْد كل امتدادٍ، سواء كان يمكن أنْ يُفرض فيه امتدادٌ آخر أو لا يمكن، أمّا الذي لا يمكن فهو الخط، وأمّا الذي يمكن فالسطح والجسم؛ فإنَّ السطح له في انبساطه امتدادٌ واحدٌ، والجسم له في ثخنه امتدادٌ واحدٌ، والخط هو امتدادٌ واحدٌ بالقوة والفعل. وأمّا السطح فإنّه يجوز أنْ يوجد هو بعينه، ويعتبر له امتدادان؛ مثلاً إنْ كان مربعاً، كان له امتدادٌ من

it will have one extension from one side to the opposite [side] and another extension from the third side to its opposite [side]. The subject is one and the same, but the relation of the starting point from which it extends to the endpoint is different from the relation of that other starting point from which it is led to that other endpoint.[2]

(3) In general, whenever an extension is posited, the attending result is that exactly two directions belong to it insofar as it is such. Now, the common view among the masses—or even the apparent one among the speculative theologians[3]—is that the line has only two directions; the surface, four; and the body, six. Their belief about the line corresponds truly with what exists, whereas [what they say] about the rest calls for a closer examination. [The number of directions] that belongs to the surface *qua* surface is [derived] from the extremities. So, in fact, if the surface is a square and its primary limits, which are lines, are considered to the exclusion of points, then the situation is as supposed. If it is not a square, however, or that [namely, its being a square] is not taken into account, then its directions are more than that. So, if it is, for instance, a hexagon, then no limiting point is more suited than another with respect to being a direction, and so the surrounded surface, inasmuch as it is such, happens to have six directions; and if it has more [limits] than that, it will have more [directions] than that. Also, even if it is a square, but its being limited at straight lines is not the only thing taken into account and, instead, all of

2. So, for example, although the square below, whether considered as ABCD or as ADCB, is the same surface, it can also be considered as extending from AB to DC, which would be one direction, as well as from AD to BC, which would be another direction.



3. The phrase *ahl al-naẓar* commonly refers to the Islamic speculative theologians, and Avicenna is almost certainly referring here to their accounts of *jihah*, the term being translated "direction" but which can also mean "space," "spatial location," or even "side"; see al-Ashᶜarī, *Maqālāt al-Islāmīn wa-ikhtilāf al-muṣallīn*, 316 were we see that mutakallimūn did ascribe six directions (*jihāt*) to the atom (*juzʾ*) as well as finding much of the same vocabulary that Avicenna himself will use to describe directions. (For a study of the early Muslim theologian's discussion of *jihah*, see Alnoor Dhanani, *The Physical Theory of Kalām*, chapters 3 and 4.)

ضلع إلى مقابله، وامتدادٌ آخر من الضلع الثالث إلى مقابله، والموضوع واحدٌ بعينه، لكنه بحسب الإضافة إلى مبدأ عنه يمتد إلى منتهى هو غيره، بحسب الإضافة إلى مبدأ غير ذلك المبدأ، يأخذ عنه إلى منتهى غير ذلك المنتهى.

(٣) وبالجملة كلّما افترض إمتدادٌ عرض عنه أنْ تصاب له – من حيث هو كذلك – جهتان لا غير. والمشهور عند الجمهور، أو عند أهل الظاهر من أهل النظر، أنَّ للخط جهتين لا غير، وللسطح أربع جهات، وللجسم ستّ جهات، أما رأيهم في الخط فصحيحٌ مطابقٌ للموجود، وفي سائر ذلك نظر. فالذي للسطح، بما هو سطح، من النهايات؛ فإنّه إنْ كان السطح مربعاً، واعتبرت نهاياته الأُولى التي هي الخطوط دون النقط، فالأمر على ما ظنّ. وإنْ لم يكن مربعاً، أو كان مربعاً ولم يعتبر ذلك، فإنَّ جهاته أكثر من ذلك، فإنَّه إنْ كان مثلاً مسدساً، فلا حدّ أولى من غيره بأنْ يكون جهة، فيعرض للسطح المحاط به، من حيث هو كذلك، أنْ تكون له ست جهات، وإنْ كان أكثر من ذلك عرض أكثر من ذلك. وإنْ كان أيضاً مربعاً، ولم يعتبر تناهيه إلى الخط المستقيم فقط، بل اعتبر له

the types of termination belonging to it are considered so as to include angles, it will have eight directions: four toward the lines, and four toward the angles. In actuality, the circle has only a single direction, whereas, in potentiality, it happens to have a potentially infinite [number of] directions. So no part of the circumference or some point in it, inasmuch at there is merely a circle, is more worthy of being assigned the direction than [any] other. Once you know this about surface, you also know it about body, as well as knowing how there are and how there are not six directions in the cube, parallelogram, and what is analogous. You also know how the directions of the four-sided pyramid are less than the directions of the cube, and how things stand in the case of the sphere.

(4) The popularity of this premise (namely, that every body has six directions) is due to two things: one is a common belief, the other is a specific consideration. The common belief explaining it is the common man's nonreflective impressions that animals, and specifically humans, are bounded by two sides (corresponding with the two hands), a back, a belly, a head, and feet. [In other words,] he has a right-hand side and a left-hand side, where the right-hand side is the direction with which he is most strongly inclined to begin a motion, whereas the left-hand side is what is opposite it. He also has an upward side and downward side, where the human's upward side is the direction closest to the head, while his downward side is the direction closest to his feet. In the case of quadrupeds, their upward side is the direction closest to their back, while their downward side is the direction closest to the belly and feet. Next, they have a front and rear: The front is the direction toward which they naturally move, as well as where the sensory faculty of vision is, while the rear is what is opposite it. Now, since, according to the [common man's]

جميع أنواع التناهي حتى إلى الزاوية، كانت له جهات ثمان؛ أربعٌ إلى الخطوط، وأربعٌ إلى الزوايا . والدائرة فلا جهة لها بالفعل إلاّ واحدة، وأمّا بالقوة فتعرض لها جهات لا نهاية لها بالقوة، فلا جزء من المحيط ولا نقطة فيه – من حيث هو دائرة فقط – هو أولى بأنْ يلي الجهة دون غيرها . وإذ عرفتَ هذا في السطح، فقد عرفت في الجسم – وعلمتَ أنَّ الجهات الست كيف تكون في المكعب والمستطيل الشبيه بالمكعب، وما يجري مجراهما، وعرفتَ كيف لا تكون. وأنّه كيف تنقص جهات المخروط الذي تحيط به أربعة سطوح مثلثات عن جهات المكعب، وكيف حال في الكرة.

(٤) وأمّا السبب في اشتهار هذه المقدمة؛ وهو أنَّ لكل جسم ست جهات فأمران: أحدهما رأي عامي، والآخر اعتبار خاصيّ، فالذي سببه رأي عامّي هو أنّه لما سبق إلى أوهام العامة أنَّ الحيوان، وخصوصاً الإنسان، يحيط به جنبان عليهما اليدان وظهر وبطن ورأس وقدم، وكان له يمين ويسار؛ أمّا اليمين فالجهة القوية منه في ابتداء الحركة، واليسار ما يقابله. وكان له فوق وأسفل، أمّا الفوق للإنسان فالجهة التي تلي رأسه، والسفل منه فالجهة التي تلي قدمه. وأمّا في سائر الحيوان ذوات الأربع فالفوق منه الجهة التي تلي الظهر، والأسفل منه الجهة التي تلي البطن والقدم، فكان له قدّام وخلف؛ فالقدّام هو الجهة التي إليها يتحرك بالطبع – وهناك حاسّة الإبصار – والخلف ما يقابله، ولم يكن عندهم

belief, he has no direction other than these, he designates from his head to his toes his *length,* from his right side to his left side his *breadth,* and from his front to his rear his *depth.* So it is as if, once these extremities were initially posited there, these intervals were then posited corresponding with them, since the reality is that the intervals are posited only by positing the limits from which and toward which [the intervals] extend. Since this is so, [the man in the street] was under the impression that the directions are six—not being aware of any other, since there are no [other] names save for these—and so he was under the impression that this number was the maximum.

(5) He was reinforced in that [belief] on the strength of a specific sort of consideration as well—namely, that within bodies there can exist only three intersecting lines at right angles, and each intersecting line is terminated at two limits. So there are six limits and, thus, six directions. Be that as it may, these intersecting lines are only three precisely when one extension is originally assumed (being supposed, it should be added, without nature [in fact] requiring it) and the intersecting lines are, furthermore, arranged at right angles. If, in place of that one extension, however, another one were assumed that is oblique to the first, there would be three other lines intersecting at right angles numerically different from the former ones, as well as directions that are numerically different from the former ones.[4] In addition to that, it is not necessary that the specificity of the directions in a body differ such that, in every body *qua* body, there is one direction that, in itself, is right and another that, in itself, is left. That—by which I mean distinguishing potentially,

4. Avicenna seems to have something like the following two figures in mind:

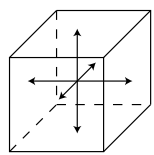


Figure 1

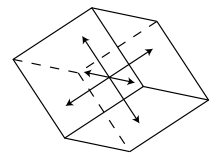


Figure 2

له جهة غير هذه، جعلوا طوله من رأسه إلى قدمه، وعرضه من يمينه إلى يساره، وعمقه من قدّامه إلى خلفه؛ فكأنه لما افترضت ها هنا هذه النهايات أولاً، افترض بعدها بحسبها هذه الأبعاد، إذ الأبعاد بالحقيقة لا تفترض إلاّ بافتراض النهايات التي عنها وإليها تمتد. فلّما كان هكذا، وقع في الأوهام إنَّ الجهات ستٌ ولم يُشعر بغيرها، إذ لم تكن الأسماء إلاّ لهذه، فوقعت الأوهام على مبلغ هذا العدد.

(٥) وأعانَ على ذلك نوعٌ من الاعتبار خاصي، وهو أنَّ الأجسام يوجد فيها إمكان وقوع مقاطعات ثلاث على قوائم ولا يجوز غيرها، وتنتهي كل مقاطعةٍ إلى طرفي الخط الذي عليه المقاطعة، فتكون ستة أطراف، فتكون ستّ جهات. لكن إنّما تكون هذه المقاطعات ثلاثاً لا غير؛ إذا فُرض امتدادٌ واحدٌ أصلاً، ووضع وضعاً من غير أنْ يكون لاطبع يوجبه ثم تُرتّب عليه المقاطعات بقوائم. ولو فرض مكان ذلك الامتداد الواحد غيره، ممّا ليس موازياً له، لوقعت ثلاث مقاطعات أُخرى على قوائم غير تلك بالعدد، ووقعت جهات غير تلك بالعدد. ثم مع ذلك فلا يجب أنْ تختلف نوعية الجهات في كل جسم، حتى يكون في كل جسم - من حيث هو جسم - جهة هي بعينها يمين، وجهة هي بعينها يسار، إنّما يجب ذلك في الحيوان؛ أعني بذلك تميّز الجهات الست بعضها عن

naturally, and specifically the six directions from one another—is necessary only in animals. Certainly, every body that is near us seems to have an upward and downward side, either accidentally or by nature. As for what is accidental, it is according to whatever chance position [the body] has, and so whatever [part] of it is closest to Earth is the downward direction, while whatever is closest to the celestial sphere is upward (or, if there is no celestial sphere above that body, that part that is opposite what is closest to Earth [is called *upward*]). Still, it could be that this is not found with respect to [the element] earth, that is to say, the natural location of [earth]. [That] is because it appears to have no direction but upward, if by *direction* one means what is nearest to a thing's extremity, and Earth's extremity is a surface, and its surface is closest to the Heavens. Perhaps, however, a consideration of the directions does not require a relation to the surface but, instead, to each limit of some interval posited along with the body. When that is the case, the interval posited with respect to the Earth will have a direction vis-à-vis the center of its sphere, which is the center of the universe and around which there is rotation, as well as a certain direction vis-à-vis its surface, both effectively being extremities of the interval. In that case, the Earth also has a downward and upward direction, but the existence of the Earth's downward direction is not due to that to which it is related in the way the upward direction is. That is because the upward direction is an actually existing surface, whereas the downward direction is a point imagined by the estimative faculty.

بعض تميّزاً بالقوة والطبع والنوع. نعم، يشبه أنْ يكون لكل جسم من ‹الذي› يلينا علوٌ وسفلٌ، إمّا عارض وإمّا بالطبع. أمّا العارض فعلى ما يتفق من وضعه، فيكون ما يلي الأرض منه هو الجهة السافلة، وما يلي الفلك، أو ما يقابل ما يلي الأرض – إنْ لم يكن فوق ذلك الجسم فلك – هو الفوق. لكن، عسى هذا أن لا يوجد في الأرض وهي موضعها الطبيعي، فيشبه أنْ لا يكون لها جهة إلاّ الفوق، وإنْ عنى بالجهة ما يلي نهاية الشيء، ونهاية الأرض سطح، وسطحها يلي السماء، فعسى أنْ يكون الاعتبار للجهات لا يقتضي النسبة إلى السطح، بل إلى كل طرفٍ لبُعْدٍ يُفترض في الجسم. وإذا كان كذلك، كان للبُعْد المفروض في الأرض جهة عند مركز كرته الذي هو مركز الكل وعليه الدور، وجهة عند سطحه، وهما نهايتا البُعْد النافذ فيه. فيكون للأرض أيضاً جهة سفْل وجهة علو، وتكون جهة السفْل للأرض ليس وجوده لما يقاس عليه؛ كوجود جهة العلو. وذلك لأنَّ جهة العلو سطحٌ موجودٌ بالفعل، وجهة السفّل نقطة موهومة.

(6) Alternatively, it is not like that either, and, instead, the upward direction is also the limit of the interval that is continuous with the center at the surface and between a given point. Now, if that is the case, [one might ask,] how could it have two actual directions rather than two potential ones? [The answer is that] we have made instances of *projecting toward* and *standing exactly opposite*, one of the causes of actually dividing what is continuous, since what is contiguous and is projected toward by what is exactly opposite becomes determinate by becoming contiguous and being exactly opposite, just as in pointing. Therefore, the center and other extreme are what determine the existence of the projection of the posited interval. The issue, however, concerning this posited interval is how is it to be posited, to which we say: Earth never ceases to have a horizon, owing to the existence of that which stands above it. Now, all of that [which stands above it] are among the causes for positing intervals that pass through it, as if it would also have no actual up and down in this way, but, rather, [that] there would only be up, in the direction of its extremity toward its surface, were the Earth to exist independently and have no relation to external bodies. The truth, in fact, is this: were there no Heaven, [the Earth] would not have an *up* at all, in any way.

(7) It now remains that we resolve a certain doubt that is raised against this. It is said, then, that, were the estimative faculty to imagine that there is no Earth, but there is the Heavens, then how would it be up when there is no *up* except relative to *down*? How will [the Heavens] have a *down* when you have already posited that downward becomes something

(٦) أو لا تكون أيضاً كذلك، بل تكون جهة الفوق أيضاً طرف البُعْد المتصل بالمركز في السطح وبين نقطةٍ مّا . فإنْ كان كذلك، فكيف تكون له جهتان بالفعل؛ بل تكونان بالقوة. لكنا قد جعلنا أحد أسباب انقسام المتصل المسامتات والمحاذيات، وهو انقسامٌ بالفعل، إذ يتعيّن المماسّ والمسامت المحاذي بالمماسّة والمحاذاة، كما في الإشارة. فيكون إذن المركز والطرف الآخر ممّا يصير معيّن الوجود لمسامتة البُعْد المفروض. لكن الشأن في هذا البُعْد المفروض أنّه كيف يفترض؟ فنقول: إنّه لا تعدم الأرض وجود أُفق لها لوجود قائم عليها، وجميع ذلك من أسباب فرض الأبعاد الذاهبة فيه، فكأن الأرض لو انفردت أيضاً، ولم تكن لها نسبة إلى أجسامٍ خارجية، لم يكن لها بالفعل فوقٌ وأسفلٌ بهذا الوجه، بل فوقٌ فقط من جهة انتهائه إلى سطحه، بل هذا حقٌ؛ فإنّه لولا السماء لم يكن لها علوٌ البتة بوجهٍ من الوجوه.

(٧) فبقي الآن أنْ نحل ما يُتشكّك به على هذا فيقال: لو توهمنا أنَّ الأرض ليس لها إلاّ السماء، أفكان يكون لها علوٌ، والعلو لا يكون علواً إلاّ بالقياس إلى السفل؟ أفكان يكون لها سفل، وقد فرضتم أنَّ السفل ليس بمتعيّن إلاّ بتعيّن بُعْد؟ فإنَّ البُعْد لا يتعيّن لوجود

determinate only through an interval's becoming determinate? [That] is because the interval did not become determinate solely on account of the existence of the Heavens, but by a consideration of what stands above, which fixes Earth's horizon (or some other cause analogous to it). From this it necessarily follows that *up* becomes determinate through the existence of the Heavens, while [at the same time] not being determinate [because there is no *down*]; but this is a contradiction. The response is that two things are meant by *up* (one of which is the opposite of *down* and the second [of which] is the direction closest to the Heavens), just as two things are meant by *lightweight* (one of which is relative to the *heavy* and the other [of which] is that which tends to move so as to encounter the surface of the [lunar] sphere). So one of the two [senses of] *up* is said relative to *down* in just the way that one of the two [senses of] *light* is said relative to *heavy,* whereas the second is intelligible in itself, where its being intelligible does not require a consideration of the existence of its opposite. So it is not a necessary conclusion for whoever posits an actual direction closest to the Heavens that he understood that, because there is some direction that is not near the Heavens. Similarly, from our supposing that something is moved so as to encounter the surface of the [lunar] sphere, it does not necessarily follow that we judge that there is something that is moved toward the center. So the Earth, relative to the Heavens alone[5] without any other consideration, has a direction that is closest to the Heavens. So, if you use this sense to designate *up,* then [the Earth] has an *up,* while, if you do not and [instead] mean by *up* what is relative to *down,* then the Earth, without being considered insofar as it is related to the Heavens, has no *up.*

5. Reading *waḥdahā* with **Z** (in close parallel with **T**'s *waḥdahū*) for **Y**'s *fī ḥaddihā* (at its limiting point).

السماء وحده، بل باعتبارٍ قائم يجعل للأرض أُفقاً، أو سبباً آخر يجري مجراه، فيلزم من هذا أنّه يتعيّن العلو بوجود السماء ولا يتعيّن، وهذا خُلْف. فالجواب، إنَّ العلو يُعنى به شيئان؛ أحدهما المقابل للسفل، والثاني الجهة التي تلي السماء، كما أنَّ الخفيف يُعنى به أمران؛ أحدهما الذي بالقياس إلى الثقيل، والآخر الذي يريد في حركته ملاقاة سطح الفلك. فأحد العلوين مقولٌ بالقياس إلى السفل، وكذلك أحد الخفيفين مقولٌ بالقياس إلى الثقيل، والثاني معقولٌ بنفسه، لا يحوج تعقله إلى اعتبار وجود مقابله، فإنّه ليس يلزم لمن فرض جهة بالفعل تلي السماء، أن يكون تعقّل ذلك لأجل جهةٍ لا تلي السماء. وكذلك لا يلزم من فرضنا شيئاً يتحرك إلى ملاقاة سطح الفلك؛ أن نحكم أنَّ شيئاً آخر يتحرك إلى المركز؛ فللأرض، بالقياس إلى السماء وحدها من غير اعتبارٍ آخر، جهةٌ تلي السماء فإنْ سميتَ هذا المعنى علواً فلها علوٌ، وإنْ لم تسمّه علواً، وعنيتَ بالعلو ما يقال بالقياس إلى السُفْل؛ فليس للأرض – من حيث هي مقيسة بالسماء بلا اعتبارٍ آخر – علو.

(8) Starting from the beginning, up and down frequently belong to plants and animals by nature. So [for example] plants have one direction for [their] branches and another for [their] roots, one of which is naturally up and the other naturally down. Up, however, may accidentally become down, and down, up. Despite that, the upward [direction] preserves the sense that it is naturally up and, likewise, the downward [direction] preserves the sense that it is naturally down, just as when water is heated, it preserves the sense that is naturally cool. As for front and rear, the only things to which they belong, whether [those things] are moving or at rest, are animals, whereas they belong to moving bodies other than animals when [those bodies] are moving (for the direction toward which they are moving is their front, while the direction being left behind is their rear). If the motion of [things that are not animals] changes, however, so does their front and rear, whereas this is not the case for animals. [This is] because the front of animals does not correspond with every motion, but with the voluntary motion that is in the direction proper to their limbs, as long as it proceeds naturally and is not like walking backward, since that is not natural but is, in a sense, forced. So the up and down of inanimate bodies sometimes overlap with their front and rear (namely, when they move up and down) and at other times their up and down differ from their front and rear—namely, when their motion is not upward (that is, in the direction of the celestial sphere) or downward (I mean in the direction of the Earth). If they move horizontally, it will be a direction not subsumed under a direction [such as up and down].

(٨) ونبتدىء من رأسٍ ونقول: إنَّ الفوق والسُفْل بالطبع قد يوجدان للنبات والحيوان. فانَّ للنبـــات جهة أغصانٍ وجهة أُصول، وأحدهما بالطبع فوق، والآخر بالطبع أســـفل. ولكن يعرض أنْ يصير الفوق أســـفل والأســـفل فوق، ويكون الفوق مع ذلك حافظاً لمعنى أنه بالطبع فوق، وكذلك يكون السُـــفْل حافظا لمعنى أنه بالطبع سُـــفْل، كما أنَّ الماء وإن ســـخن فهو حافظٌ لمعنى أنّـــه بالطبع بارد. وأمّا القدّام والخلـــف فليس إلاّ للحيوان، كان ســـاكناً أو متحركاً، وللأجســـام المتحركة، غير الحيوان، حين تكون متحركة، فإنَّ الجهة التـــي إليها تتحرك هي قدّامهـــا، والجهة المتروكة هي خلفها. لكنها إنْ تغيّرت حركتها تغيّر قدّامها وخلفها، ولا كذلك للحيوان؛ لأنَّ القدّام الذي للحيوان ليس بحسب كل حركةٍ، بل بحسب الحركة الإرادية التي إلى جهة أعضاء مخصوصة له، ما دام على النهج الطبيعي، لا كالقهقرى فإنَّ ذلك غير طبيعي، بل متكلف. فالأجســـام غيـــر الحيّة تارة يوافق فوقها وسُـــفْلها قدّامها أو خلفها، وذلك إذا تحركت إلى فوق أو إلى أسفل، وتارة يخالف فوقها وسُـــفْلها قدّامها وخلفها، وذلك إذا لم تكـــن حركاتها إلى فوق، أي نحو جهة الفلك، أو أسفل أعني نحو جهة الأرض، وإنْ تحركت عرضاً لم تدخل جهةٌ في جهة.

(9) We should now examine the states of these directions with respect to spheres that are moved upon themselves—in fact, the celestial sphere—and whether the claim that the celestial sphere has an up, down, right, left, front, and rear is meant in the way [that] it is said of other animals or [whether it] is said equivocally, as well as how those directions occur there. Before that, however, we will investigate the natural directions of things undergoing natural, rectilinear motion and how they occur.

(٩) فحـــريٌ بنا الآن أنْ نبحث عن أحوال هـــذه الجهات في الكرات المتحركة على أنفسها ، بل في الفلك ، وهل ما قيل إنَّ للفلك فوقاً وسُفْلاً ويميناً ويساراً ، وقدّاماً وخلفاً ، هو المعنى المقول للحيوانات الأخرى ، أو باشـــتراك الاســـم؟ وإنَّ هذه الجهات كيف تكون هناك؟ وقبل ذلك ننظر في الجهات الطبيعية للمتحركات الطبيعية على الاســـتقامة ، وإنّها كيف تكون.

Chapter Fourteen

The natural directions of rectilinear motions

(1) It is necessary for us now to undertake an independent verification of the account concerning the directions of natural motions and how they are delimited, beginning with the directions of rectilinear motions. From what we said earlier, direction must be delimited with respect to the interval,[1] and its being delimited must be vis-à-vis either a body or a nonbody. As we have explained, however, it is impossible to delimit a given direction in the void,[2] and so the delimitation must be vis-à-vis a body. Now, because what undergoes rectilinear motion leaves behind one direction and tends toward another, either each one of the directions is delimited by a body unique to it or a single body delimits both directions. Being delimited by a single body in the case where [the directions] are diametrically opposed to each other occurs only when one of the limiting points is at the maximal degree of proximity and the other at the maximal degree of remoteness. Now, the maximal degrees of remoteness and proximity pertaining to the body are delimited only in that there is something that surrounds and some central part as a direction in order that the single body get both of the two limiting points that it needs. The delimiting body, however, would have to be what surrounds, not an underlying body such as the central part. That is because, if it is what underlies, such as the central part, the proximity but not the remoteness would be delimited, whereas, in contrast, what surrounds delimits proximity and remoteness.[3]

1. See 3.13.2.
2. See 2.8, especially par. 10.
3. So, for example, imagine some circular body ABCD with center E. While E can delimit the maximal degree of proximity (namely, by being at E), it cannot, when taken alone, delimit the maximal degree of remoteness. In contrast, if one considers the circular line ABCD, it can delimit the maximal degree of proximity (namely, by being somewhere on the line ABCD), but it can also delimit the maximal degree of remoteness (namely, by being at the opposite extreme of some radii projecting inward from ABCD, which in effect is at point E).

<فصل الرابع عشر>

في الجهات الطبيعية للحركات المستقيمة

(١) وممّا يجب علينا أنْ نحقّق القول فيه أمر جهات الحركات الطبيعية، وأنّها كيف تتحدّد، ونبدأ بجهات الحركات المستقيمة، فنقول: قد سلف من قولنا أنَّ الجهة – لا محالة – متحدّدة في البُعْد، وتحدّدها لا يخلو إمّا أنْ يكون عند جسمٍ أو عند لا جسم، ومحال، كما بيّنا، أن يكون في الخلاء تحدّد لجهة، فيجب أن يكون التحدّد عند جسم. ولأنَّ المتحرك على الاستقامة يخلف جهة ويقصد جهة، فلا يخلو إمّا أن يكون كل واحدٍ من الجهتين يتحدّد بجسمٍ على حدةٍ، أو تكون الجهتان تتحدّدان بجسمٍ واحد، والتحدّد إنّما يكون تحدّداً متقابلاً بجسمٍ واحدٍ، إذا كان أحد الحدّين في غاية القرب منه والآخر في غاية البُعْد منه. ولا تتحدّد غاية البُعْد من الجسم كما تتحدّد غاية القرب منه؛ إلاّ بأنْ يكون على جهة إحاطة ومركز، حتى يكون الجسم الواحد يوجب الحدّين جميعاً، ويجب أنْ يكون الجسم المحدّد محيطاً لا جسماً موضوعاً كالمركز؛ وذلك لأنّه إنْ كان موضوعاً كالمركز تحدد القرب منه ولم يتحدّد البُعْد، بل المحيط هو الذي يحدُد القرب منه والبُعْد عنه.

(2) As for when the delimitation [of direction] is by means of two bodies, then either it must be that one of them is like what surrounds, while the other is like the central part, or it is not like that. On the one hand, if one of them is like what surrounds and the other is like the central part, then what surrounds would be enough to make the interval have two limiting points even if that which is in the central part did not exist, in which case the delimitation by that which is in the central part is accidental. On the other hand, when the delimitation is by means of two bodies, but it is not the case that one of them surrounds and the other is something in the center, we say initially, in that case, that it cannot be that some part of one body's simple surface has, by its nature, a claim to be that toward which [the body undergoing rectilinear motion] tends and, with which it comes into proximity, while some other part of it is not such, when, in itself, it is one homogeneous surface belonging to one homogeneous body, whose relation to what is outside it is one homogeneous relation. Instead, its state toward what is outside it is the same in all directions. Now, that surface must have by nature, something outside [it] in every one of its directions, not just [in] some specific direction but not [in] another, such that [the surface] would have one direction lying next to certain places toward which bodies are moved and another direction [at which there is] a termination that has nothing outside of it, whether a void or plenum. On the contrary, it must either have nothing at all outside it, or, if there is something surrounding [it], there is something outside [it], whether a plenum or a void. In other words, [the surface] is such that, with respect to every place outside that which belongs to it, the estimative faculty can imagine some body that is naturally moved toward [that place] so as to become proximate with it. This, however (assuming [that the motion] is not in the direction of what surrounds and the central part), requires a homogeneous periphery. In that case, when the motion toward each one of those two bodies seeks the directional side[4] that is proximate to it, then, were we to imagine the movement

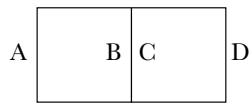
4. "Directional side" is a slight overtranslation of the Arabic *jihah,* which I have been translating "direction" but which can also mean "side." In the present context, Avicenna is using *jihah* in the sense of a given side of some body that functions as a *point of orientation* by which some direction is determined—hence the translation "directional side."

(٢) وأمّا إذا كان التحدّد بجسمين ؛ فلا يخلو أنْ يكون أحدهما كالمحيط والآخر كالمركز ، وإمّا أنْ لا يكون كذلك . فإنْ كان أحدهما كالمحيط والآخر كالمركز ؛ كان المحيط كافياً في أنْ يجعل للبُعْد حدّين وإنْ لم يكن الذي في المركز ، فيكون التحدّد بالذي في المركز بالعرض . فأمّا إذا كان التحدّد بجسمين ، ولا يكون أحدهما محيطاً والآخر مركزاً ، فنقول أولاً ؛ إنّه لا يجب حينئذ أنْ يكون بعض سطح الجسم الواحد البسيط يستحق بطبعه أنْ يكون المتوجّه إليه وإلى القرب منه ، وبعضه الآخر ليس كذلك ، وهو في نفسه سطحٌ واحدٌ متشابهٌ من جسم واحدٍ متشابهٍ ، نسبته إلى ما هو خارج عنه نسبة واحدة متشابهة ، بل يجب أنْ تكون حاله إلى ما هو خارج عنه ، من جميع الجهات ، سواء . ويجب أنْ يكون له بالطبع خارجٌ من كل جهات ذلك السطح ، ليس في جهةٍ بعينها دون جهة ، حتى تكون جهة منه تلي أمكنةً وأجساماً تتحرك فيها إليه ، وجهة نهاية ليس لها خارج ، لا خلاء ولا ملاء ، بل يجب إمّا أنْ يكون لا خارج له البتة ، أو يكون الخارج المملوء أو الخالي – إنْ كان محيطاً به – أي يكون بحيث يجوز أنْ يتوهم في كل مكانٍ من الخارج الذي له جسم يتحرك إليه بالطبع ، الحركة المقرّبة منه ، وهذا يوجب إحاطة متشابهة ، إذا كانت لا على جهة المحيط والمركز . فإذا كانت الحركة إلى كل واحدٍ من هذين الجسمين تطلب الجهة التي هي قربه ، وجب أنْ يكون لو توهمنا التحرّك واقعاً من أحد

taking place from one of the two bodies toward the side of the other body whose direction is not the closest one, it would be moved toward the proximity of the first body, necessarily being moved only to that specific directional side rather than the one opposite it. [That follows] since it would have reached the other body—namely, that [side of the other body] that delimits the opposite directional side of the first body—and it would be impossible for the motion to be toward some directional side except the one opposite it. So it has been proven that our assumption concerning the delimitation of two directions by two bodies is absurd.[5]

(3) It cannot be said that one direction is delimited on one side, and the other on the other side, and that the two directions are naturally contrary, for the discussion at hand concerns the principle of a direction that is one and the same in species and what delimits it. So when the factor delimiting the direction that is one and the same in species does

5. Avicenna's argument seems to be this: In paragraph (1) he had asserted that direction is determined by either a single body or two bodies. On the one hand, if a single body determines the direction, it is the periphery of that body that, in fact, does the work, not the central part (see n. 4). On the other hand, if two bodies are required to determine direction, then they are either nested—in which case the body at the periphery is again what does the work—or they are not nested, and so they might be related thus:



where A and B are the directional sides of one body and C and D are the directional sides of the other body. Given Avicenna's previous argument that the periphery of any given body must be homogeneous throughout, then, when there is rectilinear motion, no one part of the body is more worthy of being sought than another. Consequently, any body tending toward such a homogeneous body would stop once it reaches the closest side of the body toward which it is tending. Thus, it is impossible for an object moving from, for instance, side A of the first body to reach side D of the second body, for, as soon as it reaches C, it will have reached the second body and so arrived at that toward which it tended. Avicenna finds the conclusion absurd—probably because he thinks that it is a physical fact that something can move rectilinearly so as to cover the maximal degree of separation, which, in the present example, would be given by the distance between A and D—and so he rejects the initial assumption that gave rise to the absurdity: that directions are determined by two bodies (or, perhaps more exactly, two bodies that are not nested within one another).

الجسمين إلى الجهة التي لا تلي الجسم الآخر، فيتحرك إلى قرب الجسم الأول أنْ يكون إنّما يتحرك إلى تلك الجهة بعينها لا من مقابلها، لأنّها تؤدي إلى الجسم الآخر وهو محدّد الجهة المقابلة للجسم الأول، ويستحيل أنْ تكون الحركة إلى جهةٍ إلاّ من مقابلها. فقد بانَ أنَّ ما فرضناه من تحدّد الجهتين بجسمين محال.

(٣) وليس يجوز أنْ يقال إنّه من جانب يحدّد جهة، ومن جانبٍ يحدّد أُخرى، وأنَّ الجهتين متضادتين بالطبع؛ فإنَّ كلامنا في الشيء من حيث هو مبدأ جهة واحدة بالنوع ومحدِّدها، فإذا كان المحدِّد يحدّد الجهة الواحدة بالنوع لكونها قرباً منه؛ فيجب أنْ يكون

so on account of [that direction's] proximity, then everything at the [same] proximity must also be a direction that is one and the same in species. In that case, its contrary is everything that is at the [same] remoteness from it. So, again, it comes down to its contrary being what surrounds. [That] is because the designated remoteness of the first body's surface must either be delimited by the nature of that other body or not. Now, on the one hand, if it must be delimited by the nature of that body, then [that nature] no more requires that one part of [the body's] surface [be delimited] than another; and, instead, it requires that it [be delimited] in every direction. So the remoteness will be delimited on every side by a body having that nature. If, on the other hand, it is not like that, then the delimitation of each one of [the portions of that sphere] will require some other direction, and what is proximate will delimit a single direction, while what is remote would delimit several directions, and that which is the counterpart of what is numerically one would be specifically many, all of which is absurd. If the bodies that are assumed to be around it are at that [same degree of] remoteness and they are assumed to be scattered in [different] directions, every one of them exchanging places with one of its co-mates, one [body] would [still] delimit the direction that another would (were it in its place) by delimiting a limit of remoteness reaching between it and the first body, since they are alike in that they naturally delimit that which is remote. [That] is because they have a certain position that is at the maximal degree of remoteness, and there is no difference between them in this respect, and [yet] it is in this respect that they delimit the remoteness. Also, the directions described by their positions on that first body would not differ specifically, but only numerically. Those bodies would also be like a single body surrounding the first body, in which

كل قــربٍ منــه هو جهة واحدة بالنوع. فيجب أنْ يكون ضدّهــا كل بُعْدٍ منه، فيعود إلى أنْ يكون ضدها محيطاً، لأنَّ البُعْد المقدّر من ســطح الجسم الأول، إمّا أنْ يقتضي تحدّداً بطبيعة ذلك الجسم الآخر أو لا يقتضي، فإن اقتضى تحدّداً بطبيعة ذلك الجسم، فليس أنْ تقتضيه قطعة من سطحه، أولى أنْ تقتضيه قطعة أخرى منه، بل يجب أنْ تقتضيه من كل جهة، فيكون البُعْد متحدّداً من كل جانبٍ بجسمٍ من ذلك الطبع. وإنْ لم يكن كذلك، كان التحديــد لكل واحدٍ منها يقتضي جهة أُخرى، ويكون القرب يحدّد جهة واحدة، والبُعْد يحدّد جهــات، ويكون مقابل الواحد بالعدد كثيراً بالنــوع، وهذا كله محال. فإنْ كانت الأجســام التي تُفرض حواليه بذلك البُعْد، وتُفرض جهات شتى، أيّها كان بدل صاحبه، حدّد الجهة التي يحدّدها الآخر لو كان مكانه؛ بتحديده طرف بُعْدٍ واصلٍ بينه وبين الجسم الأول. وتكون متشــابهة في أنّها بالطبع تحدّد البُعْد، لأن لها وضعاً مّا هو في غاية البُعْد، ولم يكن بينها – في هذه الجهة – خلافٌ، وكانت بهذه الجهة تحدّد البُعْد، وكانت الجهاتُ التي ترتسم بأوضاعها من الجسم الأول جهاتٌ لا تختلف بالنوع بل بالعدد، وكانت تكون تلك الأجسام كجسمٍ واحدٍ محيطٍ بالجسم الأول، فيكون حدوث الجهتين على سبيل مركزٍ

case two directions would come about, [delimited by] some central part and what surrounds. We have already noted, however, that, when it is like a central part and that which surrounds, the surrounding thing is sufficient to delimit both of the two directions, whereas the underlying body in the center [only] enters into the [whole] affair accidentally.[6]

(4) We maintain that not every body is suitable for delimiting direction. That is because the body whose character is to be moved rectilinearly is not suitable for delimiting direction, since either its nature requires that it be in that direction or not. So, on the one hand, if it does not require it, how can the direction be delimited by it when it might not be there? On the other hand, if its nature requires it to be in that direction, and yet it is possible that it accidentally not be in that direction while naturally seeking it, then, in the nature of that body, there would be a possibility that happens to belong to it to seek that direction; and so there would be[7] no part of that body except that, in its nature, there is the possibility to seek that direction. The possibility of seeking that direction, however, can be attributed to it only if that direction determinately exists. In that case, it is possible, with respect to its nature, that no part of that body happens to be in that direction, and yet that direction determinately exists in itself such that each part of [the body] seeks it. If this possibility does not exist, it is not because of something in the natures of each and every one of the parts right down to the very last single one, depending upon the number of parts marked off, but because of something external—namely, that there is nothing that carries it away from its natural location. If that is the case, then the direction is not itself delimited by this body owing to this body itself, but it is delimited by something else. It was assumed, however, [to be delimited] by this body, which is a contradiction.

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6. See par. 2.
7. Reading *fa-kāna* with **Z** and **T** for **Y**'s *wa-ka-anna* (and as if).

ومحيط . وقد قلنا إنّه إذا كان على سبيل مركزٍ ومحيطٍ كفى المحيط في تحديد الجهتين جميعاً ، وكان الجسم الموضوع في المركز داخلاً في الأمر بالعرض .

(٤) ونقول ، إنّه ليس يصلح أنْ يكون كل جسم محدّداً للجهة ، وذلك لأنَّ الجسم الذي من شأنه أنْ يتحرك بالطبع على الاستقامة ، لا يصلح أنْ يحدّد الجهة ؛ لأنّه لا يخلو إمّا أنْ تقتضي طباعه الكون في تلك الجهة أو لا تقتضي ، فإنْ لم تقتض ، فكيف تتحدّد به الجهة؟ وجائز أنْ لا يكون هو عندها . وإنْ اقتض‹ت› طباعه الكون في تلك الجهة ، وكان مع ذلك جائزاً أنْ يعرض له أنْ لا يكون في تلك الجهة ، وهو بالطبع يطلبها كان في طبيعة ذلك الجسم إمكان أنْ يعرض له طلب تلك الجهة ، فكان لا جزء لذلك الجسم إلاّ وفي طبيعته إمكان طلب تلك الجهة . ولكنه من المستحيل أنْ يوصف بأنَّ فيه إمكان طلب تلك الجهة ؛ إلاّ وتلك الجهة حاصلة . فيكون لا جزء لذلك الجسم إلاّ ويمكن في طباعه أنْ يعرض له أنْ لا يكون في تلك الجهة ، وتكون تلك الجهة حاصلة في نفسها يطلبها كل كل جزء منه . فإنْ لم يوجد هذا الممكن ، فإنّما لا يوجد لا لأمرٍ في طباع جزء جزء من الجسم ، إلى آخر أجزائه المعدودة بحسب عدد تلك التجزئة ، بل بسببٍ من خارج ، وهو فقدان ناقلٍ عن موضعه الطبيعي ، وإذا كان كذلك ، فالجهة غير متحدّدة الذات بهذا الجسم ، لذات هذا الجسم ، بل متحدّدة بشيءٍ آخر ، وقد فُرض بهذا الجسم ، هذا خُلْف .

(5) So it has been proven that not just any body, as chance would have it, can delimit a determinate direction. From that, it also becomes clear that a direction that is one and the same in species can naturally be delimited by a single body that is of a character that it not move at all rectilinearly, for that which delimits at the periphery cannot be some given ordering of disparate bodies. Indeed, some of those intervals cannot be such that they require that there exist, relative to them, some certain body upon which they necessarily follow, while other ones require some other body naturally different from [the first] upon which they necessarily follow. It is also impossible for that surrounding body to be divided into bodies whose species vary as chance would have it, without any necessity, while it remains the same. You also cannot maintain anything like this when that which delimits at the periphery is a single body. [That] is because the single body has no actual parts, even if, through varying external factors, parts can be marked off in it accidentally. As for the ordered position of bodies differing in species at the periphery of the interval that is farthest away from the surrounded body, [that order] is not something that just occurs unexpectedly and passes away. Otherwise, those bodies would [both] come to be at that periphery and depart from it, and the delimitation of that direction would exist determinately prior to them [but, again, it is the bodies that determine the direction].

(6) From this, we next know that what delimits at the periphery must be a single body that moves only circularly. In that case, it does not naturally include any directions that do not lead to it from the center and from it to the center. Now, the extremities of those [directions]

(٥) فقد بانَ أنّه لا يجوز أنْ يكون أي جسم اتفق محدّداً للجهة المعيّنة، وتبيّن من ذلك أيضاً أنَّ الجهة الواحدة بالنوع تتحدّد بجسم واحدٍ بالطبع، ليس من شأنه الزوال على الاستقامة البتة. فإنَّ المحدّد بالإحاطة لا يصلح أنْ يكون منتظماً من أجسام شتى، فإنّه ليس يجب أنْ تكون بعض تلك الأبعاد تستحق أنْ يوجد فيه جسمٌ بعينه يلزمه، وبعضٌ آخر يستحق جسماً آخر مخالفاً له بالطبع يلزمه. ولا يجوز أنْ يكون انقسام تلك الجهة المحيطة إلى أجسام، مختلفة الأنواع، اتفاقاً من غير وجوب ويقيَ كذلك. وليس لك أنْ تقول مثل هذا؛ إذا كان المحدّد بالإحاطة جسماً واحداً؛ فإنَّ الجسم الواحد لا أجزاء له بالفعل، وإنْ عرضت له تجزئة ما فبأشياء من خارج غير ثابتة. وأمّا ترتّب الأجسام المختلفة النوع في إحاطة أبعد البُعْد عن الجسم المحاط به، فليس ممّا يطرأ ويزول؛ وإلاّ كانت تلك الأجسام تحصل في تلك الإحاطة وتخرج عنها، ويكون تحدّد تلك الجهة حاصلاً قبلها.

(٦) فنعلم من هذا؛ أنَّ المحدّد بالإحاطة يجب أنْ يكون جسماً واحداً لا يزول، اللّهم إلاّ بالاستدارة. وإذا كان كذلك، لم يكن في ضمنه جهات بالطبع إلاّ التي تأخذ نحوه من

that stand opposite one another do not vary by nature, since they terminate at some definite individual bodies. Also their limits—some of which are at the maximal degree of proximity, while others are at the maximal degree of remoteness—are not delimited at limiting points that vary. This is pretty much what we have to hold.[8]

(7) We also maintain that the maximal degree of proximity to the delimited body whose proximity is sought by motion must not be the maximal degree of proximity of each part of it. [That] is because it is impossible that a single thing that is moving along a single interval (as, for example, a single line) should have reached every part of that which it is approaching. As for the maximal degree of remoteness, it is possible that there is a maximal degree of remoteness from all the parts when [the delimited body] is at the center. When a line originating from the surrounding [body] reaches the center and then passes through it, however, the limit from which it begins is at the maximal degree of proximity, but the [line's] other limit is not at the maximal degree of remoteness, since it is closer to what surrounds, even if the whole of it is not. Now, we have already said that it is not a condition of being proximate to what surrounds that it be proximate to the whole, but only to some part of it, even if it is at the maximal degree of remoteness from some other part of it. That is because it is not at the maximal degree of proximity to some part of it unless it is at the maximal degree of remoteness from what lies opposite it. [*What lies opposite* here] is by supposition rather than by nature, since the parts of what is circular have no opposite except by positing

8. Reading *an naqūla bihi* with **Z** and **T** for **Y**'s *an yaqūlu bihi haʾulāʾ* (they have to hold).

المركـز، والتي تأخذ عنه نحو المركـز. واللواتي تعارضها فإنَّ نهاياتها لا تختلف بالطباع، فإنّها تنتهي إلى أجسـام واحدةٍ بأعيانها ولا تتحدّد أطرافها بحدود مختلفة، يكون بعضها غاية قربٍ وبعضها غاية بُعْدٍ، على نحو ما وجب أنْ نقول به هذا.

(٧) ونقول إنَّ غاية القرب من الجسـم المحدَّد المطلوب قربه بالحركة، ليس يجب أنْ تكون غاية قربٍ من كل جزء منه، فإنّه يستحيل أنْ يكون لمتحركٍ واحدٍ على بُعْدٍ واحدٍ، كخـطٍ واحدٍ، وصولٌ إلى كل جزء مـن المقترب إليه. وأمّا غاية البُعْد؛ فيجوز أنْ تكون غاية بُعْدٍ من جميع الأجزاء، إذا حصل عند المركز، وإذا انتهى خطٌ من المحيط إلى المركز ثـم عدّاه. فإنَّ الطرف الـذي ابتدأ منه هو في غاية القرب، والطرف الآخر ليس في غاية البُعْد، فإنّه يلي المحيط، وإن كان لا يلي كله. فقد قلنا إنّه ليس شرط القرب من المحيط أنْ يكون قريباً من كله، بل من شـيءٍ منه، وإنْ كان ‹في› غاية البُعْد من شـيءٍ آخر منه. وذلك لأنّه لا يقرب من شـيءٍ منه غاية القرب إلاّ صار على غاية البُعْد من مقابله بالوضع ليس بالطبع، فإنَّ أجزاء المسـتدير لا مقابلة لها إلاّ بالفرض الوضعي الإضافي المسـافي.

some position, relation, and distance. So, even if there is a maximal degree of remoteness with respect to the distance, it won't be the maximal degree of remoteness with respect to the nature and the proximity and remoteness that are in the nature, since here it is not remote from this direction. In fact, here it happens to be where it is closer *qua* a single nature and single body.[9] So, by means of this, you know the form of direction toward which natural bodies move.

(8) Let us now discuss the direction of bodies that undergo circular motion. What is moved circularly is of two classes. One of them involves [a body] that does not move around its own center, but some center outside [of it]. This can, then, be assigned one direction toward which and another from which it moves, where one of them is like its front and the other its rear. As for the right- and left-hand directions, the direction that, if this were an animal, would be its right-side one is, by analogy, more aptly labeled *right* than its opposite, even though there is nothing in the nature of that body that requires that the two sides differ in the way that the two sides of an animal require that in the animal. As for this assumed mobile's up and down, what lies closest to the vicinity of the Earth seems to be its lower directional side, while the opposite of it is its higher directional side, that being assigned to it not because of the particular thing itself (as in the case of animals) nor because of its particular motion (as with heavy and light things that are moved), but relative to other bodies.

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9. Avicenna's point in this discussion is that it is only between points or places on the periphery of what surrounds and the center point of what is surrounded that maximal separation exists between the directions. Put in geometrical terms, he is arguing that only in the case of the radius is there the maximal degree of separation between some point on a circle's circumference (which defines one direction, such as up) and the circle's center (which defines another direction, such as down). Assume circle ABCD with center E, and also assume a line AF (shorter than the diameter AC), which extends from A through E to F, where AF is longer than the radius AE by a distance x. In this case, then, at F, the line AF is closer by x to point C on the circumference than point E of the radius AE is to C. Consequently, the line AF, while longer than AE, does not have limits that are at maximal proximity and remoteness with respect to the circumference, for, while A is at maximal proximity to the circumference (since it is on it), F is not at maximal remoteness from the circumference (since it is closer to the point C on the circumference than E is).

فإنّها ، وإنْ كانت من حيث المسافة غاية البُعْد ، فليس من حيث الطبع ، ومن حيث القُرب والبُعْد الذي في الطبع بغاية البُعْد ، إذ لا بُعْد هناك من هذه الجهة ، بل هناك اتفاق من حيث أنّها تلي طبيعة واحدة وجسماً واحداً . فبهذا نعلم صورة الجهات التي تتحرّك إليها الأجسام الطبيعية .

(٨) فلنتكلم الآن في جهات الأجسام المتحركة على الاستدارة : وأمّا المتحرك بالاستدارة فهو على قسمين ؛ أحدهما المتحرّك لا على مركز نفسه بل على مركز خارج ؛ فهذا يمكن أنْ تعيّن له جهة إليها يتحرك ، وجهة عنها يتحرك ، ويشبه أنْ يكون أحدهما قدّاماً له والآخر خلفاً . وأمّا جهة اليمين واليسار فيشبه أنْ تكون الجهة التي لو كان هذا حيواناً كانت تلك يميناً له ، أولى أنْ تسمّى يميناً من مقابلها على التشبيه ، وإنْ كان لا شيء في طبيعة ذلك الجسم يوجب أنْ تختلف به الجهتان ، كما يوجب جانبا الحيوان ذلك في الحيوان . وأمّا فوق هذا المتحرّك المفروض وأسفله ؛ فيشبه أنْ يكون ما يلي ناحية الأرض جهته السافلة ، وما يقابلها جهته العالية ، يتعيّن ذلك له ، لا من ذاته بعينه كما للحيوان ، ولا من حركته بعينه كما للمتحركات الثقيلة والخفيفة ، بل بالقياس إلى أجسامٍ أخرى .

(9) As for [the second class, (that is,] what undergoes circular motion around a center internal to it and contained within it), what has been said about it—namely, that six directions can be determined for it, just like in animals—seems to have lost some of its direction. The fact is that, first, two poles and a great circle[10] are essentially to be determined with respect to it, where determining the poles and the great circle requires only [the moving body's] corporeality and its moving in the way just described [that is, rotating around an internal center]. In the case where [the body] is contained by some other body, there is one direction lying closest to that which contains it and another one opposite it that are determined for [the body] in such a way that it does not need to undergo the motion that belongs to it in order to be determined and, instead, has that even if it is at rest. Still, when its motion is considered along with that which contains it—where either certain relations between its parts are assigned, or certain points are posited in it, as well as between [other points] like them in what is contained and around which something is moved—then other directions can be determined for it. That is because, when three points are posited along the length of the motion (not its breadth, which is between [the rotating body's] two poles) and the middle one moves toward one of them and away from the other, and the direction toward which the middle one [moves]—relative to the horizon over which[11] this point rises—is the direction from which the natural motion begins (and its opposite is the opposite direction), then an eastward and westward direction are delimited. Likewise, there will be

10. While the Arabic *minṭaqah* literally means "belt," the over translation "great circle" seems appropriate, given the subsequent discussion.

11. Reading *ʿalayhu* (over which [m]) with two of the MSS consulted by **Y** and **T**, which would have the pronoun refer to "horizon," for **Y** and **Z**'s *ʿalayhā* (over which [f]), which would make the pronoun refer back to "this point," or perhaps all the way back to "direction."

(٩) وأمّا المتحرّك بالاستدارة على مركزٍ في داخله ويشتمل هو عليه، فيشبه أنْ لا يكون ما قيل فيه من أنّه قد تتحدّد له جهاتٌ ستٌ كما للحيوان أمراً على الجهة التي قيل، بل أول ما يتحدّد فيه، وعن ذاته، قطبان ومنطقة، ولا يحتاج في تحدّد القطبين والمنطقة إلى شيء غير جسميته وحركته التي هي على الصفة المذكورة. فإنْ كان محتوياً على جسم آخر تحدّدت له جهةٌ تلي ما يشتمل عليه؛ وجهة أخرى بخلافها؛ تحدّداً ليس يحتاج في ذلك إلى أنْ يكون متحركاً الحركة التي له، بل وإنْ كان ساكناً، كان له ذلك لكن إذا اعتبرت حركته على ما يشتمل عليه منها، ونوسب بين أجزائه، أو نقطٌ تفرض فيه وبين أمثالها من المشتمل عليه المتحرك حوله، فقد تتحدّد له جهاتٌ أخرى. وذلك لأنّه إذا فرضت - في طول حركته لا في عرضها الذي هو بين قطبيه - ثلاث نقطٍ، وكانت الوسطى تنحو إحداهما وتتباعد عن الأخرى، وتكون الجهة التي كانت فيها الوسطى بالقياس إلى الأفق الذي هذه النقطة طالعة عليهِ؛ هي جهة عنها ابتداء الحركة بالطبع، ومقابلها مقابل هذه الجهة فتتحدّد هناك جهة مشرقٍ وجهة مغرب. وكذلك تتحدّد هناك

delimited one direction toward the meridian and another toward what is below the Earth. In that case, the direction that is toward the meridian is that toward which the rising motion [tends] (where that is one of its extremes, because what is ascending is at its greatest proximity there), and then, gradually departing from it, [becomes] remote from it at the point where it sets. Now the extremity toward which the mobile tends is the front and its opposite is the rear, and so the meridian—relative to the ascending, eastward motion—is the front and what is opposite it the rear. Also, since the eastward direction is the direction from which the motion begins, it most deserves to be likened to the right-hand side of the animal, in which case westward is the left-hand side. That leaves the two poles, which delimit neither the interval delimited by front and rear (which most deserves to be depth) nor the interval delimited by the right- and left-hand sides (which most deserves to be breadth). So there is only the dimension of length [for them to delimit]. Of the two poles, the one deserving most to be compared with up is the South Pole, relative to the primary motion belonging to the celestial spheres, while relative to the secondary motion [belonging to the celestial spheres], the North Pole [deserves most to be compared with up].[12] [That] is because, were we to imagine some human rotating about himself, where his motion originates from his right-hand side, then his front is toward his face (that is, what is between his right- and left-hand side), where that faces the meridian, while his rear is what is toward his back. Now, when we make the eastward direction correspond with his right-hand side and the westward direction with the left-hand side, while his face [corresponds] with

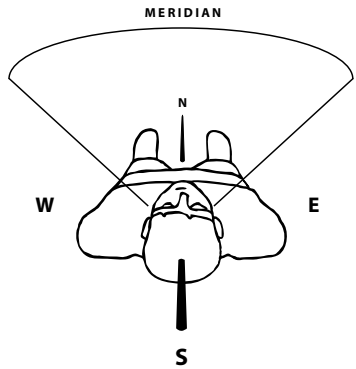
12. The primary celestial motion refers to the apparent eastward, diurnal motion of the celestial bodies around the Earth (that is, the apparent motion of the stars, Sun, Moon, and other planets around the Earth approximately once every twenty-four hours), while the secondary celestial motion refers to the westward, sidereal motion of the planets as observed against the fixed stars. Thus, for example, while the Sun has an apparent eastward motion that makes it appear to circle the Earth from east to west once every twenty-four hours, it also appears to move from west to east approximately one degree every day, as measured against the fixed stars, and so completes this apparent westward motion approximately once every year.

جهــة تلي خط الزوال وجهة تلي ما تحت الأرض، فتكون الجهة التي تلي خط الزوال هي التي إليها الحركة الآخذة بالارتفاع وتلك غايتها، لأنّها تكون هناك أقرب ما تكون من المطلوع عليه، ثم تأخذ في مفارقته قليلاً قليلاً، والبُعْد عنه إلى أنْ تغرب عنه. والغاية التي إليها يتوجه المتحرك هو القدّام وما يقابله هو الخَلْف، فخط الزوال بالقياس إلى الحركة الشــارقة الطالعة قدّام، وما يقابله خلْف. ولما كانت جهة المشــرق، الجهة التي عنها مبدأ الحركة، فأولى ما يُشــبّه به من جهة الحيوان اليمين؛ فيكون المغرب هو اليســار. وبقي القطبان، يحدّدان البُعْد الذي هو غير البُعْد المحدّد بالقدّام والخَلْف؛ الذي هو أولى بأنْ يكون عمقاً، وغير البُعْد المحدّد باليمين واليســار الذي هو أولى أنْ يكون عرضاً، فليس له إلاّ أنْ يكون بُعْــد الطول. وأُولَيْ القطبين بأنْ يكون على جهة المقايســة علواً هــو الجنوبي في الحركة الفلكية الأُولى، والشــمالي في الحركة الثانية. فإنّا لو توهمنا إنســاناً يتحرك على نفســه مســتديراً، وتنبعث حركته من يمينه؛ لكان يكون قدّامه ما يلي وجهه، وهو ما بين يمينه ويساره. وذلك عند خط الزوال وخلفه ما يلي ظهره وإذا أطبقنا بين يمينه وجهة المشرق، وبين يساره وجهة المغرب، وبين وجْههِ وجهة خط الزوال؛ انطبق رأسه مع القطب الجنوبي

the direction of the meridian, the [top of] his head will correspond precisely with the South Pole. So, were he to rotate about himself like the Heavens, the head must be the South Pole, the face is the Midheaven,[13] while the right-hand side must be eastward.[14] Other than the fact that one of the poles is up and the other is down, there is absolutely no difference in them. [Whatever difference there may be] it is purely by comparison with an animal after directions are delimited owing to other factors. So, in that case, differences in the state of the poles are relative to the directions. That eastward is the right-hand side, however, is on account of something in the motion as it is related to the horizon, whether it [is or] is not compared to an animal, for the motion essentially originates from the eastward direction; and the same holds for the direction of the Midheaven, since the motion is toward it. So, when motion distinguishes eastward, westward, and the Midheaven relative to the horizon—and, moreover, when it distinguishes the limiting points—there is entailed a certain accidental distinction with respect to the poles. [This distinction, however,] is not owing to something primarily associated with the poles, but, rather, owing to a certain relation concomitant with it because of the distinction that happened to belong to something other than them. If you take some part of the celestial sphere

13. That is, the *Medium Coeli* of Ptolemaic astronomy, which, in the present context, seems to correspond with the direction facing the point where the meridian intersects the ecliptic.

14. It is difficult trying to picture the image Avicenna has in mind. The diagram below is one way of visualizing it.



لا غير. ولو دار على نفسه مثل دَوْر السماء، لكان الرأس يلزم الجنوبي، والوجه يلزم وسط السماء، وحيث اليمين يلزم المشرق، إلاّ أنْ يكون أحد القطبين علواً والآخر سفلاً، ليس لاختلاف البتة في أمر القطبين، بل بالمقايسة الصرفة إلى الحيوان، بعد أنْ تتحدّد جهات لأمورٍ أخرى، فتختلف حال القطبين حينئذ بالقياس إلى تلك الجهات. وأمّا كون المشرق يميناً فهو لأمرٍ في الحركة مقيسة إلى الأُفق، وإنْ لم يكن حيوان يقايس به، فإن جهة المشرق لذاتها عنها تنبعث الحركة، وكذلك حال جهة وسط السماء من كونها إليها الحركة. فإذا كانت حركة تميّز المشرق والمغرب ووسط السماء بالقياس إلى الأُفق، ثم إذا تميّزت هذه الحدود؛ لزم في القطبين أنْ يعرض لهما تميّز ما، لا لأمرٍ متعلق بالقطبين تعلّقاً أولياً، بل لنسبةٍ تلحقه بسبب ما عرض لغيرهما من التميّز. هذا، وأمّا إنْ أخذتَ جزءاً من الفلك

as undergoing motion and consider it itself, you will find that what is between the eastward and westward [sides] is the length of the distance. Now, [in this case, should] it strike you that what is between the two poles is the breadth of that length, then you consider how the state of directions will vary.

(10) While the two poles delimit two directions of that body itself and its motion, they do not essentially delimit up and down, nor is there any contrariety with respect to them, since there is no contrariety in the natures of what is in them. Instead, they delimit up and down by analogy and by a certain relation to animals. As for eastward and westward (and the same will hold for the Midheaven), the two delimit two directions for the body itself neither alone nor when taken together with its motion, but only relative to the horizon. In addition to the [body's] relation [to the horizon], one part of the motion itself must be distinguished from another part relative to the horizon. [That follows] since it has to differ such that part of it is that *from which* and part of it is that *toward which* [the motion tends]—one being the motion's place of origination, the other its destination. [So] each one has an opposite for which we do not at all have to take into account a certain relation or parallel with animals. Together with that, there occurs between them a certain species of contrariety or opposition. Now, given all of this, and the fact that right and left are assigned to the celestial sphere's motion and to animals [only] equivocally or by analogy, up and down are most suited to be that [namely, the species of contrariety or opposition belonging to the poles]. As for front and rear, it would seem that front belongs to the ascending part of the celestial sphere in a sense common to both it and others. That is because, if by *front* we mean some ultimate endpoint toward which the

متحركاً واعتبرته بنفسه، وجدتَ ما بين المشرق والمغرب طول المسافة، وحصل لك ما بين القطبين عُرْضاً لذلك الطول، فانظر إلى حال هذه الجهات كيف تختلف.

(١٠) أمّا القطبان فيحدّدان جهتين لذات الجسم وحركته، ولا يحدّدان بذاتيهما فوقاً أو سُفْلاً، ولا يكون فيهما تضادّ؛ إذ لا تضادّ في طباع ما هي فيه، بل يحدّدان فوقاً وسُفْلاً بمقايسةٍ ونسبةٍ إلى حيوان. وأمّا المشرق والمغرب، وكذلك وسط السماء، فليسا يحدّدان جهتين لذات الجسم وحده ولا لذاته مأخوذة مع حركته، بل بمقايسته إلى الأفق. ثم بعد المقايسة فإنَّ نفس الحركة توجب تمييز بعضها من بعض بالقياس إلى الأُفق، إذ توجب أنْ تكون متخالفة؛ فيكون بعضها عنه، وبعضها إليه، وبعضها منبعث الحركة، وبعضها متجه الحركة، ولكل واحدٍ مقابل. ولا نحتاج في ذلك إلى أنْ نراعي مقايسة ومحاذاة مع حيوانٍ البتة، ومع ذلك فقد تقع بينها - نوع ما - مضادّة أو مقابلة. ومع هذا كله، فإنَّ اليمين واليسار تقع على جهات الحركة التي للفلك والتي للحيوان باشتراك الإسم أو باشتباهه والفوق والسُفْل أولى بذلك. وأمّا القدّام والخَلْف فيشبه أنْ يكون الجزء الطالع من الفلك قد يوجد له قدّام؛ بمعنىً يعمّه وغيره، وذلك لأنّا إن عنينا بالقدّام نهاية ما يتحرك إليه

ascending part is moving, the celestial sphere would have no front, for its motion has no [ultimate] endpoint toward which it tends. If we mean some endpoint toward which the ascending thing is moving—that is, the thing over which it is ascending—then that endpoint is projecting toward the thing that defines the horizon, and, by defining the horizon, it defines the ascending. [That] is because, when [some body] ascends over [the horizon], continuing to move along until it is projecting at [the zenith of] the meridian, and thereafter moves away from it until it sets at that same horizon, then, if nothing defined the horizon, there would be no horizon, and so there would be neither an ascending nor a meridian, since the delimitation of these directions is relative to [the horizon]. This is the way [in which] we should conceptualize these directions, understanding that these six directions are delimited for the celestial sphere inasmuch as it is undergoing circular motion. As for the direction of the surface that is closest to the Earth and its opposite, it has that inasmuch as it is a body having shape and position, not inasmuch as it is moving.

◆

الجزء الطالع مطلقاً ، لم يكن للفلك قدّام فإنّه ليس لحركته نهاية إليها تقصد . وإنْ عنينا نهاية ما يتحرّك إليه الجزء الطالع – وهو طالعٌ على شـــيء – فتلك النهاية هي مسامتة الشيء الــذي حدّد الأُفق فحــدّد الطلوع بتحديد الأُفق ، فإنّه إذا طلع عليه لا يزال ينحو نحوه إلى أنْ يسامته في خط الزوال ، ثم يعرض عنه إلى أنْ يغرب عنه في ذلك الأُفق بعينه . فإنْ لم يكــن محدّداً للأُفق لم يكن أُفق ، فلم يكن طلوعٌ عليه ولا كان خط زوالٍ فلمّا كان محدّداً تحدّدت هذه الجهات بالقياس إليه . فهكذا يجب أن تتصور أمر هذه الجهات ، ونعلم أنَّ هذه الجهات الســت تتحدّد للفلك من حيث هو متحرك على الاســتدارة . وأمّا جهة السطح التي تلي الأرض والتي تقابلها فذلك له من حيث هو جســمٌ على شــكله ووضعه ، لا من حيث هو متحرّك .

FOURTH BOOK: ON THE ACCIDENTS OF THESE NATURAL THINGS AND THEIR INTERRELATIONS, AS WELL AS THE THINGS THAT ARE NECESSARY CONCOMITANTS OF THEIR INTERRELATIONS

Chapter One

Of the subjects contained in this book

(1) In this book, we must independently investigate how motion is one and many; how two motions coinciding in concert are and are not to be compared in relation to their speed; how one motion is and is not contrary to another; how motion is natural; whether place is natural and how it is so; whether every body has a natural place; and how motions are not natural and how many kinds are non-natural. We shall also bring together all of motion's specific differences and explain the interrelations between[1] the motive powers and motions.

1. Reading *mā bayna* with **Z**, **T**, and two MSS consulted by **Y** for **Y**'s preferred *ta'thīr* (influence).

<المقالة الرابعة>

في عوارض هذه الأمور الطبيعية
ومناسبات بعضها من بعض
والأمور التي تلحق مناسباتها

<الفصل الأول>

في الأغراض التي تشتمل عليها هذه المقالة

(١) يجب أنْ نحقّق في هذه المقالة أنَّ الحركة كيف تكون واحدة، وكيف تكون كثيرة، وأنَّ الحركة كيف تكون مضامّة مطابقة لحركةٍ أخرى تقايسها في السرعة والبُطْء؛ وكيف لا تكون، وكيف تكون الحركة مضادّة لحركةٍ أخرى، وكيف لا تكون. وأنَّ الحركة كيف تكون طبيعية، وأنَّ المكان هل يكون طبيعياً، وكيف يكون طبيعياً وهل لكل جسمٍ مكانٌ طبيعي، وأنَّ الحركات كيف تكون غير طبيعية وكم أقسام غير الطبيعية؟ وأنْ نجمع جميع فصول الحركة، وأنْ نعرف مناسبات مابين القوى المحرّكة والحركات.

Chapter Two

On the numerical unity of motion

(1) There are a number of ways in which motion is one: either one in number, one in species, or one in genus (whether the proximate or remote genus). Let us, then, investigate what is one in number before the others. We say that a group of Parmenides' followers, and some Platonists who stood with them, wholly denied that being one or even being itself is to be attributed to motion.[1] They asked: How can being be attributed to motion when none of [the motion] ever determinately exists? They also mentioned other puzzles, which we have already presented in the preceding chapters on motion[2] and time.[3] For example, they asked: How could being one be attributed to motion when there is no motion that cannot be divided into past and future, nor is there any motion that does not have two periods of time belonging to it, whereas those who affirm that motion is one make, as a condition for it, that its time be one? Also, how could motion be one when everything that is one is something complete with respect to that in which it is one, and everything that is complete has a fixed existence, the parts being present (if it has them), whereas motion has no fixed existence despite the fact that it does have parts? In what preceded, we have already explained the case involving motion's existence so as not to need to worry about these puzzles.[4] At present, we need to explain the case involving motion's being one and [show] how to resolve the sophism that they have raised.

1. Cf. Aristotle, *Physics* 1.2.
2. The reference may be to 2.1.5.
3. See 2.10.2–4.
4. See 2.1.1–11.

<الفصل الثاني>

في الحركة الواحدة بالعدد

(١) الحركة تكون واحدة على وجوه. فإنَّها إمّا أنْ تكون واحدة بالعدد، وإمّا أنْ تكون واحدة بالنوع، وإمّا أنْ تكون واحدة بالجنس؛ إمّا بالجنس الأقرب وإمّا بالجنس الأبعد. فلنحقّق الواحد بالعدد قبل غيره فنقول: إنَّ قوماً من آل برمانيدس ومَنْ شايعهم من أصحاب أفلاطن منعوا كل المنع أنْ تكون الحركة توصف بالوحدة؛ بل بالهوية، وقالوا كيف توصف الحركة بالهوية، ولا يحصل شيء منها موجوداً حاصلاً؟ وقالوا – سائر ما قد فرغنا منه من الشكوك في باب الحركة والزمان فيما سلف – مثل قولهم كيف توصف الحركة بالوحدة، ولا حركة إلاّ منقسمة إلى ماضٍ ومستقبل، ولا حركة إلاّ ولها زمانان، ومثبتو وحدة الحركة يشترطون أنْ يكون زمانها واحدا. وكيف تكون الحركة واحدة، وكل واحدٍ فإنّه تامّ فيما هو فيه واحد، وكل تامّ فهو قارّ الوجود حاضر الأجزاء إنْ كانت له، والحركة لا وجود قارّ لها، مع أنَّ لها أجزاء؟ . ونحن – فيما سلف – قد بيّنا الحال في وجود الحركة بياناً لا نلتفت معه إلى هذه الشكوك. والآن، فيحق علينا أنْ نبيّن الحال في وحدة الحركة، ونبيّن أنَّ الشبهة التي أوردوها منحلّة.

(2) We say: We ourselves have already explained that motion is said both of the first perfection (which we have described) and of traversing a distance.[5] The unity of the first perfection is through the unity of its subject, together with the unity of time during which it exists, which is continuous, and is like the rest of the attributes [in that] their subject's being one, [taken] alone, is not enough that they are individually one. [This] is because, when a single subject has the accident of white in it, and then [that accident] ceases, but thereafter it happens to have another instance of white in it, this [latter] white is not the same individual one that the first one was. So the motion is one (in the sense that we have designated) when the subject is one and the same during one and the same time, where the unity of the time is its continuity. So every motion having this description is individually one. Also, [motion] is inevitably in the thing undergoing the motion with respect to some thing that is one. Examples would be one continuous distance; or some white toward which the mobile is directed without temporally stopping at some [other] degree [of whiteness] during the alteration; or, again, one quantity or the like. This account is no less deserving of being included as a condition of motion's unity than time is. If mentioning time is necessary and even sufficient, that is not because it is a distributive attribute of all the conditions by which motion is one, but, rather, because it necessitates the remaining condition, and, from [time], the mind is moved to [that condition] and entails it. (You know the difference between what is distributed, what necessitates, and what is entailed.) As for motion that is in the sense of a traversal, this account [that is, time] is most deserving of being a condition for it. So the things that must be one in order that the motion be one are the mobile, the distance (and what is analogous to it), and the time. So, necessarily, what is undergoing motion, the distance (or that with respect to which there is motion), and the time are one—that is, one in number in its entirety.

5. See 2.1.5–6.

(٢) فنقــول : قد بيّنا نحن أنَّ الحركة تقال للكمــال الأول الذي وصفناه وتقال لقطع المســافة . فالكمال الأول وحدته بوحدة الموضوع له ، مــع وحدة زمانٍ موجودٍ فيه ؛ التي هي اتصال ، وكســائر الصفات التي لا تكفي في كونها واحدة بالشخص ، كون موضوعها واحــداً فقط ، فانَّ الموضوع الواحد إذا عــرض فيه بياضٌ ، ثم عُدم ، ثم عرض فيه بياضٌ آخر ، لم يكن هذا البياض هو بعينه الأول بالشخص . فتكون الحركة – بالمعنى الذي أشرنا إليــه واحدة ، إذا كان الموضوع واحــداً بعينه ، في زمانٍ واحدٍ بعينه ، ووحدة الزمان هي اتصاله . فكل حركةٍ بهذه الصفة فهي واحدة بالشــخص ، وتكون لا محالة في متحركٍ فيه واحد ، مثل مســافةٍ واحدةٍ بالاتصال ، ومثل بياضٍ يتوجه إليه المتحرك بالاستحالة اتجاهاً لا يقــف فيه عند حدّ زماناً ، ومثل كمّ واحدٍ ، أو غير ذلك . وليس هذا المعنى بأولى في أنْ يدخل شرطاً لوحدة الحركة من معنى الزمان ، وإنْ كان لا بُدّ من ذكر معنى الزمان . وإنْ كان معنى الزمان يكفي ذكره ؛ فذلك ليس لأنّه متضمنٌ جميع الشروط التي بها تكون الحركة واحدة ، بل لأنّه يقتضي الشرط الباقي ، وينتقل الذهن منه وإليه ويلتزمه ، وأنت تعلم الفرق بــين المتضمــن والمقتضي والملتزم . وأمّا الحركة ، التي هي بمعنــى القطع ؛ فهذا المعنى أولى بأنْ يكون شــرطاً فيها ، فالأمور التي يجب أنْ تكون واحدة ، حتى تكون الحركة واحدة ، هــي المتحرك والمســافة وما يجري مجراها والزمان ، فيجــب أنْ يكون المتحرك واحداً ، والمسافة – أو ما فيه الحركة – واحداً ، والزمان واحداً ، أي واحداً بالعدد في جميعه .

(3) Motion's being many follows when the things that provide the motion with a certain quality and type of divisibility are many. These things are three: the mobile, that with respect to which [there is the motion], and the time. So, if there are many things undergoing motion while the distance is one and the same, there are many motions. Also, when there are many things undergoing motion and the time is one and the same, the distances and that with respect to which there is motion must be numerically many. Again, when there are many things undergoing motion and the distance is one, the periods of time are many. [That] is because, [when] the things undergoing motion are many, while the distance is one [they can do so] only when the things undergoing the motion follow one another sequentially over that distance, since two bodies do not simultaneously traverse one and the same distance any more than they are simultaneously in one place. Also, there simply cannot be many things undergoing motion during many periods of time when that with respect to which [there is motion] is numerically one, unless it is with respect to many distances, for [distance] can remain one and the same even after the traversal. As for the [categories of] quantity, quality, and the like, none is numerically one and the same when several mobiles undergo motion with respect to [these categories] in temporal succession. [That is] because the quality that belongs to *this* thing undergoing the motion insofar as it is numerically one is in no way shared in common with some other thing undergoing motion, nor is it like the distance.

(٣) فإنَّ كثرة الحركة تتبع كثرة الأشياء التي تفيد الحركة كمّاً مّا ونمطاً من الانقسام، وهذه الأشـياء هي هذه الثلاثة: المتحرك، وما فيـه والزمان. فإنْ تكثّر المتحرّك، وكانت المسافة واحدة بعينها، تكثّرت الحركات وإذا تكثّر المتحرّك - والزمان واحدٌ بعينه - لزم تكثّر المسـافات وما فيه الحركة بالعدد. وإذا تكثّر المتحرّك، والمسـافة واحدة، لزم تكثّر الزمان. فإنه لا يتكثر المتحرك والمسـافة واحـدة إلاّ وتكون المتحركات تتعاقب على تلك المسافة، إذ لا يقطع جسمان معاً مسافةً واحدةً بعينها، كما لا يكونان في مكانٍ واحدٍ معاً ولا يجوز أنْ يتكثّر المتحرّك في أزمنةٍ كثيرة وما فيه واحد بالعدد البتة، إلاّ في المسافات، فإنّهـا يجـوز أن تبقى بعد القطع واحدة بعينها. وأمّا الكمّ والكيف وغير ذلك، فلا يكون كيـفٌ واحدٌ بعينه، ولا كمٌّ واحدٌ بعينه بالعدد، يتحرّك فيه متحركون عدّة في زمانٍ بعد زمـان، لأنَّ الكيفية التـي لهذا المتحرّك، من حيث هي واحدة بالعدد، لا يشـاركه فيها متحرك آخر بوجه لا كالمسافة.

(4) We suppose that all of this entails that the mover is numerically one and that, when several things move something together, it is only as one thing, since the collection [of movers] becomes a single mover, since one of them alone would not produce the motion. Still, if it is possible that something produce a motion, and, either just before or simultaneous with its ceasing to produce the motion, there comes to exist a certain relation to that moved body together with some other mover—in that case, then, this thing that is undergoing the motion is aptly one through one motion. An example would be a piece of iron that is no longer being influenced by some magnet but, that we were then to imagine [that the iron] is all at once passed on to some other [magnetic] nature, and [that] the iron happens to be where it is attracted by the other magnet (and there is no time between the ceasing of the first and the beginning of the second's influence, the time and distance being continuous). Similarly, were some water heated by one fire and, then, without delay it immediately and successively came upon other fires until it reached a certain degree of hotness, this motion would not be many, but one, except by comparison. [That] is because the thing undergoing the continuous motion just happens to be many in the way in which we say *a lot,* sometimes in the sense of actually distinct and separate [things] and other times by making comparisons.[6] In fact, time also is actually divided in this way—namely, when it is compared with the starting and ending points of things coming to be during it and then instants are marked off in it accordingly. The same thing happens in our case: With the arrival of each mover,[7] a first instant of its time is posited, being posited in the time by making a comparison [with the given arrival]. As a result of that, the time is accidentally many, and so the motion is accidentally many. In this case, because of the time,

6. For example, when we say that a child rides the merry-go-round *a lot,* we may mean that he rode it at a number of different times throughout the day, or we may mean that he rode it only once but remained on it much longer than the other children, or longer than one might have expected.

7. Reading *muḥarrik* with two of the MSS consulted by **Y**, as well as **Z** and **T**, for **Y**'s preferred *mutaḥarrik* (mobile).

(٤) ونظنّ أنّه يلزم هذا كله أنْ يكون المحرّك واحداً بالعدد، وأنَّ العدّة إذا اجتمعت على تحريك شيءٍ فإنّما هي كشيءٍ واحد، إذ تصير الجملة محركاً واحداً، إذ ولا واحد منها يحرّك وحده. لكنه إنْ أمكن أنْ يكون شيء يحرّك وقبل أنْ ينقطع تحريكه أو مع انقطاع تحريكه – تقع هناك مناسبةٌ للجسم المتحرك مع محرّكٍ آخر؛ كما يتخلّص حديدٌ مثلاً من تأثير مغناطيس لو توهمناه قد استحال إلى غير طبيعته دفعة، وحصل الحديد حيث ينجذب إلى مغناطيس آخر، ولم يكن بين تعطّل الأول وابتداء تأثير الثاني زمان، واتصل الزمان والمسافة. فبالحري أنْ يكون هذا المتحرك واحداً بحركةٍ واحدة، وكذلك لو سُخّن ماء بنار تلحقه عقيب نار، من غير وقوع فتور، حتى بلغ حدّاً من السخونة. فبالحري أنْ لا تكون هذه الحركة متكثرة، بل تكون واحدة، إلاّ على جهة المقايسة. فإنَّ الشيء المتحد بالاتصال قد يعرض له التكثّر على ما قلنا مراراً؛ تارة من جهة التفكيك والقطع بالفعل، وتارة من جهة المقايسات. فإنّ الزمان ينقسم أيضاً بالفعل على هذه الجهة، وذلك إذا قيس بمبادىء أُمور كائنة فيه وغاياتها، فارتسم‹تْ› فيه، بحسب ذلك، آناتٌ، فيكون في مسألتنا أيضاً يُفرض، عند ورود كل محرّكٍ، آنٌ أول من زمانه، يفترض في الزمان بالمقايسة. فيعرض من ذلك أنْ يتكثّر الزمان، فيعرض من ذلك أن تتكثر الحركة، ولا تكون حينئذ الحركة واحدة للزمان من هذه الجهة، ومن حيث أنَّ الزمان واحدٌ في

the motion is not one from this perspective [namely, accidentally not one], whereas, inasmuch as the time in itself is one, the motion in itself is one. This is like what happens to the motions of the celestial sphere relative to the [Sun's] rising and setting such that the time and motion are divided accordingly without the continuity being severed. Also falling under this sort would seem to be the audible sound of a string plucked a single time so as to continue [sounding] for a while, which is called a *musical note*. [That] is because, in the particular instances of natural things and observing their states, you will learn that this musical note does not result from the pick's being on the string; rather, the strumming sound of the string results only by the pick's causing a vibration in it that pushes the air[8] and so produces a sound. Thereafter, it continues to vibrate like that, one strumming sound occurring after another, until it stops vibrating. Those strumming sounds preserve the continuous sound that is heard (if there is, in fact, something continuous like what we hear, and [if] the strumming sounds are not so small as to be imperceptible). Know that the common action itself [occurring] at a single instant does not require[9] that the motions be a single thing. [That] is because a single instant might be an endpoint of some locomotion while being a starting point of some alteration, both of which belong to a single body, where the two motions are not one.

(5) Equally just taking the terminus *a quo* or *ad quem* alone as a condition is not enough for the unity of motion. [That] is because being away from the terminus *a quo* may be not only toward the terminus *ad quem* but also toward the privation without crossing an intermediary. Equally, reaching the terminus *ad quem* may be all at once without crossing an intermediary. The two motions are not even one in species, let

8. Literally, "by strumming the string so that the pick, when it pulls away, forces the string to depart from its position to another with a certain power and strength that hits the air so as to push it on."

9. Reading *yūjibu* (masc.) with **T**, which is in close parallel with **Z**'s *tūjibu* (fem.), for **Y**'s *yūjidu* ([it] exists).

ذاتــه، تكون الحركــة واحدة في ذاتها. وهذا مثل ما يعرض لحــركات الفلك بالقياس إلى الشــروق والغروب، فينقســم الزمان، وتنقسم الحركة، بحســب ذلك، انقساماً لا يقطع الاتصال. ويشــبه أنْ يكون الصوت المســموع من الوتر المنقور بنقرةٍ واحدة الباقي زماناً، الذي يســمّى نغمة، هو من هذا القبيل، فإنَّ هذه النغمة، ســتعلم في جزئيات الطبيعيات ومشاهدة أحوالها، أنّها ليست تحدث عن وقع المضراب على الوتر، بل إنّما تحدث من قرع الوتــر المدفوع بالمضراب عن وضعه المنصرف، عند مفارقة المضراب إلى وضعه، انصرافاً بقــوةٍ وحميّةٍ يقرع ما زحمه من الهواء فيصوّت. ثم لا يزال مهتزاً كذلك، فيحدث قرعٌ بعد قرعٍ إلى أنْ يهدأ، وتكون تلك القروع مســتحفظة لصوتٍ مســموعٍ على الاتصال، إنْ كان بالحقيقة متصلاً كما يســمع، ولم تكن القطوع من الصغر بحيث لا تُحسّ. واعلم أنَّ نفس الاشــتراك في الآن الواحد لا يُوجب أنْ تكون الحركات متحدة، فإن آناً واحداً قد يكون منتهى نقْلةٍ ومبتدأ استحالةٍ كلاهما لجسم واحد، ولا تكون الحركتان واحدة.

(٥) وأيضاً فإنَّ اشــتراط ما منه، أو مــا إليه وحده، غير كافٍ في وحدة الحركة. فإنَّ ما منه قد يفارق لا إلى الذي إليه وحده بل إلى العدم، من غير ســلوك واســطة، وما إليه يواصل دفْعه أيضاً من غير ســلوك واســطة، فلا تكون الحركتان واحدة بالنوع فضلاً

alone one in number. Also, taking as a condition that they be simultaneous is not enough for that, because sometimes [the mobile moves] away from the terminus *a quo* toward the terminus *ad quem* through disparate mediums. In the case of distance, sometimes [the mobile] tends in a straight line toward the terminus *ad quem* and, at other times, [it travels] twisting and turning. In that case, the two motions are not one in species, let alone one in number. Likewise, sometimes [the motion] is from black to white via shades of grey, while at other times it is from yellow, then red, then dark ochre, and at even other times it is from chartreuse and then green. Now, when the two are taken as a condition [of the motion's being one] together with the previously noted conditions, then making them conditions, is superfluous. [That] is because, when that through which [there is motion] is made one, it is precisely from some starting point that is one toward some endpoint that is one. The former implies this account.

(6) So the motion that is numerically one is something continuous with respect to its time and whose distance and subject are one as well. The best candidate is that one that is the same in species, in which there is no variation. Now, [such motion] is seldom found in locomotion, for the natural ones accelerate at the end, whereas the forced ones decelerate the closer they are to the end. The continuous motions most deserving of being one are the rectilinear (if the estimative faculty can picture something's being continuous along an angle)[10] and the circular. That is most appropriate of what is complete and not deficient; for being complete is one of the attributes of being one, while what is deficient is some portion of what is one. It is also most fitting that what is complete should be such that it cannot be increased without being repeated. Now, while it is the case that when circular motion makes a complete rotation,

10. For this conception of continuous, see 3.2.8.

عن العدد . وأيضاً فإنَّ اشـــتراطهما معاً غير كافٍ في ذلك، لأنَّ ما منه قد يفارق إلى ما إليه من متوسطاتٍ شتى. أمّا في المسافة فقد يقصد ما إليه ممّا منه على الاستقامة، وقد يقصـــد على تقويسٍ وتحنيةٍ، فلا تكـــون الحركتان حركة واحدة بالنوع، فضلاً عن العدد . وكذلك قد تؤخذ من الســـواد إلى البياض من تطريق الدُكْنة، وقد تؤخذ من طريق الصفرة ثم الحمرة ثم القُتمة، وقد تؤخذ من طريق الفســـتقية ثم الخُضرة، وإن اشترطا مع الشرائط المذكورة كان اشتراطهما فضلاً . فإنَّ الطريق إذا جعل واحداً ، لم يكن إلاّ عن مبدأ واحدٍ إلى منتهى واحدٍ ، ويضمن ذلك هذا المعنى .

(٦) فالحركة الواحدة بالعدد هي المتصلة في زمانها ، ومسافتها واحدة، وموضوعها واحد ، وأُولى ذلك المستوية بالنوع الذي لا اختلاف فيها ، وقلّ ما توجد في المكانية، فإنَّ الطبيعية تشـــتد آخراً ، والقريبة القســـرية تفتر آخراً . وأُولى الحركات المتصلة بالوحدة هي التي على الاستقامة أو الاستدارة، إنْ توهم للمتصلة على الزاوية وجود ، وأُولى ذلك ما تمَّ ولم ينقص ، فإنَّ من صفات الواحد أنْ يكون تامّاً ، والناقص بعض الواحد . وأولى ما يكون تاماً ما ليس من شأنه أنْ يزاد عليه بلا تكرّر ؛ وهو الحركة المستديرة إذا تمّت الدورة، فلا

it is not increased but only repeats, that is not so for rectilinear motion as such. [That] is because, when rectilinear motion is completed, its completion is not because it is rectilinear, but on account of the fact that no distance remains, like [at] the edge of the universe. From the truth of this claim, the claim that the rectilinear line has the best title to being complete comes up short, because [the rectilinear line] has a beginning, middle, and end, whereas the circle has none of that. Indeed, if the circle is complete, the motion along it does not need to be [that is, come to an end]. [That is] because rectilinear motion comes to an end and is complete, whereas circular motion [need not] either come to an end or be complete. As a preliminary, it is not the case that whatever is complete possesses a beginning, end, and[11] middle. Instead, what is one with respect to the totality is more complete than the many in which only this threefold division [of beginning, end, and middle] exists. This, however, is only one species of completeness and is considered only with respect to what possesses number, whereas the circle has unity of form. It is not susceptible to increase, precisely [because] and for no other reason than [that] it is a circular line, while, if what is rectilinear is not so susceptible, it is not because it is rectilinear, but for some other reason. Now, when circular motion completes a rotation, it starts again, and so each rotation is one; and our discussion concerns a rotation's being one.

(7) So this is what we have to say about motion that is one in number. Let us now discuss motion that is one in species and genus.

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11. Secluding *ṭaraf* (limit) with **Z** and **T**, which apparently appears in only two MSS consulted by **Y**.

يزاد عليها بل تكرّر . ولا كذلك المستقيمة ، من حيث هي مستقيمة ، فإنَّ المستقيمة إذا تمت فليس تمامها لأنَّها مستقيمة ، بل لأجل أنَّ المسافة لم تبق ، كقطر العالم . ويسقط من تحقّق هذا قول من قال : إنَّ الخط المستقيم أولى بالتمام ؛ لأنَّ له ابتداءً ووسطاً وانتهاءً ، ولا شيء من ذلك للدائرة ، فإنّه إنْ كانت الدائرة تامّة ، فليس يجب أنْ تكون الحركة عليها تامّة ، لأنَّ الحركة على المستقيمة تتناهى وتتم ، وعلى المستديرة لا تتناهى ولا تتم . فأمّا أولاً ، فليس كل ما هو تام فهو ذو ابتداء وانتهاء ووسط ، بل الواحد في الجملة أتمّ من الكثرة التي لا يوجد هذا التثليث إلاّ فيها ، بل هذا نوعٌ من التمام . ولا يعتبر هذا التمام إلاّ في ذي عدد ، والدائرة وحدانية الصورة ، وإنّما لا تقبل الزيادة لا لشيء غير أنّها خط دائرة ، والمستقيم إنْ لم يقبل فليس لأنّه مستقيم ، بل لسببٍ آخر . وأمّا الحركة المستديرة فإنّها إذا تمت دورة ابتدأت منت رأس ، فتكون كل دورةٍ واحدة ، وكلامنا في دورةٍ واحدة .

(٧) فهذا ما نقوله في الحركة الواحدة بالعدد . ولنتكلم الآن في الحركة الواحدة بالجنس والنوع .

Chapter Three

On motion that is one in genus and species

(1) Since motion is like the rest of the accidents[1] with respect to the judgments that follow upon being an accident, it is many and one just as other accidents are many and one. So, just as white, for example, is numerically many only when its subject or the time [during which it exists] is many, so likewise is motion. Also, just as white is not many in species and genus simply because the subject is many, whether with respect to species or genus—rather, the whiteness of snow and the phoenix are one in species (since they do not differ by some admixture of another color), while the whiteness of snow and sands[2] [are one in genus][3]—so, likewise, the simple fact that the subject is many in either genus or species does not require that the motion be many in species or genus. That is because something's being many in species is a consequence of the specific differences' being many, whereas the relations of accidents to their subjects falls under the accidents' set of accidental judgments. You have learned, however, that the accidentality of the essences of accidents belongs only to the necessary[4] accidental accounts, not constitutive ones. Now, the accidental relations of the things themselves to

1. Reading *aʿrāḍ* with **Z** for **Y**'s and the **T**'s *aghrāḍ* ("goals" or "tendencies").
2. See Lane, *Lexicon,* s.v. *ḥajar* for this metonymical use of *ḥijārah*.
3. The text seems incomplete. Avicenna is providing examples of when white might exist in different subjects and yet be either specifically or generically alike. The example of snow and the phoenix present two things that are the same species of white: namely, pure white with no tinge of any other color. Thus, it would not be unreasonable to think that he is providing here an example of two things that, while generically white, are not the same species of white—hence the suggested addition.
4. Reading *al-lāzima* with **Z** and **T** for **Y**'s *li-azmina* (belonging to or on account of the periods of time). **Y** would seem to have some support for his reading, since *azmina* does appear two lines below; however, he has been misled, since Avicenna will there take up the second way in which motions differ numerically and why it need not imply a specific or generic difference in the motion. Moreover, at *Kitāb al-madkhal* 1.13, Avicenna discusses how necessary accidents (using the same vocabulary as here) can be specific differences while not being constitutive differences that produce a new species, which is the very point of the present context.

<الفصل الثالث>

في الحركة الواحدة بالجنس والنوع

(١) ولمّا كانت الحركة مشاركة لسائر الأعراض في الأحكام التي تتبع العرضية، كان تكثّرها وتوحدها يشاكل تكثّر الأعراض الأخرى وتوحدها. فكما أنَّ البياض، مثلاً، إنَّما يكـون متكثّراً بالعدد، إذا تكثّر موضوعه أو زمانه، فكذلك الحركة. وكما أنَّ البياض لا يكون متكثّراً بالنوع أو متكثّراً بالجنس، لنفس تكثّر الموضوع بالنوع أو بالجنس، بل يكون بياض الثلج وبياض القفنس – إذا لم يختلفا بمخالطة لونٍ آخر – واحداً بالنوع، بل بياض الثلـج والحجارة. فكذلك ليس نفس تكثّر الموضوع بالنوع أو بالجنس يوجب تكثّر الحركة بالنوع أو بالجنس، وذلك لأنّ تكثّر الشـيء بالنوع يتبع تكثّر الفصول وإضافات الأعراض إلى موضوعاتها، من جملة الأحكام العرضية للأعراض. فقد علمتَ أنَّ العرضية لماهيات الأعـراض إنّما هي من المعاني العارضـة اللازمة دون المقوّمة، وإضافات الذوات العرضية

their differing subjects are accidental features belonging to them, not constitutive of them so as to constitute specific differences, whereas there being many individuals does not depend upon essential differences, but upon accidents. As for periods of time, they do not at all differ in species as periods of time, but individually (if they must), because they are divisions of one continuous thing. Being joined to that which differs individually but not specifically, however, in no way requires a differentiation that makes for a different species.

(2) Motion's species may differ by things that do constitute the motion's essence—namely, [the category] with respect to which [there is motion] and the termini *a quo* and *ad quem*. So, when a species of one of these differs, the motion is different in species. So, when that with respect to which [there is motion] differs, while the termini *a quo* and *ad quem* remain consistent, the species of motion is different. An example would be that one of two motions is a rectilinear motion from some starting point to some endpoint, while the other is a circular motion from the one to the other.[5] The same holds when that with respect to which [there is motion] remains consistent, whereas the termini *a quo* and *ad quem* differ, as in the case of ascending and descending. Necessarily, then, when there is a change of one of these in species (whether with respect to itself or with respect to certain conditions and states included among the ones upon which the motion depends), the motion is not one in species. So, if all of [the motions] are with respect to place, or quality, or quantity, then they are one with respect to the highest genus, while, if they agree with respect to some lower genus, such as being colored, they are one with respect to the lower genus.

5. In this case, the rectilinear motion is a motion with respect to the category of place, while the circular motion is with respect to the category of position.

إلى موضوعاتها المختلفة أمور عارضة لها ، لا مقوّمة إياها تقويم الفصول. وأمّا تكثّر الأشخاص فليس متعلقاً بالفصول الذاتية ، بل بالعوارض. وأمّا الأزمنة فلا تختلف من حيث هي أزمنة بالنوع البتة ، بل بالشخص – إنْ كان لا بُدّ – لأنها أقسام متصل واحد ، ومقارنة ما يختلف بالشخص دون النوع لا توجب البتة مخالفة فصلية منوّعة.

(٢) فعسى الحركة يختلف نوعها باختلاف الأمور التي تقوّم ماهية الحركة ؛ وهي : ما هي فيه ، وأيضاً ما منه ، وما إليه ، فإذا اختلف نوعٌ واحدٌ من هذه ، اختلفت الحركة بالنوع. فإنَّه إذا اختلف ما فيه ، واتفق ما منه وما إليه ؛ اختلف نوع الحركة ، مثل أنْ تكون إحدى الحركتين من مبدأ إلى منتهى على الاستقامة ، والأخرى منه إليه على الاستدارة. وكذلك إذا اتفق ما فيه واختلف ما منه وما إليه ؛ مثل الصاعد والهابط ، فيجب أنّه إذا اختلف شيء من هذه في النوع في نفسه أو في شرائط وأحوال داخلة في تعلّق الحركة بها ، كانت الحركة غير واحدة في النوع. فإنْ كانت كلّها مكانية ، أو كلها كيفية أو كميّة ، كانت واحدة في الجنس الأعلى ، وإنْ اتفقت في جنسٍ أسفل كما في اللونية ، كانت واحدة في الجنس الأسفل.

(3) Now, whether it is with respect to the species or accidentally that circular motion with respect to place[6] differs from rectilinear motion might present a problem, for it apparently seems that being straight and being curved are accidental features of the line, not specific differences, which makes it immediately seem that one line can be posited as [both] rectilinear and curved. In that case, how can the species of rectilinear lines differ from the species of curved lined? Otherwise, were we to order them so that one species accompanies what is rectilinear and the other what is curved, then every accident could constitute a species; but that is not the case. Thus, when the straight line does not differ from the circular in species, how could rectilinear motion differ from circular motion in species so that a difference in [the lines] is [reflected] in the two [motions] as well? (This consideration concerns the rectilinear and circular motions that involve [change of] place, not the circular motion that involves position, as you have learned.)[7] We also say: A similar problem arises for ascending and descending—namely, it would seem to appear that ascending does not differ in species from descending with respect to the starting point and endpoint inasmuch as they are the limits of a certain interval, but rather, inasmuch as they are directions, one of which lies upward and the other downward. Now, the motion depends upon the starting point and endpoint only inasmuch as they are limits[8] of the distance, not inasmuch as one of the distance's two limits happened to be in one direction, while the other was in a different direction. [That] is because the motion is complete as a motion when it starts along this interval from beginning to end, even if the starting point were not so as to be upward (that is, closest to the Heavens) and the endpoint so as to be downward (that is, closest to the Earth). So, when the situation is such, this falls under one of motion's necessary accidents,

6. For example, circumambulation, as opposed to rotating in place, which is circular motion with respect to position.

7. For the two types of circular motion, see 3.14.8–9.

8. Reading the dual with **Z** and **T** for **Y**'s singular "limit."

(٣) لكنه قد يشكل الحال في أنّه هل الحركة المكنية المستديرة تخالف المستقيمة في النوع أو تخالفها بعرض؟ فإنّه يشبه أنْ يظنّ أن الاستقامة والانحناء من الأمور التي تعرض للخط، لا من الأمور التي هي فصول. ويسبق إلى الظنّ أنَّ الخط الواحد يصلح أنْ يوضع للاستقامة والانحناء، وإذا كان كذلك، فكيف يكون نوع الخطوط المستقيمة مخالفاً لنوع الخطوط المنحنية؟ اللّهم إلاّ أنْ نجعل تركيبها مع الاستقامة نوعاً، ومع الانحناء نوعاً آخر، فيكون كل عرضٍ من شأنه أنْ يقوّم نوعاً، وليس الأمر كذلك. فإذا كان الخط المستقيم لا يخالف المستدير في النوع، فكيف تكون الحركة على المستقيم تخالف الحركة على المستدير بالنوع لأجل اختلافها فيهما؟ وهذا الاعتبار في المستقيمة والمستديرة التي تكون مكانية، لا المستديرة التي تكون وضعية، على ما علمت. ونقول كذلك يشكل الحال في أمر الصاعد والهابط، ويشبه أنْ يظنّ أنَّ الصاعد لا يخالف الهابط في النوع، في المبدأ والمنتهى، من حيث هما طرفان لبُعْدٍ، بل من حيث هما جهتان؛ إحداهما تلي عُلّواً، والأخرى تلي سُفْلاً، والحركة لا تتعلق بالمبدأ والمنتهى إلاّ من حيث هما طرفا مسافة. وأمّا من حيث عَرض أنْ كان أحد طرفي المسافة في جهةٍ والآخر في جهةٍ أخرى، فذلك ليس ممّا تتعلّق به الحركة، فإنَّ الحركة تتمّ حركة إذا ابتدأت في هذا البُعْد من مبتدئه إلى منتهاه ولو لم يكن المبتدأ بحيث يكون عُلْواً وهو أنْ يلي السماء، والمنتهى بحيث يكون سُفْلاً وهو أنْ يلي الأرض. فإذا كان الأمر كذلك، كان هذا من الأعراض اللازمة للحركة، لا من

not one of the factors internal to its essence. So it does not produce some difference in species. The same holds for the difference between motions in that they are either natural or forced, for it, too, is a difference in factors outside of the motion's essence, even if necessary. So these are the puzzles that seem immediately to come to mind.

(4) As for ourselves, we say that these doubts arise only for locomotion, for they do not appear in instances of motions with respect to quality, quantity, and the like. Indeed, it is known by everyone that blackening differs from whitening on account of the difference of the termini *a quo* and *ad quem,* even if that through which [there is motion] is, as it were, one and is something passed through in each case, conversely with the other. Similarly, the process [starting at white and going through] yellow to red to black is different in species from the one going through green to indigo to black, even if the starting point and endpoint are one [and the same].

(5) This presents a problem only in the case of locomotion and requires that locomotion not be a genus, but only a species, where descent would differ from ascent by certain accidents falling under a single species, just as the literate man differs from the illiterate one. Just as *man* is taken in the definition of *literate man* and *illiterate man* and predicated of both, while not being their genus, but a subject, so, likewise, *locomotion* would be predicated in that way of descending and ascending. So it would be as if, with respect to descending, the underlying subject is rectilinear motion from a given starting point to an endpoint. So, as a result of that [alone], its being a motion would be made complete; however, it accidentally happens that this starting point was up and so the motion accidentally happened to be a descent. The same holds for the initial puzzle. For example, it is just accidental that locomotion is sometimes rectilinear and sometimes circular. [That] is

الأمــور الداخلة في ماهيتها ، فلم يكن الاختلاف به اختلافاً في نوعه . وكذلك الاختلاف الذي بين الحركات ؛ في أنْ تكون طبيعية أو قســرية ، فإنّه أيضاً اختلاف في أمور خارجة عن ماهية الحركة وإنْ كان لازماً ؛ فهذه هي الشــكوك التي يظنّ أنّها تســبق إلى الذهن .

(٤) أمّا نحن فنقول : إنَّ هذه الشــكوك لا تعرض في غير النُقْلة ، فإنّه لا يعرض في مثل الحركات التي في الكيف ، والحركات التي في الكمّ ، وغير ذلك . فإنَّ التســوّد معلومٌ من حاله ، عند كل أحد ، أنّه مخالفٌ للتبيض بالنوع ، لأجل مخالفة ما إليه وما عنه ، وإنْ كان الطريق كأنه واحدٌ ومســلوكٌ في كلٍ بالعكس من الآخر . وكذلك التصفّر إلى التحمّر إلى التســوّد ، مخالفٌ للتخضر إلى التنيّلية إلى التسوّد في النوع ، وإنْ كان في حال المبدأ والمنتهى واحداً .

(٥) إنّما يشكل هذا في أمر النُقْلة ، ويقتضي أنْ لا تكون النُقْلة جنساً ، بل تكون نوعاً فقــط ، ويكون النزول يخالف الصعود بأعراض تحت نوعٍ واحدٍ ، – كما يخالف الكاتبُ الأُميَ – وأنّه ، كما أنَّ الإنســان مأخوذٌ في حدّ الكاتبِ والأُمي ومحمولٌ عليهما ، وليس جنساً لهما ، بل موضوعاً ، كذلك النُقْلة محمولة على ذلك الوجه ، على النزول والصعود ، فكأن أصل الموضوع في النزول هو حركة مســتقيمة من مبدأ إلى منتهى ، فيتم بذلك كونه حركة ، لكن عرض لهذا المبدأ أنْ كان فوق ، فعرض للحركة أنْ صارت نزولاً . وكذلك الحال في التشــكّل الأول مثلاً ؛ أنّه عرض أنْ كانت النُقْلة تارة في مســتقيم ، وتارة في مستدير .

because the motion is not realized as a motion insofar as it happens to have some length through which there is the motion (like the circular distance) and what is shorter (like the rectilinear [distance]), such that the essences of the two motions, as a result, would differ specifically. So these are the lingering doubts that can be raised in this chapter. So we must resolve them, which requires that we first[9] show that locomotion is one genus and that the situation is not of this form.

(6) So we say that, in truth, neither the straight line nor the circular line undergoes alteration so as really to become the other. That is because the very being of the line is to be a limit of a surface, while the being of the surface is to be a limit of a body. So, as long as the body does not happen to lose its configuration, neither does the surface, and so nothing happens to the line. Also, if the body is dry, it is not bendable, whereas it is if it is wet inasmuch as the continuity of the convex curve is either broken up or extended (and conversely in the case of concavity). If the continuity of the convex curve is broken up, then the line is divided into a plurality of lines, whereas, if it is extended, that very line itself also ceases to be and another line comes to be, for one [and the same] line does not, by extension, become longer than what itself is. So, when it is impossible that either of these two lines [that is, the rectilinear and curved lines] be transferred to the nature of the other (not even in the estimative faculty), then, if the estimative faculty does that (namely, isolate the line from the surface), it makes the line have two directions as well as two sides not in the extension of [the line]. In that case, however, it has not been taken as a limit of a surface, for what possesses two directions <and two sides>[10] is a surface [and] not its limit, which is a line. So the estimative faculty took something other than a line. In fact, it took a thin body and then imagined that it was a line. So the belief that one and the same line is a subject of two things is groundless.

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9. Adding *awwalan* with **Z** and **T**, which is omitted in **Y**.

10. All the texts agree in having simply *jihatayn* (two directions), but at 3.13.3, Avicenna was explicit that a line alone is what has two directions, not a surface, as the present text would suggest. Thus, if Avicenna is to be made consistent, something like the suggested emendation seems required. Alternatively, he may have intended *jānibayn,* which would have the sense of "two (flanking) sides".

فإنَّ الحركة ليســت تتحقّق حركة بما يعرض لها من طولٍ ما تتحرك فيه كالمسافة المستدير، وقصره كالمستقيمة، حتى تختلف بذلك ماهيتا حركتين اختلافاً منوعاً. فهذه هي الظنون التــي يمكن أنْ تُظنّ في هذا الباب، فيجب أنْ نحلّها، ويلزمنا أولا أن نبيّن أنَّ النُقْلة جنسٌ واحدٌ، وأنَّ الأمر ليس على هذه الصورة.

(٦) فنقول: إنَّ الخط المســتقيم بالحقيقة والمستدير لا يصحّ أنْ يستحيل أحدهما إلى الآخــر فــي الوجود، وذلك لأنَّ هوية الخط في الوجود أنْ يكون طرف الســطح، وهوية الســطح أنْ يكون طرف الجسم، فما لم يعرض للجسم زوالٌ عن هيئته لم يعرض للسطح، فلــم يعرض للخطّ البتة. والجســم إذا كان يابســاً لم يقبل التحنيــة، وإذا كان رطباً قبل التحنية، بأنْ يكون اتصال الحَدْبة يتفرق، أو يكون اتصال الخَدْبة يمتد، والتقعير بالعكس. فإنْ تفرّق اتصال الحَدْبة، فقد انقســم الخط خطوطاً، وإنْ امتد فقد بطل أيضاً ذلك الخط بعينــه، وحدث خطٌ آخر، فإنَّ الخطّ الواحد لا يصير أطول ممّا هو بالمدّ. فإذا كان هذان الخطّان يستحيل انتقال أحدهما إلى طبيعة الآخر، ولا في الوهم أيضاً، فإنّ الوهم إنْ فعل ذلك مفرداً للخط عن الســطح، جعل الخط ذا جهتين وجانبين لا في امتداده، فلم يأخذه طرف ســطح، فإنَّ ذا الجهتين سطحٌ لا طرف الذي هو خطٌ، فيكون الوهم قد أخذ غير الخط، بل أخذ جسماً دقيقاً فتخيله خطّاً، فالذي ظنّ أنَّ الخط هو واحدٌ بعينه، موضوعٌ للأمرين، فقد ظنَّ باطلاً.

(7) The individuals of one species of accidents differ either through their subjects or through certain accidents joined to them, where this is of two kinds. That is because those accidents either are joined (for example, in the way that literate is with musical) [and so] do not necessarily follow in a primary way upon [their subjects], or they do follow upon their [subjects] in a primary way (as white is joined to a surface). Now, it is not merely owing to the multiplicity of the subject that the rectilinear line is set apart from the circular one, for rectilinear lines are really set apart from circular ones, and it is not because of [any] other two accidents, whatever they might by chance be. So rectilinear and circular apply to the nature of the line in a primary way, and thus they are either specific differences or primary accidents. On the one hand, if they are specific differences, they have produced [different] species. On the other hand, if they are primary accidents and if the primary accidents are the necessary ones belonging to the nature of what has the accident, then the individuals of the species are alike with respect to it. If they just happen to occur in a certain situation without being necessary, then they happen to have a certain passivity that is a concomitant of the matter. In that case, it would not be out of the question for you, through an act of the estimative faculty, to imagine [the passivity's] disappearing from what has the accident or [imagine] its not existing. So there would be no inconsistency in your imagining that the consequential accident disappears. In that case, what has the accident could exist while not differing from another, as a result of this primary accident that is a consequent of the passivity. The situation is not like that for the rectilinear and circular line. [That] is because, if the matter in each one of them does not have this description by which the line of [each]

(٧) وأشخاص النوع الواحد من الأعراض؛ تختلف بموضوعاتها أو بأعراض تقارنها، وهذا على قسمين؛ وذلك لأنّه إمّا أنْ لا تكون تلك الأعراض تلحقها لحوقاً أولياً، مثل كتابة تجتمع مع موسيقى، وإمّا أنْ تلحقها لحوقاً أولياً كالبياض يجتمع مع السطح. ومفارقة الخط المستقيم للمستدير ليس لأجل كثرة الموضوع فقط، فإنَّ هذه المفارقة موجودة بين مستقيمين وبين مستديرين، وليس لعرضين آخرين كيف اتفق، فإنَّ الاستقامة والاستدارة تنال طبيعة الخط نيلاً أولياً، فلذلك إنّما يمكن أنْ يكونا إمّا فصولاً وإمّا أعراضاً أولية. فإنْ كانت فصولاً فقد نوّعت، وإنْ كانت أعراضاً أولية؛ فالأعراض الأولية إنْ كانت لازمة لطبيعة المعروض له، استوت فيه أشخاص النوع. وإنْ كانت تعرض في حالٍ من غير لزوم؛ فتعرض لانفعالٍ يلحق المادة، فلا يبعد توهم زواله عن المعروض له، أوْ لا وجوده فلا يبعد توهم زوال العارض التابع، فيجوز أنْ يكون المعروض له يوجد، ولا يخالف الآخر بهذا العارض الأولي التابع للانفعال. وليس كذلك الحال في الخط المستقيم والمستدير، فإنّه – إنْ لم تكن المادة في كل واحدٍ منهما على هذه الصفة التي بها صار خطٌ مستقيماً

becomes either rectilinear or circular, then that very line itself would not exist. [That] is because we asserted in what went before[11] that, with [the cessation of] the dryness, the rectilinear ceases to exist and comes to be curved (or, to be exact, the line that was rectilinear ceases to exist, and another line that is curved comes to exist), whereas, if their change were accidental, the line would not cease to exist. Therefore, the difference between them is neither through some nonprimary accident nor through some primary accident that is not necessary. So, then, the rectilinear and circular are antipathetic to one another in just the way that specific differences and the concomitants of specific differences are antipathetic to one another, which indicates a difference in species among the things. Now, because motion in the genus of white is different from motion in the genus of black on account of that with respect to which there is motion, so likewise is the rectilinear and the circular.

(8) Also failing to show a proper understanding of this general rule is the erroneous claim that there is contrariety among the natures of things celestial, since there is convexity and concavity among them. [That] is because, if the primary subject of convexity and concavity is the very same body and they are joined together in one [and the same] sphere, then they are not contraries. If their subject is two separate surfaces, and it is impossible that the concave one be the subject of the convexity and the convex one of the concavity (as we have made clear),[12] then, again, they are not contraries, since those two subjects of theirs are not receiving one of them after another successively, and there simply is no other subject (as we have explained).[13] We'll explore the doubt raised concerning ascending and descending later.[14]

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11. See par. 5.

12. See par. 5, where Avicenna argues that if the concavity is changed (or extended), then a new line is created with a different curve.

13. See par. 6, where Avicenna argues that rectilinear and circular are related to the line as their subject, either as specific differences or as necessary accidents, understood in the sense of propria—as, for example, risibility is related to human.

14. The reference seems to be to 4.7.3–4.

أو مستديراً – لم يكن نفس ذلك الخط موجوداً . لأنّه قد أثبت ، ممّا تقدّم ، أنّهُ مع اليبوسة تُعْدم الاستقامة ويحدث الإنحناء ، بل يعدم الخط الذي كان مستقيماً ، ويوجد خط آخر منحني ، ولو كان تغيرهما بعرض لكان الخط لا يُعدم ، فليس إذن الخلاف بينهما بعارضٍ غير أولي ، أو بعارضٍ أولي غير لازم . فإذ الاستقامة والاستدارة متعاندان تعاند الفصول أو لواحق الفصول اللازمة ؛ التي يدل تعاندها على اختلاف الأشياء في النوع ، ولأنَّ الحركة في نوع السواد غير الحركة في نوع البياض – لاختلاف ما فيه الحركة – فكذلك المستقيمة والمستديرة .

(٨) ويسقط من تصوّر هذا القانون قول مَنْ ظنَّ أنَّ في طبائع الأمور السماوية تضادّاً ؛ لأنَّ فيها تقيباً وتقعيراً ، فإنّه إنْ كان الموضوع الأول للتقيب والتقعير هو الجسم نفسه ، واجتمعا في كرةٍ واحدة ، فليسا بمتضادين . وإنْ كان موضوعهما سطحين متفرقين يمتنع أنَّ المقعّر منهما يقبل التقيب ، والمقبّب التقعير ، على ما أوضحناه . فليْسا بمتضادين ، إذ ليس موضوعاهما ذانك يقبلان تعاقبهما ، ولا موضوع آخر البتة على ما بيّناه . وأمّا التشكّك المورد من حال الصاعد والهابط فسنحقّقه بعد .

(9) As for [differences in] speed, motions do not differ at all in species owing to them. How could it be [so] when they are both accidents of every kind of motion that is subject to increase and decrease, whereas the specific difference is not subject to either, and, in fact, one continuous motion progresses gradually from fast to slow? So they fall under the factors that belong to the motion relative to [another] motion, not the factors that belong to [the motion] in itself. Now, it has been supposed that, when *fast* is predicated of rectilinear and circular [motion], it is done so equivocally, but that is not the case. Even if, on reflection, it seems necessary that there can be no interrelation or correspondence between the two (just as there cannot be one between a line and a surface), nevertheless, magnitude is predicated of both univocally. It is not predicated equivocally because the definition of fast and slow is one [and the same] in both cases—namely, in the case of each, *fast* is that which traverses a longer magnitude in the same period of time. Now, just as the rectilinear is a magnitude, so likewise is the circular; and, again, just as being longer with respect to what is rectilinear is that with respect to which there is a potential inclination and increase, so likewise is being longer with respect to what is circular, when the period of time does not differ. Therefore, this is not an equivocal term, and, instead, the [same] definition is taken in both. Now that we have discussed the unity of motions, it seems fitting that we resolve the puzzles mentioned about it.

(٩) وأمّا السـرعة والبُطْء فلا تختلف بهما الحـركات البتة اختلافاً بالنوع، وكيف وهما يعرضان لكل صنف من الحركات ممّا يقبل الأشـدّ والأضعف، والفصل لا يقبلهما، بـل تكون الحركة الواحدة بالاتصال، تتدرج من سـرعةٍ إلى بُـطْء، فهما من الأمور التي تكـون للحركة بالإضافة إلى حركة، لا من الأمـور التي تكون لها في ذاتها. وقد ظنّ أنَّ السـرعة، إذا قيل على المستقيمة والمستديرة، كانت باشتراك الإسم، وليس كذلك، وإنْ كان النظر ربّما أوجب أنّه لا تصحّ المقايسـة بينهما، ولا المناسـبة فيهما، كما لا تصح بين الخط والسطح، مع قول المقدار عليهما بالتواطؤ. أمّا أنّه ليس يقال باشتراك الاسم؛ فلأنَّ حدّ السـرعة والبُطْء فيهما واحد، وهو أنّ السـريع في كل واحدٍ منهما هو الذي يقطع مقداراً أطول في الزمان الواحد، وكما أنَّ المسـتقيم مقدارٌ، فكذلك المسـتدير. وكما أنَّ الأطول في المسـتقيم ما فيه الميل بالقوة والزيادة، كذلك الأطول في المستدير، والزمان غير مختلف، فليس إذن هذا باشتراك الإسم، بل الحدّ يتناولهما معاً. وإذ قد تكلمنا في وحدة الحركات، فحريٌّ بنا أنْ نحلّ الشكوك المقولة فيها.

Chapter Four

Resolving the doubts raised against motion's being one

(1) The claim of those who say that all motion can be divided into past and future is untrue.[1] [That] is because, as you know, motion in the way that we ourselves have independently explained it[2] is not divisible into past and future but is always between the past and future. As for motion in the sense of *traversing,* the motion is really a traversal only in a past period of time. Moreover, if it is divisible into past and future, it is so [only] potentially; for, when, in the period of time corresponding with [the motion], one posits a certain instant that accidentally divides [the motion], the instant is not some actually determinate thing. In general, when [the motion] is divided, it is so only accidentally owing to divisions of the time or distance. Now, a condition for the unity of motion is precisely that its time and distance not *actually* be divided, not that [the time and distance] be such that they cannot be divided or are not potentially [divisible]. This is [simply] not a condition for the unity of motions[3] and many other things.

(2) The first thing to say to them about their claim concerning how [motion] could be one when it is not complete is that *one* in the sense of *complete* is different from *one* in the sense of *continuous.* Now, when something is not one in one sense, it does not necessarily follow that it is not one in the other. Moreover, on the one hand, the motion on whose definition

1. For the objections presented here and in the next paragraph, see 4.2.1.
2. See 2.1.5–6, esp. 6.
3. **Z**, **T**, and two of the MSS consulted by **Y** read *kammīyāt* (qualities).

<الفصل الرابع>

في حل الشكوك الموردة على كون الحركة واحدة

(١) أمّا قول أولئك أنْ لا حركة إلاّ وهي منقسمة إلى ماضٍ ومستقبل، فهو قولٌ غير صحيح. فإنك تعلم أنَّ الحركة على النحو الذي نحقّقها نحن، ليست ممّا تنقسم إلى ماضٍ ومستقبل، بل هي دائماً بين ماضٍ ومستقبل. وأمّا الحركة التي بمعنى القطع، فإنَّها لا تحصل حركة قطعاً إلاّ في زمانٍ ماضٍ، ومع ذلك، إنْ كانت الحركة تنقسم إلى ماضٍ ومستقبل، فإنّها تنقسم بالقوة. فإنّه إذا فرض في الزمان الذي يطابقها آنٌ عرض لها أنْ تنقسم، لا أنَّ الآن يكون حاصلاً بالفعل. وبالجملة فإنّها إذا انقسمت، فإنّما تنقسم بالعرض، ولأجل انقسام الزمان، أو لانقسام المسافة. وإنّما الشرط في وحدة الحركة هو أنْ لا يكون زمانها ومسافتها منقسمين بالفعل، لا أنْ يكونا بحيث لا ينقسمان ولا بالقوة، ولا هذا شرطٌ في وحدة الحركات، وكثير من الأشياء.

(٢) وأمّا قولهم؛ إنّها كيف تكون واحدة ولا تكون تامّة، فأول ما يجابون به عن ذلك أنَّ الواحد، بمعنى التام، غير الواحد الذي بمعنى الاتصال، فلا يجب أنْ لا يكون الشيء واحداً بمعنى، إذا لم يكن واحداً بمعنى آخر. وأيضاً، فأنَّ الحركة التي شرحنا

we are commenting is indivisible and preserved in the thing undergoing motion as something complete and remaining the same until [the motion] ends. On the other hand, if motion in the sense of traversal exhausts the rectilinear interval, it is complete. Also, if it completes a rotation, it is something complete to which nothing more is added. Since something is complete when no part of it lies outside of it, and [since] motion in the sense of traversal exists on the condition that the traversal occurred, [then], when there is no part of it that has not already occurred and there remains no anticipated part [of it] that lies outside, it is complete. In this case, it is one in [both] ways [of being one].

(3) Now, some responded to this [objection that motion cannot be one when it is not complete] by saying that, inasmuch as the parts of motion might cease to exist, while the form is preserved despite the loss of those parts, it is like the form of a house that remains one and the same even when one brick after another gradually crumbles but is [in turn] replaced.[4] In this case, the form is numerically one, even though it is preserved by the succession of [new] materials. The same holds in the case of each individual plant and animal, as well as psychological habits that remain one and the same despite the decomposition, exchange, and change of the [humoral] mixture (only the states of being affected cease and are renewed). Similarly, the form of the shadow in the stream whose flowing waters[5] are [ever] changing remains one and the same. They said that, because the emanative principle (that is, the Creator most high) is one, the form (in other words, the emanation proceeding [from Him]) is also one in relation to its procession from Him. So, as long as the material is at the limit of receptivity (even should it be by replacement), that very same form remains.

4. Cf. Philoponus, *In Phys. ad* 185b11ff., 45.27–47.24.
5. Literally, "matter."

حدّها لا تنقسم، وهي محفوظة في المتحرّك، تامّة ثابتة بعينها إلى أنْ تنتهي. وأمّا الحركة بمعنى القطع، إنْ استوفت البُعْد المستقيم، فهي تامّة، وإنْ أتمت دائرة فهي تامّة لا تزيد عليها، إذ كان التامّ ما ليس منه شيء خارجاً عنه، وكان وجود الحركة بمعنى القطع، وهو على أنَّ القطع حصل. فإذا كان ليس شيء منه إلاّ وقد حصل ولم يبق خارجاً منتظراً؛ فهو تام، وهو حينئذ واحد من وجهين.

(٣) وقد أجاب بعضهم عن هذا بأنْ قال: إنَّ مَثَلَ الحركة في أنّها قد تعدم منها أشياء، وتكون الصورة مع عدم تلك الأشياء محفوظة، هو مثل صورة البيت التي تستحفظ واحدة بعينها، مع نقص لبنة لبنة، وسد الخلل الواقع عند النقص بما يقوم مقامها، فتكون الصورة واحدة بالعدد، وإنْ استحفظت بمواد متعاقبة، وكذلك صورة كل شخص من النبات واحيوان. وكذلك تبقى الملكات النفسانية محفوظة واحدة بعينها، مع التحلّل والاستبدال وتغيّر المزاج، وإنّما تبطل الانفعالات وتتجدّد، وكذلك صورة الظل تبقى واحدة بعينها في النهر الجاري المتغيّر المادة. قال؛ لأن مبدأ الفيض، وهو الباري تعالى، واحدٌ والصورة – وهي الفيض الصادر – واحدٌ بالقياس إلى صدوره عنه. فما دامت المادة في حدّ القبول – ولو بالتعاقب – كانت تلك الصورة بعينها مستحفظة.

(4) I am not particularly impressed by answers like these. It does not seem to be true that the things subject to generation and corruption have a permanent form that does not undergo [any] alteration—that is, unless we grant that the parts that existed in the generated things are permanent, being preserved until the moment of corruption, neither leaving nor ceasing to be. They are joined to a single form or single power, that form or power being preserved [during] the decomposition of the rest of those parts, where that which comes to take the place of one balances out that which it replaces.

(5) Our position is that the emanative principle's being one is insufficient to maintain that the emanation is one. [That] is because, when the one emanative principle emanates many things, the emanation is many as a result of the many [emanated things], regardless of whether they are many things occurring at a single time or [whether] they occur successively over many [times]. Indeed, it is known with certainty that the form subsisting in the second brick, owing to the act of composition and the form that that one has relative to the existing brinks, is not the same one by which the first brick that was removed subsists, which accidentally belongs to that one owing to the relation, given that these states are not transferred from their materials. Instead, the individual [forms] are corrupted through the corruption of their individual bearers. Given that, the form of the present brick is not the same one that was before, but it is only similar to that one whose place it is taking. So, likewise, were the damage not constantly being repaired such that there is a replacement, the form would pass away. Moreover, if, in the gradual

(٤) وليس يعجبني أمثال هذه الأجوبة، ولا يصحّ عندي أنْ يكون للكائنات الفاسدة صورة ثابتة لا تستحيل، اللّهم إلاّ أنْ نقضي بثبات أجزاء وجدت في الكائنات من أول الكون محفوظة إلى وقت الفساد، لا تفارق ولا تبطل، وتكون مقارنة لصورةٍ أو قوةٍ واحدةٍ، تلك الصورة أو القوة تستحفظ التحلّل الواقع في سائر تلك الأجزاء، وتسدّ مسدّه بما تورده من البدل.

(٥) ونقولّ إنّه ليس يكفي في ثبات الفيض واحداً، كون مبدئه المفيض واحداً. فإنَّ المبدأ المفيض الواحد، إذا أفاض على أشياء كثيرة، كان الفيض متكثّراً بتكثرها، سواء كانت متكثّرة حاصلة في زمانٍ واحدٍ، أو كانت متعاقبة التكثّر. فإنّه يعلم يقيناً أنَّ الصورة القائمة في اللبنة الثانية من التركيب، والصورة الإضافية التي لها بعينها إلى اللبن الموجود، ليست هي بعينها ما كان يقوم باللبنة الأولى المنتزعة، ويعرض لها بعينها من الإضافة. إذ كانت هذه الأحوال لا تنتقل من موادها؛ بل تفسد أشخاصها بفساد أشخاص حواملها. فإذا كان كذلك، لم تكن صورة اللبنية الآن هي بعينها التي كانت قبل، بل تكون شبيهة بتلك، تسدّ مسدّها، فكما أنّه لو لم يتدارك النزْع بالالتئام حتى يتعوض، لكانت الصورة

replacement of the bricks, [the building] is deprived of that very organization that is that form, [the form that] would have come to be would be different in species [from the first form]. Also, if one were not to observe the damages during the entire period of time until the restoration is complete, the one observing the form that came to be would suppose that it is the first form, even though it is different. Similarly, when one is not negligent[6] in restoring the damages, continuously making the needed repairs, he supposes that the second [form] is the first without anything new coming about. So this account of theirs is altogether incorrect—that is, unless, in the set of accidents, there is one that is such as to be transferred from one subject to another, or one subject after another is transferred to it.

(6) The same might be supposed about light and darkness. So [for example], when the source of light or darkness moves, [the light or darkness] is outwardly seen to move with [the moving source]. Also when what receives them moves but the source of light and darkness remains at rest, [the light and dark] move in [that] recipient. Still, it seems that light and darkness (or the shadow in the flowing water) are one and the same individually, since the light that occurs is a certain attribute and state of some recipient resulting from some agent, and, when the recipient undergoes alteration, its attribute no longer remains. So, when the recipient undergoes alteration absolutely, the attribute and state no longer remain absolutely. When *this* recipient undergoes alteration, then *this* attribute and *this* state do no remain; and, when *this* attribute and *this* state do not remain, then what does remain is not some individually enduring thing. On the contrary, at every instant, there is another individual belonging to a whole of a species that remains

6. Reading *lam yuhmil* with **Z** and **T** for **Y**'s *lam yamhal* (does not tarry), which may actually be an inadvertent transposition of the *h* and *m*.

تبطـل. ثم إنْ أخـذ في إعادة لبنة لبنة، على ذلك النظم بعينـه، تكون تلك الصورة قد حدثت، وتكون صورة أخرى بالنوع، حتى لو لم يشاهد الانتقاص المستمر زماناً إلى أنْ يردّ إلى العمارة، لكان مشاهد الصورة الحادثة يظنّ أنّها هي الصورة الأولى، وإنْ كانت أُخرى. وكذلك إذا لم يهمل العمارة إلى الانتقاص، بل لم يزل المسْترمّ يرمّ؛ ظنَّ أنَّ الثانية هي الأُولى من غير حدوث أمر، فهذا القول منها غير صحيح البتة. اللّهم إلاّ أنْ يكون في جملة الأعراض عرضٌ من شـأنه أنْ ينتقل من موضوعٍ إلى موضوع، أو ينتقل إليه موضوع بعد موضوع.

(٦) كما عسى أنْ يظنّ من أمر الضوء والظلمة، فإنَّ المضيء والمظلم إذا انتقلا انتقلا معه في ظاهر الأمر، وإذا انتقل القابل، وسكن المضيء أو المظلم، انتقلا في القابل. لكن يشبه أنْ لا يكون الضوء والظلمة أو الظّل في الماء السائل واحداً بعينه بالشخص، إذا كان الضوء الواقع هو صفة أو حالٌ لقابلٍ عن فاعل، فإذا اسـتحال القابل لم تبق صفته، فإنْ اسـتحال القابل مطلقاً، لم تبق الصفة والحال مطلقة، فإذا استحال هذا القابل لم تبق هذه الصفة وهذه الحال، وإذا لم تبق هذه الصفة وهذه الحال، لم يكن الباقي ثابتاً بالشـخص، بل يكون كل آن شـخصاً آخر، من جملة نوع مستحفظ على الاتصال. وهذا كما يعرض

continuously. This is like what happens to the stream of liquid that remains stationary with respect to what is parallel to it or stands opposite of it; for it does not necessarily follow from the fact that, when one parallel or opposite part after another continues to exist in the liquid, the parallel things in the liquid are individually preserved. Likewise, illumination and darkening track [the cases of] being parallel and exactly opposites, except that when, at every moment, one sensibly observes some light just like the one that was, he reckons that that is one and the same lasting thing. It is like air moving in a dark house, for you know that, when the air in it moves, the darkness of [the air] moves in it. So the darkness moves about accidentally, but, when [the moving darkness] is succeeded by its like, [the motion] is not sensed. The same would hold if darkness were replaced with red and no motion is sensed as a result of some tactile sensation or the like. In this case, then, vision does not pick out any motion at all, and one would reckon that the red he is experiencing at every moment is the first. [Yet] it is different from it since it is in a different part. In fact, [if you imagine that] there chanced to be some river whose banks were of a uniform height and slope and whose bed is the same throughout (whether flat or curved) and [that] the water flows in it wholly undisturbed by winds or some difference in the parts at the bottom of the river or the like, [then] you yourself would reckon that this water is one and the same water, tranquil and at rest, since you cannot sense any differences between a part that has passed you and another that has arrived before you. Similarly, when you do not sense altering differences in the darkness and light connected with something, you reckon that the darkness or light is the former one itself.

للسيّال مع الساكن من أمر الموازاة والمحاذاة. فإنّه ليس إذا كان لا يزال يوجد في السائل جزء موازٍ بعد جزء أو محاذٍ، يلزم من ذلك أن الموازاة التي في السائل تكون محفوظة بالشخص، كذلك ما يتبع الموازاة والمحاذاة من إضاءةٍ وإظلام. إلاّ أنَّ الحس إذا شاهد في كل وقتٍ ضوءاً كالذي كان، حسب ذلك شيئاً واحداً بعينه راهناً؛ كالحال في بيتٍ مظلم متحرك الهواء. فإنّا نعلم أنَّ الهواء الذي فيه إذا تحرّك يحرّك فيه ظلمته، فتكون الظلمة متحركة ومتنقلة بالعرض، لكن إذا كان إنّما يعقبها مثلها لم تحسّ به. وكذلك لو كان بدل الظلمة حُمرة، وكان لا يحسّ بالحركة من جهة اللمس أو غيره، فإنَّ البصر لا يدل حينئذ على حركةٍ البتة، ويحسب أنَّ كل ما يلقاه من الحمرة كل وقتٍ هي الأولى، ويكون غيرها؛ لأنّها في جزء غير. بل لو اتفق أنْ كان نهرٌ غير مختلف الشطوط، بارتفاعٍ وانحدار، وأسفله مستوٍ متشابه، مسطّح أو مقبّب، وفيه ماء يسيل من غير أنْ تكون هناك علّة تموّج؛ من ريحٍ أو اختلاف أجزاء قرارٍ أو غير ذلك، فإنك تحسب هذا الماء ماء واحداً بعينه، راكداً ساكناً، إذ لا يمكنك أنْ تحسّ بفصولٍ بين جزء عدّاك وجزء وصل إلى سمتك، وكذلك إذا لم تحسّ بفصول الاستحالة في الظلمة والضوء لاتصال الأمر، حسبتَ أنَّ الظلمة أو الضوء هو ذلك بعينه.

(7) There is a puzzle that is to be noted about this: namely, that if it is not one, it is thus many; but it cannot be infinitely many, and so it is finitely many, in which case there is one of two alternatives. On the one hand, each one belonging to that plurality might remain only for an instant; but it was thought to be some continuously existing thing, and so, from a finite number of instants, one continuous period of time would be composed, which is absurd. On the other hand, each one of them might remain for some period of time, along with the flow of the subject; but this is what they denied, in which case you must uncover its solution[7] from principles that you have independently verified.

(8) Next, a doubt comparable to the ones we have mentioned might be raised about heavenly motion, even if it differs from them a bit. So it is said that it must be either one or many. If it is one, then how can it be one and not complete? Indeed, we find some part of it that lies outside of that which has yet to occur; but whatever is one is complete. If it is many, how does one speak of its number and units? We say that *motion* is either in the sense that we speak[8] of it (and so is one and remains in [the mobile] as it is undergoing motion), or it is that which is in the sense of traversal (in which case each rotation is one motion, except that the rotations are renewed only by supposition).[9]

(9) Since we have completed the discussion about motion's being one, we should discuss the comparison between motions with respect to their speed—namely, the account designating when motions are in concert.

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7. Reading *ḥallahu* with **Z** and **T** for **Y**'s *jumla* (whole).
8. Reading *naqūlu* with **Z** and **T** for **Y**'s *yaqūlu* (he says).
9. For Avicenna's analysis of rotation, see 2.1.20–23.

(٧) وأمّا التشـــكّك الذي يقال في هذا ؛ وهو أنّه إنْ لم يكن واحداً فهو إذن كثير ، ولا يجـــوز أنْ يكـــون كثيراً غير متناهٍ ، فيكون كثيراً متناهياً ، فـــلا يخلو إمّا أنْ يكون كل واحدٍ من ذلك الكثير لا يبقى إلاّ آناً ، وقد كان يرى موجوداً على الاتصال ، فتكون الآنات المتناهية يتألف منها زمانٌ متصلٌ واحدٌ ، وهذا محال . أو يكون كل واحدٍ منها يبقى زماناً ، مع ســـيلان الموضوع ، وهذا ما ينكرونه . فيجب أنْ تعرف حلّه من الأصول التي تحقّقتها .

(٨) وبعد هذا ، فقد يشـــكّك في أمر الحركة الســـماوية بتشكّكٍ يناسب الشكوك التي ذكرناها ، وإن كان مغيّراً عنها يسيراً . فقيل إنها لا تخلو إمّا أنْ تكون واحدة أو تكون كثيرة ، فإن كانت واحدة فكيف تكون واحدة وليست بتامّة؟ فإنّا نجد منها شيئاً خارجاً عنهـــا لم يحصل بعد ، وكل واحدٍ تام ، وإنْ كانت كثيرة فكيف يقول : عددها وآحادها ؟ فنقول ؛ أمّا الحركة بالمعنى الذي نقوله فهي واحدة باقية فيه أبداً ما تحرّك ، وأمّا الذي بمعنى القطـــع فيشـــبه أنْ يكون كل دورةٍ حركة واحدة ، إلاّ أنَّ الـــدورات لا تتحدّد إلاّ بالوضع .

(٩) وإذ قد فرغنا من الكلام في وحدة الحركة ، فبالحري أنْ نتكلم في التقايس الذي بين الحركات ، في سرعتها وبطئها ، وهو المعنى الذي يسمّى تضامّ الحركات .

Chapter Five

On motions that are and are not in concert

(1) It is normal practice for people, in one turn, to say that any motion that is completed in a shorter time is faster and so to say that this alteration is faster than this locomotion, where the sense of *faster,* in this context, is that which is conveyed to the end in the shorter time. Alternatively, they refuse, in turn, to say that the tortoise's moving a hand's width in a quarter of an hour is faster than a horse's moving a parasang[1] in an hour. In fact, they count the tortoise's motion as slower, even though it reached its goal or came to rest in a shorter period of time, whereas they count the horse's motion as faster, even though getting to the end took a longer amount of time. Thus, this fastness and slowness must have some sense other than the first one—namely, that what is fast is that which traverses a longer distance (or what is analogous to distance) in an equal time or that which traverses equal [distances] in a shorter period of time. Thus, when we want to compare the speed of two motions, we must take into account that [category] with respect to which there is [the motion]. So, if there can be a comparison of the increase and decrease and the intensity and weakness between two things with respect to which there is motion, then the speed of the two motions, as well as the increase and decrease of the two things, can be compared.

1. That is, 3.5 miles or 5.6 kilometers.

<الفصل الخامس>

في مُضامَّة الحركات ولا مضامّتها

(١) من عادة الناس أنْ يقولوا مرّة، في كل حركةٍ تتمّ في زمانٍ أقصر، إنّها أسرع، فيقولون إنَّ هذه الاستحالة كانت أسرع من هذه النُقْلة، فيكون معنى الأسرع في هذا الموضع هو الذي ينتقل إلى الغاية في زمانٍ أقصر. أو يمتنعوا مرة أخرى عن أنْ يقولوا إنَّ حركة السلحفاة، من مبدأ شبرٍ إلى منتهاه في ربع ساعة، هي أسرع من حركة الفرس فرسخاً في ساعة، بل يعدّون حركة السلحفاة بطيئة، وإن كانت تبلغ المقصد، أو تنتهي إلى السكون في زمانٍ أقصر، ويعدّون حركة الفرس سريعة، وإنْ كانت طويلة الزمان إلى المنتهى. فيجب أنْ يكون لهذه السرعة وهذا البُطء معنى آخر غير الأول؛ وهو أنَّ السريع هو الذي يقطع من المسافة – أو ممّا يجري مجرى المسافة – ما هو أطول في زمان مِثْل، أو الذي يقطع المِثل في زمانٍ أقصر. فيجب إذا أردنا أنْ نقايس بين حركتين في السرعة والبطء، أنْ يكون ما فيه الحركة مُراعىً. فإنْ أمكن بين الشيئين اللذين فيهما الحركة مقايسة بالزيادة والنقصان، والاشتداد والضعف؛ أمكنت المقايسة بين الحركتين في السرعة والبُطْء. والمقايسة بين الشيئين في الزيادة والنقصان.

(2) Quantity is equal in two ways: one, actually; the other, potentially. The one that is actually [equal] occurs when one of the two [quantities] can be made to coincide with the other such that the whole of one coincides with the whole of the other. In that case, either the two limits (assuming that they have limits) [of the one] may actually coincide with the two limits [of the other], or one of them may exceed that part that coincides with the other. In the first case there is equality, while in the second there is a difference in size.[2] The second way, which is [to be equal] potentially, is that the two magnitudes are such that there cannot be a coinciding or [measurement of] excess between them—as, for example, the rectilinear and circular line, and the triangle and square. Now, it is obvious that the triangle does not coincide with the square nor does the rectilinear coincide with the circular in the former way. Still, it might be supposed that there is this coincidence among them potentially. In the case of the triangle, it is such that it can be divided into sections that can be rearranged [to form] a square, in which case that [rearranged] triangle can be constructed on top of that [original] square, so as either to coincide with and actually be equal to it or to exceed it and so actually have a greater size. Before that, however, it was not, in fact, in any obvious way, actually equal or greater. So it is in this respect that the triangle is said to be equal to the square. The same holds for the circular line. If it could be so worked so as to be changed into a rectilinear line, then, by making [the reworked line] coincide with it, it would be such that it either exceeds or falls short of or equals it. Again, however, as long as it is circular, this coinciding does not actually work, save potentially (assuming that that is possible). When one thing and its limits do not

2. Literally, "a difference in increment and decrement."

(٢) والمساواة في الكميّة على وجهين : أحدهما بالفعل ، والآخر بالقوة ، أمّا الذي بالفعل فأنْ يكون انطباق أحدهما ممكناً بالآخر ، حتى ينطبق كله على كله ، فينطبق الطرفان – إنْ كان لهما طرفان – على الطرفين بالفعل أو يفضل أحدهما على مطابق الآخر ، فيكون في الأول مساواة ، وفي الثاني تفاوت بزيادةٍ ونقصان . والوجه الثاني الذي بالقوة ؛ هو أنْ لا يكون المقداران بحيث يمكن أنْ يكون بينهما مطابقة وفضل ، مثل خطٍ مستقيم ومستدير ، ومثل مثلثٍ ومربع . فظاهر أنّه لا ينطبق المثلث على المربع هذا الانطباق ، ولا المستقيم على المستدير ، لكن قد يظنّ أنَّ هذا الانطباق فيهما بالقوة . أمّا المثلث فهو بحيث يمكن أنْ يقطع قطوعاً يردّ إلى نظامٍ يكون منه مربع ، فحينئذ يمكن أنْ يركّب ذلك المثلث على ذلك المربع ، فينطبق عليه ويساريه بالفعل ، أو يفضل عليه ، فيزيد عليه بالفعل ، وقبل ذلك لم يكن مساوياً ولا زائداً بالحقيقة بالفعل الصريح . فمن هذا القبيل يقال إنَّ المثلث مساوٍ للمربع ، وكذلك المستدير ، لو أمكن أنْ يعمل به ما يغيره إلى الاستقامة ، لكان يكون بحيث يزيد على المستقيم أو ينقص عنه أو يساويه بالانطباق عليه . فما دام مستديراً فليس يمكن أنْ يعمل به هذا الانطباق بالفعل اللّهم إلاّ بالقوة ، إنْ

coincide with another and its limits, it is not actually equal to it. When there is nothing with respect to which it is equal in the way mentioned, however, and there is nothing that exceeds the equal part, then neither does the one actually exceed the other nor the other actually fall short of it. (From what has been explained to you before,[3] you can judge that it is not in the power of the rectilinear line to be changed to the point that it coincides with the circular line while existing as the same thing, so its status, in this [case]—when you are being precise—is not like that of the triangle and square.)

(3) Someone could say that we know with certainty that the arc is greater than the chord, and that the chord is smaller than it. So, when there exists some difference in smallness and largeness, it is just fitting that there be equality.[4] Some of those who are exact responded to this, saying: There sometimes is a comparison of greater and lesser between two things; nonetheless, a comparison of equality cannot occur between them. [That] is because you know with certainty that an acute angle [formed] of two straight lines is greater than the angle that comes to be from an arc and a straight line,[5] while being smaller than another. [Yet] it is impossible that there be an angle of the two-straight-lines sort that is equal to something of the other sort. We say that the acute [angle formed] of two straight lines is greater than an angle resulting from [a curved and straight line] only because the curved angle actually exists within that [smaller acute rectilinear angle] and another greater [rectilinear angle], where the other [angle] is greater than [the first one] of two straight lines only because the [first's] two straight lines exist in

3. See 4.3.6.

4. Avicenna had just argued that, speaking precisely, there cannot be a comparison between rectilinear and circular lines. The would-be-objector is observing that, since judgments of "greater" and "smaller" are known to apply to the chord and the curved line that delimits that chord, one should likewise be able to speak of "equality" between curved and straight lines. In the Arabic, the example is more striking, since *qaus* (translated here as "arc") also means "bow," while *watar* (translated as "chord") can also mean "the string of a bow." Of course, the string of a bow must be shorter than the bow itself, even though we think that, if the string were longer, it could equal the length of the bow.

5. That is the so-called horn angle, which is the angle between a circle and a line tangent to it.

أمكن ذلك. والشيء إذا لم يكن منطبقاً على غيره، ونهاياته على نهاياته، لم يكن مساوياً له بافعل، وإذا لم يكن فيه ما يساويه على الوجه الذي قيل، وزيادة على ما يساويه، لم يكن زائداً عليه بالفعل، ولا الآخر ناقصاً عنه بالفعل. وممّا سلف بيانه لك، تحكم بأنَّ المستقيم ليس في قوته أنْ يتغيّر إلى أنْ ينطبق على المستدير وهو موجود بعينه، فليس حكمه في هذا - إذا رجعت إلى التحقيق - حكم المثلث والربع.

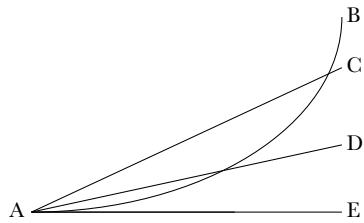
(٣) فإنْ قال قائل: إنّا نعلم يقيناً أنَّ القوس أعظم من الوتر، والوتر أصغر منه، فإذا وجد تفاوتٌ في الصغر والكبر، فبالحري أنْ تكون هناك مساواة. وقد أجاب عن هذا بعض المحصّلين فقال: يكون بين شيئين تناسب الزيادة والنقصان، مع استحالة أنْ تقع بينهما مناسبة المساواة. فإنّا نعلم يقيناً أنَّ زاوية مستقيمة الخطّين حادّة؛ هي أعظم من زاويةٍ حادثةٍ عن قوس ومستقيم، وأصغر من أخرى، ويستحيل أن تكون من قبيل مستقيمة الخطّين زاوية مساوية لشيءٍ من قبيل الأخرى. وإنّما قلنا إنَّ الحادّة، المستقيمة الخطّين أعظم من زاويةٍ منهما، لأنَّ الزاوية القوسية توجد بالفعل في تلك وزيادة أخرى، وإنّما كانت الأخرى أعظم من مستقيمة الخطّين، لأنَّ مستقيمة الخطين توجد فيها وزيادة، فهذا

it and it is greater.[6] So this is one response. Additionally, how could we concede that the arc is actually greater than the chord when there cannot exist in the arc that with which the rectilinear line coincides so that there is a coincidence with two generically similar things? How can there be an actual comparison at all between them? That might occur potentially or through an act of the estimative faculty such that, if the circular line could be made rectilinear, something like it and something greater would exist with respect to it. So, therefore, difference and equality are sometimes considered as actual; sometimes they are potential in the sense that there is some ultimate existential basis, as between the triangle and the square; and sometimes [they] are considered as remote—namely, that the thing is such that, *if* (counterfactually) it were susceptible to change, *then* it would be described as solely larger or solely smaller or solely equal; but, again, this is a remote consideration.

(4) So the local motions that are comparable are those that undergo motion with respect to that which is comparable. So, if the like is traversed in a like period of time, the speed is equal; if one traverses a longer [distance] in the same amount of time or the same [distance] in a longer time, the motions are unequal and, in fact, they differ in being greater and lesser. Next, if that with respect to which they undergo motion is not comparable either actually or potentially, then the motions are [likewise] not comparable either actually or potentially. So rectilinear and circular motion are not, in fact, comparable save in that very remote way just mentioned.

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6. The present discussion draws on Euclid's description of the horn angle in *Elements* 3.16, as well as Euclid's definition of when two magnitudes can be compared: namely, when they have some ratio to one another, (book 4, defn. 4). Avicenna's point might be explained by reference to the following diagram:



the rectilinear angle DAE is smaller than the rectilinear angle CAE, because DAE is contained in CAE. Similarly, the horn angle BAE is smaller than DAE because the horn angle is contained in DAE.

جواب. ومع ذلك فكيف نسلم أنَّ القوس أعظم بالفعل من الوتر، وليس يمكن أنْ يوجد في القوس ما ينطبق عليه المستقيم انطباقاً مع انطباق المتجانسين، وكيف تكون بينهما مقايسة البتة بالفعل؟ عسى أنْ يكون ذلك بالقوة، أو عسى أنْ يكون ذلك بالتوهم، بحيث أنَّ المستدير لو أمكن استقامته؛ لكان حينئذ يوجد فيه مِثْل وزيادة، فيكون إذن اعتبار التفاوت والمساواة مرّة بالفعل ومرّة بالقوة المستندة إلى الوجود، كالحال بين المثلث والمربع. ومرّة باعتبارٍ بعيدٍ وهو أنْ يكون الشيء بحيث لو كان يقبل التغيّر لصار إلى صفة الزيادة لا غير، أو النقصان لا غير، أو المساواة لا غير، وهذا اعتبار بعيد.

(٤) فالحركات المتقايسة المكانية هي التي تكون ما تتحرك فيه متقايساً، فإنْ كان المِثْل يقطع في زمانٍ مِثْلٍ، فالسرعة متساوية، وإنْ كان الأطول يقطع في زمانٍ مِثْلٍ، أو المِثْل يقطع في زمانٍ أطول؛ فالحركات غير متساوية، بل متفاوتة بالزيادة والنقصان. فإنْ لم يكن ما تتحرك فيه متقايساً بالفعل ولا بالقوة، فالحركات غير متقايسة بالفعل ولا بالقوة، فتكون المستقيمة والمستديرة لا تقايس بينهما بالتحقيق إلاّ المقايسة المذكورة البعيدة جداً.

(5) As for comparing qualitative motions, some are close and others farther removed. Close [comparisons] are those where that with respect to which there is motion admits comparing truly similar things, such as black and black and hot and hot. So, when something undergoing a [qualitative] motion has started from some quality similar to some other quality from which another moving thing starts, and then it ends at something like what the other ends at in the same period of time, and [when] they both coincide in reaching any resting point that the estimative faculty might imagine (were they to rest at it), then the one would be equal to the other in speed. If one has not yet reached [that ending point] (even if both were to rest during the intervening period of time), then its quality is weaker and it takes some additional time, in which case it is slower than the other, and the other is faster than it. So that with respect to which there is motion must be one, as well as the starting and ending points—that is, [one] in species. [The comparison of qualitative motions] that are farther removed considers contraries, such that, if, in the contrariety, one of the termini *a quo* and *ad quem* is a limit and the other is that other limit exactly opposite it (or it falls short of the limit and is closer to the middle), then the one on one side is like the other (or is alike with respect to closeness to the center). So the consideration would be, for example, [that] this instance of whitening is faster than or equal to this instance of blackening such that a certain relation of some termini *a quo* and *ad quem* and that with respect to which there is whitening is like the relation of its exact opposite on that side that is blackening. (This way, however, is not established in a principled way.)

(٥) وأمّا المقايسة المعتبرة في الحركات الكيفية، فمنها وجهٌ قريبٌ ومنها وجهٌ بعيد، فالوجه القريب هو أنْ يكون ما تتحرك فيه قابلاً لقياس المشابهة الحقيقية، مثل سوادٍ وسواد، وحرارةٍ وحرارة. فإذا كان متحركٌ ما قد ابتدأ من كيفيةٍ شبيهةٍ بكيفيةٍ أخرى ابتدأ منها متحرك آخر، ثم انتهى إلى شبيه ما انتهى إليه الآخر في زمانٍ واحدٍ، وكان كل موقفٍ متوهم يتوافيان فيه متشابهين – لو وقفا عليه – فهو مساوٍ له في السرعة وإن كان لم ينته إليه بعد. ولو وقفا جميعاً في وسط الزمن، كانت كيفيته أضعف وبقي زمان، فهو أبطأ منه، فيكون الآخر أسرع منه، فيجب أن يكون المتحرك فيه واحداً، والمنتهى والمبتدأ واحداً؛ أي في النوع. وأمّا الوجه البعيد، فأنْ يكون الاعتبار بالضّد، حتى إنْ كان أحد المنتهى إليهما والمبتدأ منهما طرفاً في التضاد، والآخر ذلك الطرف الآخر لنظيره، أو إنْ كان دون الطرف وأقرب إلى الوسط، كان الآخر من ذلك الجانب كذلك، أو على مِثْل ذلك القرب من الوسط. فيكون الاعتبار مثلاً هو أن هذا يبيضّ أسرع من هذا وهو يسودّ، أو مساوٍ له، حتى تكون نسبة ما منه ابتدأ وما إليه انتهى، وما كان فيه إلى البياض، كنسبة نظرائه من ذلك الجانب إلى السواد، وهذا وجهٌ غير محقّق بحسب الأصول.

(6) Sometimes it happens that two things are comparable absolutely, while not being comparable relative to a given thing. So [for example] large and small with respect to water *qua* water is different from the large and small with respect to air *qua* air, for the maximally large amount of water is unlike that of air; and the same holds for smallness. [An example would be that] when water undergoes rarefaction so as to become a large quantity of air, the motion has a certain limiting point that falls below the limiting point for air when it undergoes rarefaction so as to become a large quantity of fire.[7] So, when these motions are taken absolutely with respect to being large and small, they are comparable, whereas comparing what it is to be a large quantity of fire with a large quantity of air is not possible. So the rarefaction of air (that is, the motion that makes it larger) is not comparable to the rarefaction of water. Also, the condensation of one cannot [be compared] with that of the other, for the large or small quantity of the latter is not of the [same] species as the large or small quantity of the former. The comparison takes place, rather, between two instances of the rarefaction of air or two instances of [that of] water. The same holds for flying and walking: They might turn out to be comparable *qua* moving through some rectilinear distance, but inasmuch as this one is the flight of an eagle and this one the flight of a sparrow (to say nothing of walking), the [long] flight of an eagle and the [long] flight of a sparrow are not comparable. Instead, an eagle's flight is to be compared only with that of an eagle's, and a sparrow's with that of a sparrow's. The same holds for [comparing] cases of grogginess that follow upon honey wine and those following upon grape wine.

7. In his discussion concerning the void (see 2.9.17 & 20–21), Avicenna observed that natural substances can undergo rarefaction and condensation such that their natural volume becomes larger or smaller without the need of positing a void. Here, he seems to suggest that there is some natural limit of rarefaction for each substance beyond which there is a substantial change. Thus, if one begins with an equal volume of water and air and then rarefies the two, the size that the rarefied water can reach before turning into air is less than the size that the rarefied air can reach before turning into fire. See also 3.12.8.

(٦) وقد يعرض أن يكون شيئان متقايسين على الإطلاق، ولا يكونان متقايسين بالنسبة إلى شـــيء، فإنّ الكبير والصغير في الماء – مـــن حيث هو ماء – غير الكبير والصغير في الهواء من حيث هو هواء، لأن غاية الكبر في الماء ليست مثل غاية الكبر في الهواء، وكذلـــك في الصغر. وإذا تخلّخل الماء إلى كبر الهواء، كان للحركة حدٌّ دون حدّ تخلّخل الهـــواء إلى كبر النار. فإذا أُخذت هذه الحركات في الكبر مطلقاً وفي الصغر مطلقاً، كان ذلك متقايساً، وأمّا مقايسة الكبر الناري إلى الكبر الهوائي فليس بجائز، فالتخلخل الهوائي وهـــو الحركة إلى الكبـــر – لا يقايس بالتخلْخل المائي ولا تكاثفـــه بتكاثفه، فإنَّ كبر هذا ليس من نوع كبر ذلك، ولا صغره من نوع صغره، بل المقايسة تجري بين تخلخلي هوائين أو تخلخلي مائين، وكذلك حال الطيران والمشي. وأمّا من حيث الحركة في مسافةٍ مستقيمةٍ فقـــد يصح التقايس، وأمّا من حيث هذا طيران النسْـــر، وهذا طيران العصفور – فضلاً عن المشـــي – فلا يتقايس طيرانٌ نسْـــريٌّ وطيرانٌ عصفوريٌ، بل الطيران النسري يقاس بالطيران النســـري، والعصفوري بالعصفوري، وكذلك النحلي العسلي بالنحلي العسلي،

In this context, then, one must take into account the thing with respect to which there is motion, whether it is being taken absolutely or conditionally, and then consider the time. So, if that thing does not differ in species, one can be compared with the other (and sometimes the comparison is not with respect to the nature of the species, but the nature of the species together with some accident). What is undergoing the motion is not taken as a condition in this context. [That follows] since a difference in it does not bring about a difference in the motion—that is, unless it is taken as a condition in the configuration of the motion and that with respect to which there is motion, like the sparrow for the flight of a sparrow, for [whether] the distance of the sparrow's motions [is long or short] relative to its flight is different from the distance of the motion of what is not a sparrow.

(7) Also, in this context, equivocal terms and things like them might lead to error. For example, it might be supposed that this knife becomes sharp faster or slower than this tone does, but *sharp* means something different in the two cases. Similarly, one might suppose that this inflamed eye has healed faster than this paralyzed hand. [That] is because, just as the humoral mixture of the eye and its activity is different in species from [those of] the hand, so, likewise, the soundness or lack thereof of its activity is different in species from those of the hand, and so the motion with respect to them is not of a single species. That is [so] unless we consider *health* absolutely, in which case the two motions are not one with respect to species, but genus; but you have already learned that generic comparisons are not true.[8]

8. See, for instance, *Kitāb al-jadal* 1.5.

والنحلـــي العنبي بالنحلي العنبي. فيجب أنْ يراعـــى في هذا الباب معنى ما فيه الحركة، ويراعى أخذه مطلقاً أو بشرط، ثم ينظر إلى الزمان، فإنْ لم يختلف ذلك في النوع، صحّ التقايس به، فربما كانت المقايسة لا لطبيعة النوع، بل لطبيعة النوع مع عرض. وأمّا المتحرك فلا نأخذه شـــرطاً في هذا الباب، إذ لا يغيّر اختلافه اختلاف الحركة، اللهم إلاّ أنْ يكون مأخوذاً شـــرطاً في هيئة الحركة، وفيما فيه الحركة؛ كالعصفور للطيران العصفوري، فإنَّ مسافة حركات العصفور في طيرانه غيرمسافة حركات ما ليس بعصفور.

(٧) وقد يغلط في هذا الباب اشتراك الاسم أو أشباهه، مثل أنْ يظن أنَّ هذا السكين تحدّ أسرع أو أبطأ ممّا يحدّ هذا الصوت، لكن الحدّة فيهما بمعنى مختلف. وكذلك قد يظنّ أنَّ هذه العين الرمدة قد صحّت أسرع مما صحّت هذه اليد المفلوجة. فإنّه كما أنَّ مزاج العين وفعله غير فعل اليد في النوع، فكذلك سلامة فعله أو فساد فعله غير الذي منهما لليد في النوع، فلا تكون الحركة فيهما من نوعٍ واحدٍ؛ اللّهم إلاّ أنْ نعتبر الصحة مطلقاً، فلا تكون الحركتين في النوع، بل في الجنس، وقد علمنا أنَّ ذلك التقايس الجنســـي ليس بالحقيقي.

(8) Here there arises a question that one might ask: [Imagine] that some moving thing [*x*] traverses a certain distance, but that distance begins to undergo alteration at the very same time that [*x*] begins to move such that the alteration quits at the point at which [*x*'s motion] stops and is completed, and so the locomotion stops at the same time [that the alteration] does. In that case, can this instance of alteration be said to be equal to this motion? The answer is that this is a mistake and cannot be maintained. That is because, while the distance is equal to that which has undergone the alteration, the motion is not equal to the alteration, save with respect to time only. Also, the locomotion is not traversing something that the alteration is traversing. That is because the motion traverses a given distance, since it was a change from the beginning of [the distance] to its end, whereas the alteration traversed what is between two qualities, since it was a change, not from some limiting point of a given distance to another, but from one quality to another. [That] is because that which underwent the alteration as such did not proceed from some limiting point of a given distance to another limiting point, but from one quality to another, except that one quality after another was continually being renewed in it in such a way that the thing's substrate was undergoing uninterrupted renewal.

(٨) وها هنا مسألة ربّما سأل عنها سائل وقال: متحركٌ قطع مسافة وكانت تلك المسافة تبتدىء تستحيل مع ابتداء حركته، حتى انتهت الاستحالة إلى الحد الذي تقف عنده وتتم لديه، فوقفت النُقْلة معها، فهل من الممكن أنْ يقال إنَّ هذه الاستحالة مساوية لهذه الحركة؟ فالجواب أنَّ ذلك خطأ لا يجوز أنْ يقال، وذلك لأنَّ المسافة مساوية للمستحيل، وأمّا الحركة فليست مساوية للاستحالة، إلاّ في الزمان فقط. ولا النقلة قطعت شيئاً ممّا قطعته الاستحالة، . وذلك لأنَّ الحركة قطعت مسافة إذ كانت تغيّراً من مبدئها إلى منتهاها، والاستحالة قطعت ما بين كيفيتين، إذ كانت تغيّراً لا من حدّ مسافةٍ إلى أخرى، بل من كيفيةٍ إلى أُخرى. إذ المستحيل - من حيث هو - لم يخرج من حدّ مسافةٍ إلى حدٍ آخر، بل خرج من كيف إلى كيف، إلاّ أنه لم يزل يتجدّد فيه كيفٌ بعد كيف؛ لا على استقرار تجدّد الشيء في محله.

Chapter Six

On the contrariety of motions and their opposites

(1) Since we have mentioned the similarity and difference among motions, we should now discuss the contrariety of motions. So we say: Generically different motions, such as locomotion, alteration, and augmentation, might be joined together. So, if, at some moment, some of them are prevented from joining together with others, that is not because their natures *qua* locomotion, alteration, and augmentation make that necessary, but because of some additional, extrinsic causal factor. Motions that are included under a single genus—as, for example, blackening and whitening (which fall under the genus of quality)—occur in the way previously mentioned.[1] So blackening and whitening agree in genus and share a common subject, yet they are opposites that cannot simultaneously be joined together. In other words, [blackening] (as is whitening) is a fact about existence, not something that is said relative to something else. Also, the difference between them is greater than that which is between one of them and yellow or the like—namely, it is the maximal degree of difference. These are the situations whereby one thing becomes a contrary of another. So whitening is the contrary of blackening, just as white is the contrary of black. The same likewise holds for the category

1. See 4.5.5.

<الفصل السادس>

في تضادّ الحركات وتقابلها

(١) وإذ قد قلنا في تساوي الحركات وتفاوتها، فأولى ما نتكلم فيه هو حال تضادّ الحركات فنقول: أمّا أولاً؛ فإنَّ الحركات المختلفة الأجناس؛ مثل النُقْلة والاستحالة والنمو، فقد تجتمع معاً. فإن امتنع بعضها عن الاجتماع مع بعض في وقتٍ ما، فليس ذلك لأن طباعها - من حيث هي نُقلة واستحالة ونمو - توجب ذلك، بل لأمرٍ زائدٍ وسببٍ من خارج. وأمّا الحركات الداخلة تحت جنسٍ واحدٍ؛ مثل التسوّد والتبيّض الواقعين في جنس الكيفية، على النحو من الوقوع المذكور، فإنَّها قد تكون متضادّة. فإنَّ التسوّد موافق للتبيّض في الجنس، ويشاركه في الموضوع، ولكنه مقابلٌ له يستحيل اجتماعه معه، وهو معنى وجودي، كما أنَّ التبيّض معنى وجودي، وليس مقولاً بالقياس إلى الآخر. وبينهما من الخلاف أكثر ممّا بين أحدهما وبين التصفّر وغيره، وهو غاية الخلاف. وهذه هي الأمور التي بها يصير الشيء ضدّاً للشيء؛ فالتبيّض ضدّ التسوّد، كما أنَّ البياض

of quantity, for augmentation is the contrary of diminution. Indeed, even if one says that small is not the contrary of big, but, rather, its correlative, this can be undermined by the fact that the small and big that are commensurate in species are said absolutely, but not relatively. [That] is because there is some other consideration in augmentation and diminution that does away with saying that, since increasing is only an increase relative to decrease, and yet the increase and decrease that are the termini *ad quem* that exist in nature are not relative. So you will find that the situation concerning augmentation and diminution is just like that of whitening and blackening, and the same holds for the case of rarefaction and condensation. As for motions that are with respect to position, it would seem that there is no contrariety, just as there is no contrariety in circular motions, which you will learn shortly.[2]

(2) As for motion with respect to place, the genus of circular [motion] falling under [the category of place] is in no way whatsoever the contrary of the genus of rectilinear [motion]. That is because the specific differences of contrary motions, despite agreeing in genus, must be opposites that are inevitably antipathetic to one another, while being related to something or other upon which the motion is dependent. It is not [enough] that the two things undergoing motion should be contraries [to make] the motions contraries, for contraries might accidentally be undergoing some motion that agrees in species. So, when, by force, something hot has an accidental motion downward (and so it is like the stone), then there are two species of two motions that do not differ in themselves, but differ only by force and nature. Force and nature, however, do not make something to be different, for the heat that forcibly comes to be in some body and that naturally rises is a heat whose action is the same.

2. See par. 6, specifically, and also pars. 7–8.

ضدّ السواد، وكذلك في مقولة الكم أيضاً؛ فإنَّ النمو ضدّ الذبول. فإنّه، وإنْ كان لقائل أنْ يقول إنَّ الصِغر ليس بمضادّ للكِبر، بل هو مضايف له، وكان يجوز أنْ يبطل هذا بأنَّ الصغير والكبير، اللذين بحسب النوع، يقالان على الإطلاق لا بالقياس، فإنَّ في النمو والذبول اعتباراً آخر يُغني عن أنْ يقال ذلك، لأنَّ الحركة إلى الزيادة إنّما هي زيادة بالقياس إلى النقصان، وعلى أنَّ الزيادة والنقصان اللذين يتوجهان إليه موجودان في الطبع ليسا بالقياس. وستجد الحال في النمو والذبول، كما في التبيّض والتسوّد، وكذلك الحال في التخلّخل والتكاثف. وأمّا الحركات التي في الوضع، فيشبه أنْ لا يكون فيها تضادّ، على نحو ما لا تضادّ في الحركات المستديرة، وستعلم هذا عن قريب.

(٢) وأمّا الحركة المكانية؛ فإنَّ الجنس المستدير منها غير مضادّ للجنس المستقيم بوجهٍ من الوجوه، وذلك لأنَّ فصول الحركات المتضادّة – مع الاتفاق في الجنس – يجب أنْ تكون متقابلة متعاندة لا محالة، وتكون منسوبة لا محالة إلى أمرٍ من الأمور التي تتعلق بها الحركة. والحركات ليس كونها متضادة هي أنَّ متحركها متضادان؛ فإنَّ الأضداد قد يعرض لها أنْ تتحرك حركة متفقة في النوع. فإنَّ الحار إذا عرض له حركة بالقسر إلى أسفل؛ وشاكل الحجر في ذلك، كان نوعا الحركتين لا يختلفان في ذاتيهما، إنّما يختلفان بالقسر والطبع، والقسر والطبع لا يجعل الشيء مختلفاً. فإنَّ الحرارة التي تحدث في جسمٍ

Also, the black that comes to be by force and the one that is by nature are [both] a black that produces one and the same effect; they differ only in that this one is accidental, while that one is natural. The same holds for natural and non-natural[3] shapes and the like. Moreover, if the contrariety of motions were due only to force and nature, two forced motions would not be contraries, nor would two natural motions be contraries. Clearly, then, one motion does not become the contrary of another solely from the fact that the two agents of the motion are contraries. In the same way, you also know that one motion does not become the contrary of another on account of the fact that the two movers are contraries. It likewise is not on account of the time, because the nature of time has no contrary; and, even if it were to have some contrary, the contrariety would involve something accidental to the motion, not the motion's nature, since time is an accident of motion. Also, motions are not contraries [just] because that with respect to which there is one motion is the contrary of that with respect to which there is another motion. [That follows] since that with respect to which there is motion [might] be the same, while the motions are contraries. So [for example] the course from white to black, as well as from large to small, is the very same course as that from black to white, and from small to large, and, in general, between the intermediary things themselves—as, for example, the distance in descending is [the same as] the distance in ascending. In short, these intermediary things have no contraries, because they are things in the middle [of two contraries]. So how could it be on account of their contrariety that motions become contraries?

3. Literally, "forced."

بالقسر، والتي تثور بالطبع، حرارة متفقة الفعل. والسواد الذي يحدث بالقسر والذي يحدث بالطبع، سواد يؤثر تأثيراً واحداً، إنّما يختلف بأنَّ هذا عرضي وذاك طبيعي، وكذلك الأشكال الطبيعية والقسرية وغير ذلك. ولو كان تضاد الحركات أيضاً إنّما هو للقسر وللطبع، لما كانت حركتان قسريتان متضادتين، ولا طبيعيتان متضادتين. فبيّنٌ أنّه ليس تصير الحركة مضادّة للحركة لنفس أنَّ الفاعلين للحركة متضادان. وبمثل ذلك تعلم أيضاً؛ أنَّ الحركة ليست تصير مضادّة للحركة لأجل أنَّ المحركين متضادّان، ولا أيضاً لأجل الزمان؛ لأنَّ الزمان لا تتضادّ طباعه، ولو كانت تتضادّ لكان يكون التضادّ في أمر يعرض للحركة لا لطبيعة الحركة، فإنَّ الزمان عارضٌ للحركة. ولا أيضاً تكون الحركات متضادّة لأجل أنَّ الذي فيه الحركة مضادّ للذي فيه حركة أُخرى، فإنَّ الذي فيه الحركة يكون متفقاً، والحركات تتضادّ؛ فإنَّ الطريق من البياض إلى السواد، ومن الزيادة إلى النقصان، هو بعينه الطريق من السواد إلى البياض، ومن النقصان إلى الزيادة، وبالجملة هي بين المتوسطات بأعيانها، كما أنَّ المسافة في النزول هي المسافة في الصعود. وبالجملة فإنَّ هذه المتوسطات لا أضداد لها لأنّها متوسطات، فكيف تكون هي التي لتضادّها تصير الحركات متضادّة؟

(3) So nothing remains now but the termini *ad quem* and *a quo;*[4] for, when they are contraries, like black and white, the motions are contraries, but not in whichever way chance may have it. [That] is because the motion *from black* is not a contrary of the motion to black simply because it is from black, but because it necessarily follows from the fact that there is a motion *toward white* together with that, just as its being a motion *toward black* necessarily follows from its being a motion *from white.* There is no transition from black except toward white, nor is there transition toward black except from white. (As for from becoming transparent and toward becoming transparent, that is not a motion, but, rather, something that occurs all at once.) Were it the case that the motion from black was not directed toward white, then these two motions would not be contraries, just as something can be moved away from the right while not [being moved] to the left, but upward.

(4) So contrary motions are those whose limits are opposites. This is understood in two ways (which [in fact] are traced back to three ways). One of them is that their limits are opposite as a result of a real contrariety in the things themselves—as, for example, black and white, and the largest and smallest volume with respect to a given thing's nature. The second is that, although their limits do not oppose each other in themselves and essentially, they do oppose each other in two ways, one of which is relative to the motion, and the second relative to factors outside the motion. An example would be, for instance, the two limits of gazing along the continuous distance between the Heavens and the Earth, whether as two points or two places. The natures of the two points in the two places are neither contraries nor opposites in the way that black and white are, but

4. Following **Z** and **T** and rejecting **Y**'s suggested addition *tataḍāddu* and secluding *al-ḥarakah,* which appears in only two of the MSS consulted by **Y**. If retained, the sense would be "So nothing remains *contrary to the motion* but. . . ."

(٣) فلم يبق الآن إلاّ الأمور التي إليها وعنها، فإنّها إذا كانت متضادّة، كالسواد والبياض، كانت الحركات متضادّة، ولا كيف اتفق. فإنَّ الحركة من السواد ليس بضدّ للحركة إلى السواد، لأجل أنّه حركة من السواد فقط، بل لأجل ما يلزمه من أنْ يكون مع ذلك حركة إلى البياض، كما يلزم كونها حركة إلى السواد من كونها حركة من البياض. فإنَّ الانتقال من السواد لا يكون إلاّ إلى البياض، والانتقال إلى السواد لا يكون إلاّ من البياض. فأمّا من الإشفاف وإلى الإشفاف فذلك ليس بحركةٍ بل أمرٌ يقع دفعة، ولو كانت الحركة من السواد قد تتوجه لا إلى البياض، لم تكن هاتان الحركتان متضادتين، كما أنّه يجوز أنْ يتحرك الشيء من اليمين لا إلى اليسار، بل إلى فوق.

(٤) فالحركات المتضادّة هي التي تتقابل أطرافها، وهذا يتصوّر على وجهين يرجعان إلى وجوهٍ ثلاثة: أحدها أنْ تكون أطرافها تتقابل بالتضادّ الحقيقي في ذواتها؛ مثل السواد والبياض، ومثل أكبر حجم في طبيعة الشيء، وأصغر حجم في طبيعة ذلك الشيء والثاني أنْ تكون أطرافها لا تتقابل في ذواتها وفي ماهياتها، بل تتقابل من جهتين إحداهما بالقياس إلى الحركة، والثانية بالقياس إلى أمورٍ خارجةٍ عن الحركة؛ مثل أنَّ طرفي النظر في المسافة المتصلة بين السماء والأرض مثلاً نقطتان أو مكانان، وطباع النقطتين في المكانين لا تتضادّ ولا تتقابل تقابل السواد والبياض، بل تتقابل لأمرٍ آخر خارج، وذلك الأمر، إمّا غير

[they] are opposites owing to some outside factor, where that factor either is or is not dependent upon the relation to motion. What is outside the relation to the motion occurs [for example] in that one of the two limits is at the maximal degree of proximity to the celestial sphere, whereas the second is at the maximal degree of remoteness from it. So [the gaze falls] necessarily upon one of [the celestial sphere's] limits if [that limit] is up and another if it is down. As for that which is dependent upon the relation to the motion, an example would be that one of the two limits is accidentally the beginning of one single motion and the other is accidentally the end. So the relation of each one of them to the motion is something different and opposite of the other's relation. Even if the relation of each one of them to the motion is a relation of relative opposition—since the beginning is a beginning of something that has a beginning and the end is an end of something that has an end, and vice versa—the opposition between beginning and end will not be this opposition. [That] is because the beginning is not the opposite of that end in that it is said relative to it. [That] is because it does not follow that when motion has a certain beginning, then it must be understood to have a certain end. Perhaps (if not necessarily) it will be known by some proof and an additional middle term. The same holds in the case of ending. Now, with two correlatives, to know either one is necessarily to know the other. The distance's beginning, however, is not something essentially understood relative to its end, nor is its end essentially understood relative to its beginning. So, between them, there is not the opposition of being correlative. [Still], there is inevitably some opposition between them (I mean, when they are through what is rectilinear), since it is impossible that the starting point and endpoint be joined together at one and the same

متعلقٍ بالنسبة إلى الحركة، وإمّا متعلق بها. أمّا الخارج من النسبة إلى الحركة فبأنْ يكون أحد الطرفين في غاية القرب من الفلك، والطرف الثاني في غاية البُعْد منه، فيكون طرفٌ منه يلزمه، إنْ كان علوّاً، والآخر <يـ>لزمه إنْ كان سُفْلاً. وأمّا المتعلّق بالنسبة إلى الحركة، فمثل أنْ يكون أحد الطرفين عرض له أنّه مبدأ الحركة الواحدة، والآخر عرض له أنّه منتهى لتلك الحركة، فقياس كل واحدٍ منهما إلى الحركة مخالفٌ ومقابلٌ لقياس الآخر. فإنّه وإنْ كان قياس كل واحدٍ منهما إلى الحركة؛ قياس المقابل بالإضافة، إذ المبدأ مبدأ لذي المبدأ، والمنتهى منتهى لذي المنتهى، وكذلك بالعكس في الأمرين، فليس مقابلة ما بين المبتدأ والمنتهى هذه المقابلة، فإن المبدأ لا يقابل المنتهى بأنّه مقول بالقياس إليه، فإنّه ليس يلزم أنّه إذا كان للحركة مبدأ ما، وجَبَ أنْ يفهم من هذا بعينه أنَّ لها منتهى، عسى – إنْ كان ولا بُدّ – فسيعلم بدليلٍ ووسطٍ من خارج، والأمر في المنتهى كذلك. والمضافان، أيّهما علم، لزم العلم بالآخر، فليس ابتداء المسافة متصور الماهية بالقياس إلى منتهاها، ولا منتهاها متصور الماهية بالقياس إلى مبتداها، فليس بينهما تقابل المضاف، وبينهما لا محالة تقابل، أعني إذا كانا في المستقيمة. إذ يستحيل أن يكون المبدأ والمنتهى مجتمعين في شيءٍ واحدٍ

moment of time in one and the same thing to which they are related as a starting point and endpoint. Also, one of them is not some privation of the other, such that the endpoint would be the privative notion of the starting point, except by contrariety. There simply is no other kind of opposition but contrariety. It is not improbable, however, that, with respect to what is not rectilinear, there is some one and the same thing that is [both] a starting point and endpoint for the nonrectilinear motion. So, in that case, there would be neither contrariety nor opposition with respect to the starting and ending points.

(5) The first class, without doubt, makes motions to be contraries, whereas there seems to be doubt about the latter two classes. That is because the things possessing those limits do not oppose each other essentially, but only do so by happening to have some accident. So, when there is nothing that is really contrary, why should we make the motions contraries? We say that this premise is false. When *x* is dependent upon *y,* and [when] the contrariety that *y* happens to have is not[5] in its substance but owing to some accident that it happens to have, it does not necessarily follow that the contrariety in *x* is accidental. That is because this thing that is accidental to *y* might be some factor internal to the substance of *x*. So being delimited by [a given] limit is not essential to wax, but it is essential to the shape that is in the wax—that is, it is dependent upon the wax and subsists through it. Similarly, hot and cold bodies are contraries by virtue of their accidents and activities, and the [motions of] heating and cooling that proceed from them are not accidental, but real contraries. [That] is because, even if hot and cold are accidents relative to the body, they are essential or exist necessarily, such that [the motions of] heating and cooling are realized and have this form. Motion, then,

5. **Y** seems inadvertently to have omitted *laysa,* which appears in **Z** and **T**.

همـــا بالقياس إليه مبتدأ ومنتهى، اجتماعاً في زمانٍ واحد، وليس أحدهما معنى عدمياً للآخر، حتى يكون المنتهى عدم المبتدأ إلاّ بالتضاد، ولا وجه من وجوه التقابل إلاّ التقابل بالتضادّ. وأمّا في غير المســـتقيم فلا يبعد أنْ يكون شـــيءٌ واحدٌ مبتدأ ومنتهى للحركة، التي ليست على الاستقامة، فلا يكون في المبدأ والمنتهى هناك تضادّ أو تقابل.

(٥) وليس يقع الشـــك في أنَّ القســـم الأول يجعل الحركات متضادّة، وأمّا القسمان الآخران فيشبه أنْ يقع هذا الشك فيهما، وذلك لأنَّ ذوات تلك الأطراف لا تتقابل لذاتها، بل تتقابل بعارضٍ عرض لها، فإذالم تكن متضادّة حقيقية، لِمَ نجعل الحركات متضادّة حقيقية؟ فنقول: إنَّ هذه المقدمة باطلة؛ فإنّه ليس إذا كان الشيء متعلقاً بشيءٍ ويكون ذلك الشيء ليس يعرض له التضادّ في جوهره، بل لعرضٍ يعرض له، يجب أنْ يكون التضادّ، في المتعلق بذلك الشيء، تضادّاً بالعرض؛ وذلك لأنّه يجوز أنْ يكون هذا الذي هو عارضٌ للمتعلق به أمراً داخلاً في جوهر المتعلّق. فإنَّ التحدّد بالطرف أمرٌ غير ذاتي للشمع، وذاتي للشكل الذي هو في الشمع، وهو ممّا يتعلق بالشمع ويتقوّم به. وكذلك الجسم الحار والجسم البارد، يتضـــادّان بعرضيهما وفعلاهما؛ وهو الاســـخان والتبريد الصـــادران عنهما، لا يتضادّان بالعرض بل بالحقيقة، لأجل أن الحار والبارد – وإنْ كان عارضاً بالقياس إلى الجســـم – فإنّه ذاتي، أو واجب الوجود حتى يكون الاسخان والتبريد متحقّقاً وعلى هذه الصورة.

does not depend upon the distance's limit inasmuch as it is merely a limit, however it might be. So, when [the motion] at the limit happens to have some accident, neither is [that accident] internal to the subsistence of the motion nor is its inclusion necessary. Very much to the contrary, the motion depends upon the limit only inasmuch as it is starting point and endpoint. [That] is because every motion, in its very substantiality, includes the posterior and the prior, because the very substance of motion is to be a departing from and tending toward. So the very substantiality of motion includes a starting point and endpoint, whether in actuality or in the potentiality proximate to actuality, which we have indicated.[6] So it is only insofar as distance's limits are a starting point and endpoint that motion is dependent upon them, and insofar as they are a starting point and endpoint that they are opposite each other, and insofar as they are opposites of each other that they are constitutive of the motion, even though that is not constitutive of them.

(6) It is patently obvious that the motion, which has a designated starting point and endpoint, where the two are actually different from one another [and] one of which cannot be brought to the other, but is as we described, is essentially from one contrary to another. Now, the two contraries are essential to it but are not essential to the subject, which is the limit. Someone might ask: How can the starting point be a contrary of the endpoint when motion's starting and ending points are sometimes in a single body, whereas contraries are not joined together in a single body? The answer is that contraries might be joined together in a single body when the body is not their primary, proximate subject. Only in the primary, proximate subject are contraries not joined together simultaneously. The subject functioning as the starting point

6. See 2.1.22.

فإنَّ الحركة ليست تتعلق بطرف المسافة، من حيث هو طرفٌ فقط كيف كان، حتى إذا عرض للطرفية عارضٌ كان غير داخلٍ في تقويم الحركة، أو لا يجب دخوله، كلا بل إنّما تتعلق الحركة بالطرف من حيث هو مبدأ ومنتهى. فإنَّ كل حركةٍ بجوهريتها تتضمن التأخّر والتقدّم، لأنَّ الحركة جوهرها مفارقة وقصد، فجوهرية الحركة تتضمن المبدأ والمنتهى، إمّا بالفعل، وإمّا بالقوة القريبة من الفعل التي أشرنا إليها. فالأطراف التي للمسافة، إنّما تتعلق بها الحركة من حيث هي مبدأ ومنتهى، وهي - من حيث هي مبدأ ومنتهى - متقابلة، وهي من حيث هي متقابلة؛ فهي مقوّمة للحركة، وإنْ كانت ليست متقوّمة بذلك.

(٦) وظاهرٌ بيّنٌ أنَّ الحركة التي يتعيّن لها مبدأ ومنتهى متغايران بالفعل لا يجوز أنْ يؤدي أحدهما إلى الآخر، بل يكون على النحو الذي وصفنا، فهي لذاتها من ضدّ إلى ضدّ، والضدّان ذاتيان لها، وليسا ذاتيين للموضوع الذي هو الطرف. ولقائلٍ أنْ يقول؛ كيف يكون المبدأ مضادّاً للمنتهى؛ ومبدأ الحركة ومنتهاها قد يكونان في جسمٍ واحدٍ، والأضداد لا تجتمع في جسم واحد؟ فيقال له: الأضداد قد تجتمع في جسم واحدٍ، إذا كان الجسم ليس موضوعها الأول القريب، إنّما لا تجتمع الأضداد معاً في الموضوع الأول القريب. وموضوع المبدائية والمنتهائية ليس هو الجسم بل الطرف، ولا يجتمع في طرفٍ بالفعل أنْ يكون مبدأ حركةٍ مستقيمةٍ واحدةٍ بالاتصال ومنتهاها، وهذا كما قد يجتمع في

and endpoint is not the body, but the limit. In a limit, however, there is no actual joining together [such] that there is [both] a starting and endpoint of a single, continuous, rectilinear motion. This is like opposite things that are sometimes joined together in a single body (and even at the same time) without there being contrariety—as, for example, a body in which there exists a convex and concave line, and whatever is like that. The one who thinks that it is no more fitting that rectilinear motions are contraries of one another than that they be contraries of circular [motions]—since the course and distance in contrary rectilinear [motions] is one and the same—is simply being obtuse. He might just as well say that black and white are not contraries because their subject is one and the same. Were it one of the conditions of being contraries that two contrary things should not share anything in common, then two contraries would not be joined together in a single genus, nor would their subject really be one and the same; for *contrariety* is to be different to the maximal degree possible along a single course. Blackening is undoubtedly the contrary of whitening, and the course between them, which is one, is the intermediate states; however, the two opposing processes with respect to [that course] are as different as can be.

(7) Having laid these foundations, let us return to our intended goal of explaining that circular motion is not the contrary of rectilinear motion. We say: If there is contrariety between the two, then that contrariety either is or is not on account of being circular and rectilinear. On the one hand, if it is on account of being circular and rectilinear, then

جسم واحدٍ أشياء متقابلة، وإنْ كانا معه، بغير التضادّ؛ كجسمٍ يوجد فيه خطّ محدّب وخطٌّ مقعّر، وما أشبه ذلك. والذي ظنَّ أنَّ الحركات المستقيمة ليست أوْلى بأنْ تتضادّ، من أنْ تضادّها المستديرة – إذ الطريق والمسافة في المتضادّات المستقيمة واحدة – فقد سها سهواً عظيماً، وكان يلزمه أيضاً أنْ يقول: السواد والبياض ليسا بمتضادين؛ لأنَّ موضوعهما واحد. ولو كان من شرط التضادّ أنْ لا يكون للضدّين أمرٌ مشتركٌ، لما اجتمع الضدّان في جنسٍ واحدٍ، ولما كان موضوعهما واحداً بالحقيقة، فإنّ التضادّ هو اختلافٌ في طريق واحد على غاية ما يمكن. ولا يُشك أنَّ التسوّد ضدّ التبيّض، والطريق بينهما هو الوسائط وهو واحد، لكن السلوكين المتقابلين فيه هما على غاية الخلاف.

(٧) وإذ قد بيّنا هذه الأصول، فلنرجع إلى غرضنا من تبيين أنَّ الحركة المستديرة لا تضادّ الحركة المستقيمة، فنقول: إنْ كان بينهما تضادّ، فإمّا أنْ يكون ذلك التضادّ لأجل الاستدارة والاستقامة أو لا يكون، فإنْ كان لأجل الاستدارة والاستقامة، كانت الاستدارة والاستقامة متضادّتين؛ لأنَّ الشيء الذي به الاختلاف بين الأضداد المتفقة في الجنس

being circular and being rectilinear are two contraries, because the thing by which contraries agreeing in genus differ is a contrary. As was noted,[7] however, the proximate subject of the circular and rectilinear is not one and the same, nor, as we said,[8] can any part of the subjects undergo alteration from being circular to being rectilinear without its undergoing corruption. So, they are not contraries because of the contrariety of the motions, but neither is that with respect to which there is motion the cause of the motions' contrariety. So if their contrariety is not owing to that with respect to which [there is motion], it remains that it is owing to the limits. Now, if it is because of the limits that circular motion is contrary to the others, one and the same motion would have an infinite number of different motions contrary to it. [That] is because it is possible that the rectilinear line (which has been picked out and denoted as that along which there is this rectilinear motion) is a chord for a potential infinity of dissimilar arcs. There is, however, only one contrary of this one—namely, that which is at the maximal degree of remoteness from it. In this [way], we can also explain that the form of the rectilinear and the circular are not generically contrary to one another. [That] is because, if the rectilinear absolutely is a contrary of the circular absolutely, then, equally, *this* rectilinear thing is contrary to *this* particular circular thing, since this one thing can be an opposite of only one particular thing. [That is] because what is at the farthest degree of difference from this one in a given nature is itself one, and if it is not at the farthest degree, it is not a contrary. Since this individual is not numerically many, neither can its contrary be something common to many.

7. See 4.3.6
8. Ibid.

متضادّ. لكن الاستدارة والاستقامة – كما قيل – ليس موضوعهما القريب واحداً، ولا شيء من الموضوعات يجوز أنْ يستحيل من الاستدارة إلى الاستقامة إلاّ بفساده، على ما قلنا، فليس بضدّين بسببي تضادّ الحركات، بل ليس ما فيه الحركة هو السبب لتضادّ الحركات، فإنْ لم يكن تضادّهما لما فيه؛ بقي أنْ يكون للأطراف. ولو كانت مضادّة المستديرة لغيرها بسبب الأطراف، لكانت الحركة الواحدة بعينها تضادّها حركاتٌ لا نهاية لها مختلفة، لأنَّه يمكن أنْ يكون الخطّ المستقيم المعيّن المشار إليه الذي عليه هذه الحركة المستقيمة وترا لقسيٍّ غير متشابهة لا نهاية لها بالقوة، لكن ضد هذا الواحد واحدٌ فقط؛ وهو الذي في غاية البُعْد عنه. ويمكن أنْ نتبين بهذا أيضاً أنَّ صورة الاستقامة والاستدارة لا تتضادّ تضادّاً جنسياً، لأنّه إنْ كان مطلق الاستقامة مضاداً لمطلق الاستدارة؛ كان أيضاً هذا المستقيم يضادّ هذا المستدير بعينه. إذ لا يجوز أنْ يكون هذا الواحد مقابلاً إلاّ لواحدٍ بعينه، لأنَّ ما هو أبعد عن هذا الواحد في طبيعة الخلاف، فهو واحدٌ، فإنْ كان لا أبعد؛ فلا ضدّ. وهذا الشخص، لما لم يكن متكثراً بالعدد، لم يجز أنْ يكون ضدّه معنى عامياً متكثراً.

(8) Undermined in the same way is the claim of those who say that the many motions along the arcs can be the contraries to the one rectilinear motion. It is said that even if the contrary of one thing is one thing, these many things are like one thing inasmuch as they are circular. This claim is, in fact, mistaken. That is because the contrary of the single thing that is common to many things taken individually is [likewise] some single thing taken in common. It is not the case that the contrary of the single thing taken in common is one thing taken individually. So this single rectilinear line taken individually is not the contrary of all of those circular lines that are alike in being circular. The fact is that it seems more fitting that those circular lines are not like individuals of a single species, but, rather, [that] each one of them is an arc of some other circle whose curvature and protraction are different. It is not unlikely that there are numerically many circles that agree in species and do not differ in having a curved shape, but which in no way can be made to coincide with one another. In some way like this, what is rectilinear and what is circular differ, even while being alike inasmuch as they are extended lines. So it is not unlikely that two arcs that cannot be put in exact correspondence with one another will differ specifically, while agreeing in being two curve-shaped circular things. So how can all of those different arcs be some contrary for a single thing?

(9) Moreover, the demand of anyone who asserts that there is a generic contrariety between what is rectilinear and circular and a specific contrariety between two rectilinear things comes to naught by the [simple] fact that we do not deny that one and the same thing has a number of contraries from various perspectives, whether generically or specifically. That is because one thing may be the contrary of another with respect either to the nature itself or to certain accidents and states.

(٨) فسقطَ بهذا قول مَنْ قال إنَّ هذه الحركات القوسية الكثيرة، يجوز أنْ تكون مضادّة للمستقيمة الواحدة؛ قال وإنّه وإنْ كان ضدُّ الواحد واحداً، فهذه الكثيرة، من حيث هي مستديرة، كشيءٍ واحد. فإنَّ هذا القول خطأ، وذلك لأنَّ ضدّ الواحد بالعموم واحدٌ بالعموم، متكثّر بالشخص، ليس ضدّ الواحد بالعموم واحداً بالشخص. فليس ضدّ جميع تلك المستديرات المتفقة في معنى الاستدارة هذا المستقيم الواحد بالشخص، بل الأولى أنْ تكون تلك المستديرات ليست كأشخاصٍ من نوعٍ واحدٍ، بل كل واحدٍ منها قوسٌ من دائرةٍ أخرى، انعطافها وانجذابها إنعطافٌ وانجذابٌ آخر. ولا يبعد أنْ تكون الدوائر المتفقة في النوع هي التي تتكثّر بالعدد، ولا تختلف في الإحديداب، فيكون لا جواز مطابقة فيما بينهما بوجهٍ من الوجوه. وبمثل هذا ما اختلف المستقيم والمستدير، وإنْ اتفقا من حيث أنّهما خطّان ممتدان، فلا يبعد أنْ يختلف نوعا القوسين اللّذين لا ينطبق أحدهما على الآخر، وإنْ اتفقا في أنهما مستديران مُحْدَوْدبان، فكيف تكون تلك القسي المختلفة كلها مضادّة لشخصٍ واحد؟

(٩) ويسقط أيضاً سؤال مَنْ قال؛ ليكن بين المستقيم والمستدير مضادّة جنسية، وبين المستقيمين مضادّة نوعية، بأنْ يقال: إنّا لا نمنع أنْ يكون للشيء الواحد أضداد من جهاتٍ كانت جنسية أو كانت نوعية، وذلك لأنَّ الشيء يضادّ الشيء في طبيعة ذاته، وقد يضادّه في أعراض وأحوال. ونحن لا نمنع أنْ يعرض للحركات المستديرة أنْ يكون لها

Now, we ourselves do not deny that circular motions happen to have certain contraries that belong to rectilinear and circular things among their accidental features. We deny only that they have some contrary in themselves and essentially. This is like the fact that, in ethics, the mean is contrary to [both] excess and deficiency,[9] even though, in themselves, [excess and deficiency] are contraries as well. In fact, the contrariety of the excess and the deficiency is a real contrariety in the things themselves—namely, they are at the maximal degree of remoteness from one another. The contrariety of the mean and the two extremes, however, is not owing to the nature of the mean and the two extremes, but because the mean is a virtue, while the latter two are alike in being vices. Now, virtue is either some inseparable or accidental feature of that nature belonging to a mean, just like the latter two's being vices is something inseparable or accidental to them. So one limit is the contrary of the other as a result of their very substance, whereas the mean is a contrary accidentally. As for whether something can have one contrary due to its genus and another due to its species, you have already learned elsewhere[10] what there is to this when you discovered that the contrary is, in fact, the contrary of the thing itself and its specificity. So what is circular cannot be generically contrary to what is rectilinear, and one rectilinear thing [cannot be] specifically contrary to another. Also in this, one must not appeal to the generic contrariety of motion and rest to bolster one's case, and then the specific contrariety of two motions; for rest is a privative feature, not a contrary.[11] So it has become clear that rectilinear motion is not the contrary of circular motion.

9. Cf. Aristotle, *Nicomachean Ethics* 2.6.
10. The reference is probably to *Kitāb al-maqūlāt* 7.3.
11. See 2.4.

أضداد ، من المستديرات ومن المستقيمات في معانٍ تعرض لها ، وإنّما نمنع أن يكون لها ضدٌّ في ذاتها وماهيتها . وهذا ؛ كما أنَّ التوسّـــط في الأخلاق يضادّ التقصير والإفراط، وقد يتضادّان هما أيضاً في أنفسهما ، ولكن تضادّ الإفراط والتقصير تضادّ حقيقي في الذات، وهمـــا المتباعدان غاية التباعد . وأمّا تضادّ التوسّـــط والطرفين ؛ فليس لطبيعة التوسّـــط والطرفين، بل لأنَّ التوسّـــط فضيلة، وذانك يجتمعان في الرذيلة، والفضيلة معنى لازمٌ أو عارضٌ لتلك الطبيعة المتوسطة، وأيضاً كون ذينك رذيلة معنى لازم لهما أو عارض، وليس للفضيلة والرذيلة دخولٌ في ماهية هذه. فيكون التضادّ بين المتوســـط والطرفين تضادّاً في عارض ؛ فالطرف يضاد الطرف بجوهره وذاته، ويضاد الوســـط بعارض. وأمّا هل يكون للشـــيء ضدٌّ من جهة جنســـه، وضدّ من جهة نوعه، فقد علمت في موضع آخر ما في هـــذا ، وتحقّقت أنَّ الضدّ بالحقيقة هو ضدّ ذات الشـــيء ونوعيتـــه. فلا يجوز أنْ تكون المستديرة تضادّ المستقيمة تضادّاً جنسياً ، وتضاد المستقيمةُ المستقيمةَ تضادّاً نوعياً ، ولا يجب أنْ يســـتعان في هذا بتضادّ الحركة والســـكون تضادّاً جنســـياً ، ثم بتضادّ الحركتين تضادّاً نوعياً ، فإنَّ الســـكون معنى عدمي لا مضاد ؛ فقد اتضح أنَّ الحركة المســـتقيمة لا تضادّ المستديرة.

(10) Likewise, you know that circular motions along arcs are not contrary to one another, because there can be infinitely many arcs agreeing in certain shared limits. Also, the motion from one limit of an arc to the other (and vice versa), when the arc is one and the same, has no contrary. You will understand that once you understand that the circular motion that involves [change] of position [rather than change of place], making a complete rotation, has no contrary whatsoever, because it has no actual limit.[12] When it is posited as having a limit at which a designated position comes to be actual by that act of positing, there comes to be, at [the designated position] (if there does), a starting point and endpoint. In doing so, the starting point and endpoint are not contraries on account of being the initial point of origin and ultimate point of termination, but because, whenever [that designated position] passes by you, there is a certain starting point and endpoint of a given motion. It does not happen no matter what, but because there is a starting point and endpoint of a given motion whose starting point is not itself the point at which its extension ends, such that the opposition between the starting point and end would, in fact, be on account of the relation to the motion. That happens only where the starting point and endpoint belong to a rectilinear motion whose extension is not such that one and the same point is appointed as both the starting and end point,[13] and so that [starting point and endpoint] are not together. When

12. See par. 8.

13. Literally, "the starting point is made an endpoint nor the endpoint a starting point."

(١٠) وكذلك لك أنْ تعلم أنَّ المستديرات التي على القسي لا تتضادّ؛ لأنّه يجوز أنْ تتفق في أطراف مشتركة قسيٌ بلا نهاية. فأمّا الحركة من طرف قوسٍ إلى طرفٍ آخر، والتي بالعكس - والقوس واحدة بعينها - فلا تكون مضادة لها أيضاً، تعلم ذلك إذا علمت أنَّ الحركة المستديرة الوضعية، التامّة الدوران، لا ضدّ لها بوجه، لأنّه لا طرف لها بالفعل. وإذا فرض لها طرف يكون فيه خروج وضْعٍ معيْنٍ إلى الفعل، بذلك الفرض اجتمع فيه، إنْ كان، مبدأ ومنتهى، إذ لم يكن المبدأ والمنتهى ضدّين لأجل المبدئية والمنتهائية، بل لأجل أنّهما - كما مرَّ ‹بك› - مبدأ ومنتهى حركة، ولا كيف اتفق، بل لأجل أنّهما مبدأ ومنتهى حركةٍ بصفةٍ لا يكون مبدؤها هو بعينه منتهاها في استمرارها، حتى يصح التعاند بين المبدأ والنهاية من جهة القياس إلى الحركة. وذلك إنّما يتفق حيث يكون المبدأ والمنتهى لحركةٍ مستقيمة، يكون الاستمرار فيها لا يجعل المبدأ منتهى ولا المنتهى مبدأ،

that is the case, you also know that the two motions along a single arc are not contraries. [That] is because the motion along those arcs, inasmuch as it is a curved motion, is not posited such that its starting point is essentially different from its endpoint; rather, that is accidental to some posited segment[14] or some chance pause. Otherwise, it would, in fact, continue toward the same starting point. In other words, it is single, continuous motion that does not reverse itself.

(11) Circular motions involving [change] of position—and especially those belonging to a body whose parts are homogeneous, whether taken as a body whose parts are homogeneous or in a body whose parts are homogeneous (where I mean homogeneous in nature and in the position of the parts)—are such that, if they are many and different, they are numerically many and different only because each one of the motions has been completed. [That] is because they begin from some position (once it is actually posited) and end at some position (once it is actually posited), where there is only numeric difference between the two. Also, in the middle it will have positions (once they are actually posited) that are only numerically different from the ones preceding them. Every one of the motions—indeed, its posited starting point, endpoint, and intermediary points—differ from another motion only numerically. So [circular motions involving change of positions] are only numerically different. Now, things that differ only numerically are not contraries, even if it is impossible that they be joined together. It is claimed that, just as the

14. Alternatively, the text's *qaṭ*^{c} might be understood as "traversal."

فذلــك هو الذي لا يجتمع . وإذا كان كذلك ، فقد عرفــت أنَّ الحركتين اللّتين على القوس الواحــدة لا تتضادّان ، لأنَّ الحركة على تلك القوس لا يُفترض لها – من حيث هي حركة قوسية – أنْ يكون مبدؤها غير منتهاها مغايرة ذاتية ، بل يعرض ذلك لقطْع يفرض ووقوفٍ يتفق ، ولولا ذلك لصحَّ لها التوجه المســتمر إلى المبدأ بعينه ، وهي حركة متصلة واحدة لا رجوع فيها .

(١١) والحركات المســتديرة الوضعية ، وخصوصاً ما يكون منها لجســم متشــابه الأجزاء ، موضوع على جســم متشابه الأجزاء ، أو موضوع في جسم متشابه الأجزاء ، أعني المتشابه في الطبيعة وفي وضع الأجزاء ، فإنّها حركاتٌ – إنْ تكثّرت وتخالفت – فإنّمــا تتكثر وتتخالف بالعدد ، لأنَّ كل حركةٍ منها تمت فإنّها تبتدىء من وضع ، إذا فُرض بالفعــل ، وتنتهي إلى وضْع إذا فــرض بالفعل ، لا اختلاف بينهما إلاّ بالعدد ، ويكون له في الوسط أوضاع ، إذا فرضت بالفعل ، لم تكن مخالفة لما قبلها إلاّ بالعدد . وكل حركة منها فإنَّ مبتدأها المفروض ومنتهاها المفروض ووســطها المفروض ، لا يخالف حركة أخرى إلاّ بالعدد ، فهي لا تخالفها إلاّ بالعدد ، ولا شيء ممّا لا يتخالف إلاّ بالعدد بأضداد ، وإنْ كانت

circular differs from the rectilinear in that it has no actual limit, so likewise it differs from it in that its species of contrariety does not depend upon limits. [Such a claim] comes to naught given what we know—namely, that there is no way for there to be contrariety among motions except on account of the endpoints and limits. So, when the endpoints come to naught, so goes the way of contrariety, and so there is no contrary. From what we have said, then, you also know the situation concerning circular motion and have learned that rectilinear things have contraries. How could they not?! Indeed, descending and ascending are contraries in the aforementioned way, which belongs to motion inasmuch as it is a rectilinear motion, as well as in another way besides that—namely, that the two limits are sometimes contraries by way of being high and low as well. So the motion that has a contrary [call it *x*] is the one that is taken as most closely approximating a distance from some actual limit to some actual limit, and *x*'s contrary is that [motion] that starts at *x*'s endpoint and proceeds toward *x*'s starting point, and toward nothing else.

يســـتحيل أنْ تجتمع . وأمّا الذي قيل من أنّه كما أنَّ المســـتديرة تخالف المستقيمة في أنها لا طرف لها بالفعل ، فكذلك تخالفها في أنَّ نوع تضادّها لا يتعلق بالأطراف ، فيسقط – بما عرفنـــاه – أنّـــه لا وجه لتضادّ الحركات إلاّ أنْ يكون بســـبب النهايـــات والأطراف ، فإذا ســـقطت النهايات ، سقط وجه التضادّ ، فلم يكن ضدّ . فقد علمتَ ممّا قلناه حال الحركة المســـتديرة . وأمّا المســـتقيمات فقد عرفت أيضاً أنّها تتضادّ – وكيف لا تتضادّ – وأنْ النـــازل والصاعد يتضادّ التضادّ المذكور الذي للحركة بما هي حركة مســـتقيمة ، وتتضادّ تضادّاً خارجاً عن ذلك ، وهو أنّ الطرفين قد يتضادّان من طريق أنّهما عُلو وسُـــفْل أيضاً . فالحركـــة ذات الضـــدّ هي التي تأخذ أقرب مســـافة من طرفٍ بالفعـــل إلى طرفٍ بالفعل ، وضدّها هو الذي يبتديء من منتهاها ذاهباً إلى مبتداها ، لا إلى شيءٍ آخر .

Chapter Seven

Of the opposition of motion and rest

(1) The opposition between motion and rest is something I confirmed in what went before.[1] You have also learned that every genus of motion has a rest that is its opposite. We still need to explain the opposition of one rest to another *qua* rest and not inasmuch as a rest is natural and forced, and the other differences external to the substance of the two. So we say that rest is also something in which a certain opposition and contrariety occur on account of the things on which the state of rest depends. Now, when you closely consider the accurate account we presented in the chapter on motion's contrariety,[2] you'll easily understand that the thing producing rest, what is undergoing rest, and the time have nothing to do with that. You'll also know that rest does not depend upon either a starting point or endpoint that is in the [category] of place, although it does depend upon that with respect to which there is [rest].

(2) So it seems that the contrariety of that with respect to which [there is rest] makes rest a certain contrary. Now, that with respect to which [there is rest] admits of contrariety in two ways: contrariety that depends upon its being a space, direction, place, or other analogous terms (which, in general, is a contrariety that depends upon its essence); and

1. See 2.4.
2. See 4.6.

<الفصل السابع>

في تقابل الحركة والسكون

(١) أمّا تقابل ما بين الحركة والسكون، فأمرٌ قد تحققته فيما سلف، وعلمت أنَّ لكل جنس حركةٍ سكوناً يقابله. لكنه قد يجب علينا أنْ نعرف تقابل السكون للسكون، من حيث هو سكون، وسكون لا من حيث هو طبيعي وقسري، وغير ذلك من الفصول الخارجة عن جوهرهما، فنقول: إنَّ السكون أيضاً ممّا تقع فيه مقابلة ومضادّة ما، بسبب الأمور التي يتعلق السكون بها. وإذا تأملت ما اقتصصناه عليك في باب تضادّ الحركات، فعن قريب تعلم أنَّ المسكّن والمتسكّن لا دخل لهما في ذلك، ولا الزمان. وقد علمتَ أنَّ السكون لا يتعلق بمبدأ أو منتهى مكاني، ولكن يتعلّق بما فيه.

(٢) فيشبه أنْ يكون تضادّ ما فيه يجعل السكون متضادّاً، وما فيه بتضادّ على وجهين: تضاداً يتعلق بكونه حيّزاً وجهةً ومكاناً، أو أسماء أُخر ممّا يجري مجراه؛ هي وبالجملة تضادّاً يتعلّق بماهيته، وتضادّاً يتعلق بأمور أخرى مثل أنْ يكون مكاناً حاراً أو

contrariety that depends upon other things—as, for example, that it is a hot or cold place. The latter genus of contrariety is something foreign to rest, which does not bring about any change in the state of resting, such that if there were some body [*x*] in which [another] body [*y*] continues to be at rest, and [if] *x* happened to be heated or cooled or made white or black, [*y*'s] resting in *x* at one moment need not become the contrary of the state of rest in *x* at another moment. Instead, the resting in it continues to be one and the same, because this contrariety is not primarily in the very thing with respect to which there is rest, but in something else. When the contrariety is in the very thing with respect to which [there is rest] in that it is at rest upward at one time (and so where it rests is *up*) and it is at rest downward at another time (and so where it rests is *down*), then the former state of rest is aptly the contrary of the latter state of rest, where resting in the higher place is a contrary of resting in a lower place.

(3) It now remains for you to learn whether the state of rest that opposes moving away from above [that is, downward motion] is to rest above or to rest below. It has been said that resting above is contrary to moving away from above and not to moving above.[3] That is because resting above[4] is sometimes a perfection of the motion upward; but it would be absurd that the natural perfection oppose the thing, while the thing is led to an opposite and contrary. So this is what is said. As for myself, it is not clear to me why something doesn't lead to an opposite in the sense that some opposite immediately follows it. Were that the case, the existence of motion could not lead to the loss of [motion]; but who denies

3. Cf. Aristotle, *Physics* 5.6.230b15–16.

4. Secluding *ilá* (toward) with **Z** and **T**, which appears in only one MS consulted by **Y**.

مكاناً بارداً . وأمّا هذا الجنس من التضادّ ، فهو أمرٌ غريب عن السكون ، لا يغيّر من أمر السكون شيئاً ؛ حتى أنّه لو كان جسم يسكن فيه الجسم سكوناً متصلاً ، وكان يعرض أنْ يسخن أو يبرد ، أو يبيضّ أو يسود ، لم يجب أنْ يصير السكون فيه ، وقتاً مّا ، ضداً للسكون فيه وقتاً آخر ، بل يتصل السكون فيه واحداً بعينه ، لأنَّ هذا التضاد ليس في ذات ما فيه الساكن أولاً ، بل في شيءٍ آخر . وأمّا إذا كان التضادّ في ذات ما فيه ؛ بأنْ كان مرّة يسكن فوق ، فيكون الذي يسكن فيه فوق ، ومرّة يسكن أسفل ، فيكون الذي يسكن فيه أسفل ، فبالحري أنْ يكون هذا السكون مضادّاً لذلك السكون ، ويكون السكون في المكان الأعلى ضدّاً للسكون في المكان الأسفل .

(٣) وقد بقي أنْ تعلم هل السكون الذي يقابل الحركة من فوق هو السكون فوق ، أو السكون أسفل؟ وقد قيل إنَّ السكون فوق ضدّ للحركة من فوق ، لا للحركة إلى فوق ، وذلك لأنَّ السكون فوق قد يكون كمالاً للحركة إلى فوق ، ومحالٌ أن يكون الكمال الطبيعي مقابلاً للشيء ، وأنْ يكون الشيء يؤدي إلى مقابلٍ وضدّ ، فهذا ما يقال . وأمّا أنا فلم يتضح لي أنَّ الشيء لا يؤدي إلى مقابلة ، بمعنى أنّه لا يعقبه مقابلة ، ولو كان كذلك ، لما جاز أنْ يؤدي وجود الحركة إلى فقدانها . ومَنْ ينكر أنَّ الحركة بالطبع إلى فوق إنما

that the natural motion upward is a natural motion upward only so that a natural state of rest occurs at it? So[5] this motion undoubtedly leads to its own loss. It is also not clear to me why resting above is a perfection of the motion in the sense that the *motion* is perfected by that. Quite the contrary, it is a perfection of *what is undergoing the motion,* whereas the motion is corrupted and passes away as a result of it. In other words, it is not the perfection of the motion, but the corruption of the motion. It is a perfection only of what is being moved, which that moved thing comes to have through the motion.

(4) It seems to me that every state of rest that happens to belong to the mobile is an opposite of every motion that is, in fact, in it (should [the motion] in it be replaced by a state of rest). [That] is because [resting] is a certain privation of any motion that was in [the mobile] toward or away from that location. In fact, resting is not the privation of motion inasmuch as it is toward a certain direction; otherwise, whatever is moving in some direction that differs from that one would be at rest. Instead, resting is the absolute privation of motion that is in that genus. The same holds for what is at rest with respect to the categories[6] of place,[7] quantity, and quality. For example, when one and the same place is preserved, the thing is at rest with respect to that place; and when one and the same quality is preserved, the thing is at rest with respect to that quality; and when one and the same magnitude is preserved, the thing is at rest with respect to that magnitude. It is impossible that there be something [of such a nature] that it remains in one and the same place but then cannot undergo any sort of local motion—and the same holds for alteration and the other [types of motion]. If it does not under undergo local motion but does undergo a motion with respect to position—as, for

5. Reading *fa* with **T**, for **Y** and **Z**'s *wa* (and).

6. Literally, "species."

7. Literally, "where" (i.e., the Aristotelian category of *pou*), here and in the following.

هي حركة بالطبع إلى فوق، ليحصل منه سكونٌ بالطبع، فلا شك أنَّ هذه الحركة مؤدية إلى فقدان نفسها . ولم يتضح لي أنَّ السكون فوق ‹هو› كمالٌ للحركة، بمعنى أنَّ الحركة تستكمل بذلك، بل إنّما هو كمالٌ للمتحرك. وأمّا الحركة فإنها تفسد وتبطل به، وذلك ليس كمال الحركة بل فساد الحركة، إنما هو كمالٌ للمتحرك، يحصل للمتحرك بالحركة.

(٤) وعندي أنَّ كل سكونٍ يعرض للمتحرك فهو مقابلٌ لكل حركة تصح فيه، لو كانت فيه بدل السكون، لأنّه عدمٌ لكل حركةٍ تكون فيه إلى ذلك الموضع، أو عن ذلك الموضع. فإنَّ السكون ليس هو عدم الحركة من حيث هو إلى جهةٍ ما ؛ وإلاّ لكان المتحرك إلى خلاف تلك الجهة ساكناً، بل السكون عدم الحركة التي في ذلك الجنس مطلقاً . وكذلك الساكن في نوع أيْنٍ أو كيفٍ أو كمّ، إذا حفظ مثلاً أيناً واحداً ؛ فهو ساكن في ذلك الأين، وإذاً حفظ كيفاً واحداً فهو ساكن في ذلك الكيف، وإذا حفظ مقداراً واحداً فهو ساكنٌ في ذلك المقدار. ويستحيل أنْ يكون الشيء يحفظ أيناً واحداً، ثم يكون عادماً لنُقْلةٍ دون نُقْلة، وكذلك في الاستحالة وغيرها . وإنْ كان يجوز أنْ يكون عادماً لنُقْلة وغير عادمٍ

example, something like a celestial sphere that is in another celestial sphere—then, while it is at rest with respect to place, it is absolutely undergoing motion with respect to position. The same holds for quality, for that which is at rest relative to change in quality is that which does not undergo change in quality. Also, that which is at rest relative to change in quantity is that which does not undergo change in quantity. Still, if someone is eager to make every motion as such have some state of rest that is its opposite and is the privation of that motion *qua* that motion, then he has to make resting from motion downward [the opposite and privation of] undergoing motion upward. If he is then eager to make the opposing state of rest that which the estimative faculty imagines to come upon the motion all of a sudden, so as to bring about its privation, then, despite the fact that he is at liberty to be eager, it is not necessary. [That is] because not every privation is the last, and, rather, sometimes it is earlier, from which it follows that resting in some area below would be that which suddenly comes upon the downward motion.[8] If he is then eager to make the opposing state of rest that which suddenly comes upon the motion such that it is like the prior preparedness and privation joined to potency, resting above is the opposite of the upward motion. As for the natural and forced opposition, it seems that resting above is not the opposite of upward motion (since there are two natures), but, rather, it is downward [motion]. The remaining differences by which motions differ are to be met with analogously.

8. In other words, if some moving thing had initially been resting in some place *x* that is above certain other places *y, z, . . . n,* then, should that thing move downward and rest at any of those places *y, z, . . . n,* that later state of rest would be contrary to the state of having rested at *x*.

لحركةٍ في الوضع، مثلاً مثل الفلك الذي يكون في فلكٍ آخر؛ فإنّه من حيث الأين ساكن، ومن حيث الوضع متحرك مطلقاً. وكذلك الحال في الكيف، فإنَّ الساكن بقياس التغيّر في الكيف هو الذي لا يتغيّر في الكيف، والساكن بقياس التغيّر في الكمّ هو الذي لا يتغيّر في الكمّ. لكنه إنْ نشط أحدٌ أن يجعل لكل حركةٍ، من حيث هي بصفة، سكوناً يقابلها يكون عدم تلك الحركة – من حيث هي تلك الحركة – لزمه أنْ يجعل المتحرك إلى فوق ساكناً عن الحركة إلى أسفل. فإنْ نشط أنْ يجعل السكون المقابل هو الذي يتوهم طارئاً على الحركة فيعدمها، فمع أنّه يُرخص له في هذا النشاط من غير وجوب، إذ ليس كل عدم يتأخر، بل قد يتقدّم، يلزمه أنْ يكون السكون في ناحية تحت، هو الذي يطرأ على الحركة إلى أسفل. فإنْ نشط أنْ يجعل السكون المقابل هو الذي تطرأ عليه الحركة، حتى يكون كالاستعداد المتقدّم والعدم المقارن للقوة، كان السكون فوق، مقابل الحركة من فوق. وأمّا اعتبار التقابل بالطبيعة والقسرية؛ فيشبه أنْ يكون السكون فوق لا يقابل الحركة إلى فوق لأنّهما طبيعتان، بل التي إلى أسفل. وعلى هذا القياس تورد سائر الفصول التي بها تتخالف الحركات.

Chapter Eight

An explanation of whether one motion
can really be continuous with another
or whether that is impossible for them, such that
there must be a state of rest between them

(1) Having learned how motion is one, and how motions are conjoined, as well as how they are opposite, it is fitting that we note which motions are continuous with which [other] ones, and which ones are not [continuous] and, instead, follow immediately upon one another and in succession. We say without question that, when [motions] of differing genera occur successively in a single subject, they are not as a single, continuous motion. Those that are of the same genera, however, such as one alteration after another or one local motion after another, deserve our further investigation. [That] is because there are serious doubts as to whether a stone's ascending motion is continuous with its descending motion and whether the motion along an arc is continuous with the motion along its chord. In general, are there continuous motions, each one of which is assumed to have some [terminus] *a quo* and *ad quem* of the motion, such that one of them would be an ultimate endpoint and the other a starting point, whether like a point (which is a limit of some distance), or a quality (which is a motion's terminus *ad quem*, or the like)?

<الفصل الثامن>

في بيان حال الحركات في جواز أن يتصل بعضها ببعض اتصالاً موجوداً ، أو امتناع ذلك فيها ، حتى يكون بينها سكون لا محالة

(١) قد عرفنا أنَّ الحركة كيف تكون واحدة، وكيف تتضام الحركات، وعرفنا أنها كيف تتقابل، فحري بنا أنْ نعلم أن أي الحركات تتصل بأي الحركات، وأيّها لا تتصل، بل تتشافع وتتالى، فنقول: أمّا المختلفة الأجناس، فلا شك أنّها إذا تعاقبت على موضوعٍ واحد لم تكن على أنّها حركة واحدة بالاتصال؛ وأمّا المتفقة الأجناس، كاستحالةٍ واستحالة، ونُقْلةٍ ونُقْلة، فخليق بنا أنْ نحقّق الأمر في ذلك. فإنّه مما يعظم فيه الشك أنّه هل تتصل حركة الحجر الصاعدة بحركته النازلة، والحركة على قوس بالحركة على وترها وبالجملة، هل تتصل الحركتان اللتان يُفرض لكل واحدٍ منهما شيء عنه وإليه الحركة، فيكون لأحديهما غاية، وللآخر مبدأ، كنقطةٍ هي طرف مسافة، أو كيفية هي نهاية حركة إليها، أو غير ذلك فإنَّ قوماً جوّزوا هذا الاتصال، وقوماً لم يجوزوا، وأوجبوا أنْ يكون

Now, there is one group that allows this continuity, while there is another that does not, but requires that there be a rest between instances of these motions; and both those who allow it and those who deny it have their arguments. So let us list and explain [those arguments] and then present our own view.

(2) One of the arguments of those who allow it is to say: Consider a millstone that is either hurled upward or is falling downward, and, during its course, a very small pebble is going in the opposite direction so that it comes into contact with it. Does that pebble[1] first come to rest and then, thereafter, start its contrary motion, or are there two motions that are continuous with one another? If there is a rest, it follows that an ascending pebble must arrest the millstone's descending motion, which is absurd, whereas, if the two motions [namely, the pebble's ascending and then descending] are continuous, then the position of those who deny that has been refuted.

(3) They further said that it would be absurd for that state of rest to occur without there being some reason or other for it. If there is, then, some reason for it, it is because of either something's absence or [its] existence. If the reason for it is an absence of something—namely, the absence of some cause that brings about the motion—then there does not have to be in that body that is thrown upward, for instance, some principle of moving downward. So it ought not to move [downward] until its substance underwent a change, but that is not the case. If the reason [for resting] is some existing thing, it prevents the motion by being either some external force, or nature, or some internal psychological act of the will, none of which is the case.

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1. Reading *tilka ḥaṣāh* with **Z** and **T** for **Y**'s simple *tilka* (that).

بين أمثال هذه الحركات سكون، وللمجوّزين حجج، وللمانعين حجج، فلنعدّها ولنكشف عنها، ثم لنورد ما عندنا.

(٢) فمن حجج المجوّزين قولهم. أرأيتم حجر رحى يُرمى إلى فوق، أو ينزل إلى أسفل، وتعارضه في مسلكه حصاة صغيرة حتى تماسّه، أتسكن تلك الحصاة أولاً، ثم تأخذ في ضد حركتها، أم تتصل الحركتان معاً؟ فإنْ سكن، وجب من ذلك أنْ تكون الرحى تحبسها حصاة صاعدة، عن الحركة النازلة لها، وهذا محال، وإنّ اتصلت الحركتان فقد بطل مذهب مَنْ يمنع ذلك.

(٣) وقالوا أيضاً؛ إنَّ ذلك السكون من المحال أنْ يحصل من غير أنْ يكون له سببٌ بوجهٍ من الوجوه، ثم إنْ كان له سببٌ، فإمّا أن يكون سبباً عدمياً أو يكون سبباً وجودياً، فإنْ كان سببه عدمياً - وهو عدم سبب التحريك - فيجب أنْ لا يكون في ذلك الجسم المرمي إلى فوق مثلاً مبدأ حركةٍ إلى أسفل، فينبغي أنْ لا يتحرك إلاّ أنْ يتغيّر جوهره، وليس الأمر كذلك. وإنْ كان السبب وجودياً فهو شيءٌ مانعٌ عن الحركة، إمّا قسري من خارج، وإمّا طبيعي أو إرادي نفساني من داخل، وجميع ذلك ليس.

(4) They also say that it is *not impossible* that something should come in contact with and depart from some particular thing in an instant and not remain in contact with it for a period of time so as to be at rest at it. Thus, a mainstay of the argumentation used by those who want to establish that there is rest is unsound, for they depend upon its being *impossible* that one and the same thing be in contact and then depart in a single instant. This [possibility], they said, presents itself [in, for example, the case of] a sphere mounted on a rotating wheel. So [for example] when one supposes a two-dimensional surface[2] above [the sphere] such that, on ascending, [the sphere] meets [the surface] and then departs from it, [the sphere] will be in contact with that surface at a point, but after that it does not continue to remain in contact with it for some period of time.

(5) As for those who deny that,[3] one of their arguments is that it is impossible for one and the same thing to be in contact actually with some definite and distinct end, except at two instants. Between any two instants, however, there is a period of time, and during that time there is no motion, in which case there is rest during it.

(6) Furthermore, they said that if it were possible for ascending to be continuous with descending as a single thing, then, from the two motions, there would come to be a single continuous motion, because it is the continuity that [explains] there being a single motion. It would be necessary, then, that two contrary motions are a single motion, which is absurd.

(7) Likewise, they maintained that, if it were possible for the two motions to be continuous, then the end of the upward motion, which then turns downward, must always terminate at that from which it began. In that case, the starting point of the rectilinear motion that retreats from some space is the very [space] intended by that retreat.

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2. Literally, "a simple surface," but Avicenna uses *saṭḥ basīṭ* regularly to identify the innermost containing surface that is a thing's place, which is not three-dimensional so as to be a body.

3. Most of the arguments for this group are derived from Aristotle, *Physics* 8.8.

(٤) وقالوا أيضاً، إنَّه لا يمنع أنْ يكون شيء يماسّ شيئاً معيناً في آنٍ ويفارقه، ولا يبقى مماسّاً له زماناً حتى يكون ساكناً فيه. فلا يصح ما هو عمدة احتجاج مثبتي السكون، فإنّهم يتعلقون بأنَّه لا يجوز أنْ يقع في آنٍ واحدٍ مماسّة ثم مفارقة. قالوا؛ وهذا مثل كرة مركبة على دولاب دائر، فإنها إذا فرض فوقها سطح بسيط؛ بحيث يلقاه عند الصعود، ثم يفارقه، فإنّها تماس حينئذ ذلك السطح بنقطة، ولا تبقى مماسّة له بعد ذلك زماناً لا يزول.

(٥) وأمّا المانعون عن ذلك، فمن حججهم أنَّ الشيء الواحد لا يجوز أنْ يكون مماسّاً بالفعل لغايةٍ معيّنة ومبايناً، إلاّ في آنين، وبين كل آنين زمانٌ، وذلك الزمان لا حركة فيه، ففيه سكون.

(٦) وقالوا أيضاً؛ إنَّه لو كان اتصال الصاعد بالهابط شيئاً واحداً، لكانت الحركتان تحدث منهما حركة واحدة بالاتصال؛ لأنَّ وحدة الحركة هي الاتصال، فكان يجب أنْ تكون الحركتان المتضادتّان حركة واحدة، وهذا محال.

(٧) وقالوا أيضاً، لو جاز اتصال الحركتين لكان يجب أنْ تكون غاية الصاعد العائد هابطاً هي أنْ ينتهي في حركته مستمراً إلى ما عنه ابتدأ، فيكون مبدأ الحركة المستقيمة الهاربة عن حيّز هو بعينه المقصود بذلك الهرب.

(8) Finally, they said that when something is in a process of becoming white, and then [at some instant *x*] it [actually] becomes white but [immediately starts] a process of becoming black, then, inasmuch as it is becoming black, there is some blackness in it. As such, however, there is a potential to be white in it. In that case, then, despite the fact that [at the instant *x*] it has [actually] become white, it would also be potentially white, which is absurd.

(9) These and similar things are the basis upon which the two groups argue, but the argumentation of neither one of them is outstanding (even if the second school of thought is true). The fact is that they have entrusted us with no demonstration such that it either completely satisfies us or brings us to a level of understanding that removes all doubts. [Consequently], those who advocate a state of rest took to task the arguments of the former [group].

(10) Concerning the report about the pebble,[4] either the air being pushed in front of the millstone turns the pebble around before the two come into contact (in which case, that state of rest occurs in the air before the contact) or it is not turned around until it meets the millstone (in which case, even if [the notion is] loathsome, it is not impossible that the millstone does stop, owing to the impossibility that the [pebble's upward and downward] motions should be continuous). That is similar to what happens owing to the impossibility of the void.[5] Indeed, it is not improbable that the existence of something necessary will render inactive that which can be so rendered or oppose that which can be so opposed, where there will be an amount of time during which there is the rendering inactive and opposing corresponding with the relation of the acting and being acted upon.

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4. See. par. 2.
5. See for instance 2.8.25.

(٨) وقالوا أيضاً، إنَّه إذا كان الشيء يبيض فابيَضّ وهو يتسوّد، فمن حيث يتسوّد ففيه سواد، ومن حيث هو كذلك ففيه قوة على البياض، فيكون مع أنَّه أبيض، فيه قوة على البياض، وهذا محال.

(٩) فهذه الأشياء وما يشبهها عمدة ما يحتج به الفريقان، وليس - لا واحد منهما - حسن الاحتجاج، وإنْ كان المذهب الثاني هو الحق. لكنهم لم يتركوا لنا برهاناً أقاموه عليه، بحيث نقتنع به أو لم يفهموناه تفهيماً يتعرضون به لأنْ يقع على وجهٍ يزيل الشكوك، فلهؤلاء القائلين بالسكون أنْ ينقضوا ما احتج به أولئك.

(١٠) أمّا حديث الحصاة، فإنَّها لا تخلو إمّا أنْ يكون الهواء المندفع أمام الرحى يصرف الحصاة قبل أنْ تقع بينهما مماسّة، فحينئذ يكون ذلك السكون واقعاً في الهواء قبل المماسّة، وإمّا أنْ لا يكون بحيث يصرفه حتى يلقى حجر الرحى، فحينئذ لا يستحيل، وإنْ كان شنعاً، أنْ تتوقف الرحى لاستحالة اتصال الحركتين، كما يقع مثل ذلك لاستحالة الخلاء. فإنَّ الأمر الواجب وجوده لا يبعد أنْ يبطل ما من شأنه أنْ يبطل، أو يمنع ما من شأنه أنْ يمتنع، ويكون القدر من الزمان، الذي فيه الإبطال والمنْع، بحسب مناسبة الفعل والانفعال.

(11) Against the other argument,[6] they can say that the reason for [the resting] is a certain absence of something—that is, the absence of the inclination opposing the motive power, for this motive power brings about motion only by producing an inclination. It is known, however, that when [the motive power] is in its natural place, it has no inclination there toward a given direction at all, and [yet] that power does exist. Thus, with respect to some direction other than [a thing's natural direction] toward which it is thrown by a forced inclination, the accidental forced inclination can, at times, oppose the inclination that [the motive] power naturally produces, from which it necessarily follows that it would not be undergoing motion. This is like when water is vigorously heated by a foreign [source], after which the natural coolness of the water is prevented from arising from the water's nature; for we know that a foreign inclination can overpower and bring about the absence of the natural inclination and prevent the natural motion. At the end of the [forced] motion, then, there might be a remnant of the foreign inclination that is just enough to prevent the natural power from producing the natural inclination. Despite that, it will be too weak to be able to bring about motion in that direction [opposite of the natural motion]. In fact, it will be so weak from causing motion that it no longer produces motion, and, [yet] it is not too weak to prevent the nature from producing the inclination [that will move it toward its natural direction]. The foreign inclination will not be able to produce motion while overcoming the natural motion, but neither will the natural power be able to produce the natural inclination until that remnant of foreign inclination passes away, either through itself or through some other cause. Something like this might also be observed between two opposing things when they rival one another for

6. See par. 3.

(١١) وأمّا الحجة الأخرى، فيجوز أنْ يقولوا عليها ؛ إنَّ السبب فيه سببٌ عدمي، وهو عدم حدوث الميل عن القوة المحركة. فإنَّ هذه القوة المحركة إنّما تحرّك بإحداث ميلٍ، وقد علم أنَّها إذا كانت في مكانها الطبيعي لم يكن لها هناك ميلٌ إلى جهةٍ البتة، وتلك القوة موجودة. فلذلك يجوز في الجهة الأخرى، التي ترامت إليها بميلٍ قاسر، أنْ تكون تارة ممنوعة عن الميل الذي يحدثه بالطبع بمعارضة الميل القسري، ويلزم ذلك أنْ لا تتحرك ؛ وذلك كسخونة الماء الغريبة إذا كانت قوية بعد، فإنّها مانعة عن أنْ ينبعث عن طبيعة الماء برده الطبيعي. فإنّا نعلم أنَّ الميل الغريب يستولي على الميل الطبيعي ويعدمه ويمنع الحركة الطبيعية، فيجوز أن يكون عند انتهاء الحركة بقية من الميل الغريب بقدر ما يمنع القوة الطبيعية عن إحداث الميل الطبيعي، ويكون أضعف من أنْ يقوى مع تلك الممانعة، على التحريك في تلك الجهة، بل يضعف عن التحريك فلا يحرّك، ولا يضعف عن ممانعة الطبيعة من إحداث الميل. فلا الميل الغريب يقوى على التحريك غالباً للقوة الطبيعية، ولا القوة الطبيعية تقوى على إحداث الميل الطبيعي، إلى أنْ تبطل تلك البقية من الميل الغريب بنفسها، أو يبطلها سببٌ آخر. ومثل هذا قد يشاهد بين المتقاومين أيضاً إذا تنازعا في

other reasons. In that case, this sometimes prevents the motions, while at other times it is prevented because of the need to rest for a period of time, after which the natural inclination arises when there is the production of motion. So not every inclination, as it just comes to be *qua* inclination,[7] comes to be together with a motion. Instead, it might either be too weak for that or be tainted with the opposite so as exactly to equal each other out until the taint is removed. This is like the inclination that occurs in a heavy load that nine porters apply themselves to, but [only] when a tenth joins them, is it [able to] be carried. In this case, the nine necessitate one inclination in it while depriving it of another, except that that inclination does not complete what is needed to carry [the load], and, in fact, an additional [porter] is needed. It also may be said that some existing thing is the reason for it—namely, some accidental factor. That is, the mover provides a certain foreign power by which the body is moved and indirectly provides a certain power that will bring [the body] to rest. Again, it will be some factor like the contrary of the inclination and a certain contrary form. It will be some foreign factor by which the body remains in some place in which it is and, likewise, leaves its place as a result of the inclination, in some cases forcibly and in others naturally, just as some inclination is forced and some natural.

(12) It has been said against the wheel argument[8] that no point in the true sense belongs to spheres occurring in nature and that [spheres] are [only] contacted at a surface. This does not particularly impress me. The more appropriate response is, instead, that wherever there is a true sphere either only a sphere surrounds it or it is not surrounded at all as in

7. Reading *maylan* with **Z** and **T** for **Y**'s *mathalan* (for example).
8. See. par. 4.

معانٍ أخرى، فيكون الامتناع عن الحركة تارة لهذا، وتارة يكون الامتناع بسبب وجوب السكون زماناً، بعده ينبعث الميل الطبيعي إذا وجد التحريك. فليس كل ميل، كلّما حصل ميلاً، حصلت معه حركة، بل ربما كان أضعف من ذلك، أو مشوباً بالمقابل شوب المتوسطات إلى أنْ يصفو. وهذا مثل الميل الذي يحصل في حِمْلٍ يتناوله محركون تسعة، فإذا انضمّ إليهم العاشر إستقلّ، فإنّ التسعة قد أوجبوا فيه ميلاً ما وأعدموا ميلاً، إلا أنَّ الحاجة لا تتم بذلك الميل في الإستقلال بل تحتاج إلى زيادة. ويجوز أنْ يقال إنَّ السبب فيه معنى وجودي، وهو أمرٌ عرضي أيضاً، وهو أنْ يكون المحرّك يفيد قوة غريبة يتحرك بها الجسم، وبتوسطها يفيد قوة مسكّنة؛ وهو أمرٌ كالمضادّ للميل، وصورة مضادّة، إنّه أمرٌ غريب به يحفظ الجسم مكان ما هو فيه، كما بالميل يترك مكانه، فيكون منه قسري وطبيعي، كما يكون من الميل قسري وطبيعي.

(١٢) وأمّا الحجة الدولابية؛ فقد قيل عليها أنَّ الكرة الطبيعية لا نقطة حقيقية لها، وأنها تماسّ بسطح. وهذا لا يعجبني، بل الجواب الأصوب أنَّه حيث تكون كرة حقيقة فلا تكون إلاّ محاطة بكرة، أو لا محيط لها كما في السماوات، ولا يمكن معها هذا العمل –

the case of the Heavens. This practical application cannot work with [a real sphere], and, in the case where it can work, there is not a real sphere. Even if it were [a real sphere], it may well be impossible that, instantaneously, there is contact and the cessation [of the contact], and, because of that impossibility, there would necessarily be a brief pause. Additionally, between the sphere and the flat surface there either is or is not a void. Now, there cannot be a void between the sphere and the flat surface, and so there must be a plenum between them. Since there is a plenum between them, there will be the surface of that plenum that meets the flat surface, which is a two-dimensional surface,[9] and another surface that meets the convex [surface] of the sphere. It is impossible, however, that, on the outside surface of [the plenum], there be some point belonging to another body that is foreign [to the plenum]. [That] is because the point on a two-dimensional [plane] has no determinate position distinct from that two-dimensional [plane]. Consequently, contact does not occur between the surface and the flat plane at a point; but it was assumed that there was contact. This is absurd. Even setting all this aside, this [argument of theirs] makes the laws of nature dependent upon certain mathematical abstractions of the estimative faculty, which is not right. In fact, beyond going outside the discipline [of physics], that [argument] doesn't even entail what [they] wanted it to prove, but only requires that the continuity of the two designated motions be in the estimative faculty. We, however, don't deny that that continuity is in the estimative faculty. We deny that only of the natural things that deviate from the abstractions of the estimative faculty.

9. Literally, "a simple surface," but see note 2.

من حيث يمكن هذا العمل – فلا تكون كرة حقيقية. ولو كانت، فربّما استحال أنْ تماسّ دفعة وتزول، ووجب أنْ تقف وقفة ما، لاستحالة ذلك. ومع ذلك فلا يخلو، إمّا أنْ يكون هناك بين الكرة والصفيحة خلاء، أو لايكون. ويستحيل أن يكون بين الكرة والصفيحة خلاء، فيجب أن يكون بينهما ملاء، فإن كان بينهما ملاء كان سطح ذلك الملاء الملاقي يلاقي الصفيحة وهو بسيط مسطّح، وسطح آخر يلاقي تقبيب الكرة، ولا يجوز أنْ يكون في وجهه نقطة غريبة من جسم آخر، فإنَّ النقطة لا يتعيّن لها في البسيط وضْعٌ متميّزٌ عن أنْ يكون من ذلك البسيط، وإذا كان كذلك، لم تقع مماسّة بين الكرة وبين الصفيحة بالنقطة – وفرضت مماسّة – وذلك محال. على أنَّ هذا تعليقٌ لأحكام طبيعية بأوهام رياضية، وهو غير صواب، فإنَّ ذلك – مع أنَّه خروجٌ عن الصناعة – فليس يلزم منه المراد على ما بيّناه، إلاّ أنْ يوجب منه اتصال الحركتين المذكورتين في الوهم، ونحن لا نمنع من اتصال الحركتين المذكورتين في الوهم، إنّما نمنع ذلك في الأمور الطبيعية الخارجة عن الأوهام.

(13) In their turn, the former group [namely, those who denied that there must be a moment of rest between two contrary motions] can go on the offense and take the arguments of the latter group to task. As for the first one[10] it is sophistical. That is because one means by *the instant at which there is separation* the limit of the time at which there is separation. So it is the limit of the time of separation, where [the separation] is the motion. So that [limit] is, itself, the instant at which there [still] was contact. It is not impossible, then, that the limit of the period of time of the motion be something at which there is no motion and, in fact, be different from the motion, and that the limit of the period of time of the separation be, itself, the instant of separation at which there is no separation. If by [*the instant at which there is separation*] one means some instant at which it is correct to say that the thing is separated, then it is true that there is a period of time between the two [instants]. Still, that period of time is the time during which it was moved from being in contact to that interval [of separation], which is not the time that it is at rest. [That] is especially [the case], given that, according to their school of thought, motion, separation, and what is analogous have no first [part of] moving or separating.[11] The same holds [even] if they drop the term *separating* and replace it with *not contacting*, for there can be contact at the limit of the time during the whole of which there is no contact. (Earlier, we provided an explanation upon which the truth of this position relies, and so let it be consulted.)[12] Be that as it may, all of that falls away when that with respect to which something is moved (I mean the distance) happens to have certain actual divisions already in it, in that [for instance] some of it is black and some white, or its parts are, as it were, striated, so that there are actual limiting points. Still, it is not

10. See. par. 5.
11. Cf. 3.6.3–6.
12. See 2.12.4.

(١٣) ثم لأولئك أنْ يعودوا وينقضوا حجج هؤلاء. أمّا الأولى فلأنّها سوفسطائية؛ وذلك لأنَّه أمّا أنْ يعني بالآن الذي يكون فيه مبايناً، طرف الزمان الذي يكون فيه مبايناً، فيكون طرف زمان المباينة – التي هي الحركة، – فيكون ذلك بعينه الآن الذي كان فيه مماسّاً، فلا يمنع أنْ يكون طرف زمان الحركة شيئاً ما ليس فيه حركة، بل فيه أمرٌ مخالفٌ للحركة. وأنْ يكون طرف زمان المباينة هو نفس آن المماسّة، وليس فيه مباينة. وإنْ عني به آنٌ يصدق فيه القول إنَّ الشيء مباينٌ، فحقَّ أنَّ بينهما زماناً، لكنه الزمان الذي تحرّك فيه من المماسّة إلى ذلك البُعْد، وليس ذلك الزمان زمان السكون، وخصوصاً – ومن مذهبهم – أنَّ الحركة والمباينة وما يجري ذلك المجرى، ليس له أول ما يكون حركة ومباينة. وكذلك إنْ تركوا لفظة المباينة وأوردوا بدلها لا مماسّة، فإنَّه يجوز أنْ تكون في طرف الزمان الذي في كله لا مماسّة؛ مماسّةٌ. وقد سلف منا بيان يتعلَّق به تحقّق هذا المكان، فليستعن به. وعلى أنَّ جميع ذلك ينتقض إذا كان المتحرك فيه – أعني المسافة – قد عرض فيه فصولٌ بالفعل؛ بأنْ صار بعضه أسود وبعضه أبيض، أو كأن أجزاءه منضودة على التماسّ، فكان هناك حدود بالفعل. لكنه ليس يبعد أنْ يقال إنَّه إذا عرض ذلك، وجب أنْ يقع عند

completely outlandish to say that, if that happens, brief pauses must occur at the actual divisions, and that the motion is slower than it would have been had there been none. I suppose that some of them said that what is traversed is like that. As for that with respect to which there are accidental termini—as, for example, between white and black—they do not have limiting points relative to what is undergoing the motion, but relative to those qualities, and relative to [the fact] that it is something continuous, as if there is neither white nor black in it. I don't find this too astonishing, for, if the obstacle that they mentioned is not something relative, but owing to the actual existence of some thing at which it arrives and from which it departs (and this status undoubtedly exists in it), then, between black and white, there is an actual limiting point. Granted, when that does not exist, then neither is there any actual limiting point at all, except for the distance's limit, whether absolutely (in which case it is its extreme) or inasmuch as there is some distance (in which case it is its extreme as well as something other than its extreme—I mean wherever it pauses, even if it has not reached the limit of the distance *qua* interval).

(14) As for the second argument,[13] the former group can say that the motion's being a single motion is not according to just any chance manner of continuity, just as the line's being a single line is not according to just any chance manner of continuity. Instead, the continuity is one that makes magnitudes and the like to be a single thing—that is, the continuity in which there exists no actual common division. As for the continuity in the sense of sharing a common limit, that [sort] does not make lines, motions, and the like a single thing in such a way that there is no multiplicity in them actually (although perhaps potentially). Otherwise, a

13. See par. 6.

الفصـــول بالفعل وقفاتٌ، وتكون الحركة أبطـــأ منها لو لم تكن. وأظنُّ أنَّ بعضهم قال: أمّا المقطوع فكذلك، وأمّا ما تكون النهايات فيه بالعرض – كما بين الســـواد والبياض – فإنَّ الشـــيء لا يكون بالقياس إلى المتحرك ذا حدود، بل بالقيـــاس إلى تلك الكيفيات، وهو بالقياس إلى ذلك، متصلٌ كأنَّه لا بياض فيه ولا سواد. وهذا ليس يعجبني، فإنَّه إنْ لم يكن المانع الذي أوردوه أمراً بالقياس إلى شيء، بل كان لوجود أمرٍ بالفعل موصل إليه ومنفصل عنه، وها هنا ذلك الحكم موجودٌ لا شك فيه، فها هنا حدٌّ بالفعل بين السواد والبياض. ومسلّم أنَّه إذا لم يكن ذلك، لم يكن ذلك، لم يكن حدٌّ بالفعل البتة إلاّ طرف المسافة، إمّا على الإطلاق فهو آخره، وإمّا من حيث هو مســـافة؛ فهو آخره وغير آخره أيضاً، أعني حيث يقف عليه المتحرك، وإنْ لم ينته إلى طرف المسافة من حيث هو بعد.

(١٤) وأمّـــا الحجة الثانيـــة، فلأولئك أنْ يقولوا إنَّ الحركة الواحدة؛ ليســـت تكون واحـــدة على أي نمطٍ من الإتصال اتفق، كما أنَّ الخط الواحد ليس يكون واحداً على أي نمطٍ مـــن الاتصال اتفق؛ بل الاتصال الموحد للمقادير وما يشـــبهها، وهو الاتصال المعدوم فيه الفصْل المشـــترك بالفعل. وأمّا الاتصال الذي يكون بمعنى الاشـــتراك في طرف، فذلك لا يجعل الخطوط والحركات وغير ذلك شـــيئاً واحداً – الوحدة التي لا كثرة فيها بالفعل،

single line would really surround the triangle. Earlier, we ourselves gave a complete identification of the ways that *continuity* is said, and you learned that some continuity is unified and some is discrete.[14] So, then, these two motions [namely, ascending and then descending] are not a single motion by [way of] the unified continuity, but are two motions between which there is a discrete continuity. This continuity is a continuity of one thing with another through an actually existing limit that is commonly shared between them; and whenever there is not an actual two-ness, there will not actually be this continuity. This continuity is, instead, like two lines that meet at some angle that is itself an actual point. Therefore, this continuity is not the unified continuity, but the discrete continuity, where the status of this continuity is like black's being continuous with white. Through this, you also know the error in the next argument[15]—namely, that the final end would be, as it were, the same point from which its starts only if there were a unified continuity, not a discrete one. Things that are discrete and follow one another successively might be able to have a number of final ends successively.

(15) The last[16] argument[17] is fatuous. That is because, at the moment [when something actually] becomes white, it is not said to be in a process of becoming black; rather, that follows thereafter in a period of time whose limit is that instant at which it is white. Additionally, their argumentation is unsustainable if someone should maintain that this actual white is likewise potentially some other [shade of] white, because another white different from this white inheres in it potentially. Between the two, then, there would be a period of time that differentiates them. So relative to this existing white, there is no potentiality to be it, whereas, relative to some future white, there is.

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14. See 3.2.8–10.
15. See par. 7.
16. Reading *akhīrah* with **Z** and **T** for **Y**'s *ukhrá* (other).
17. See par. 9.

بل عسى بالقوة، وإلاّ فالمثلث يحيط به خطٌّ واحدٌ بالحقيقة. وقد فرغنا نحن سالفاً عن تحقيق وجوه ما يقال عليه الاتصال، وعرفت أنَّ الاتصال منه موحّد ومنه مفرّق، فلا تكون إذن هاتان الحركتان حركة واحدة بالاتصال الموحد، بل حركتان إثنتان بينهما الاتصال المفرّق. فإنَّ هذا الإتصال هو اتصال شيء بشيءٍ بطرفٍ موجودٍ بالفعل مشتركٍ بينهما، وما لم تكن إثنينية بالفعل، لم يكن هذا الاتصال بالفعل، بل هذا الاتصال يكون مثل خطّين ملتقيين على زاوية ذات نقطة بالفعل؛ فهذا الاتصال إذن ليس هو الاتصال الموحّد، بل الاتصال المفرّق، وحكم هذا الاتصال كاتصال السواد بالبياض، وبهذا تعلم أيضاً الغلط في الحجّة التي تتلوها. وأنَّه إنّما، كأنْ تكون الغاية هي بعينها المبدأ، لو كان اتصالٌ موحّد لا مفرّق، والأشياء المتفرّقة المتتالية قد يجوز أنْ تكون منها غايات بعد غايات.

(١٥) وأمّا الحجّة الأخيرة فهي سخيفة، وذلك أنَّه عندما صار أبيض لا يقال إنَّه يتسود، بل ذلك بعده في زمان، طرفه هو ذلك الآن الذي هو فيه أبيض. ومع ذلك فلا يستمر احتجاجهم إذا قال قائل: إنَّ هذا الأبيض بالفعل هو بالقوة أبيض آخر أيضاً، لأنَّه في قوته أنْ يحل فيه بياض آخر غير هذا البياض، وقد تخلّلهما زمانٌ يفصل بينهما، فيكون بالقياس إلى هذا البياض الموجود لا قوة له عليه، وبالقياس إلى بياضٍ ينتظر له قوة عليه.

(16) Having indicated and explained the arguments of these groups, we should reveal the argument for why we hold to the school of thought that we do. So we say that every motion in the proper sense proceeds from an inclination that is confirmed by either the repulsion of the thing standing in the way of the moving thing or the power needed [by the thing standing in the way] to hinder [the moving thing]. This inclination is, in itself, one of the things by which [the moving thing] reaches the motions' limiting points—namely, by freeing itself of anything that clings to it, pushing away whatever is in the path of the motion, and advancing toward something. Now, it is absurd that what arrives at a given limiting point should do so without some existing cause that makes it arrive. It is also absurd that this cause should not depart from the initial place of rest. This cause is proportional to what causes the departure and what pushes away, and it is that proportion that is called *inclination*. Indeed, this thing, inasmuch as it is what makes it arrive (even if the subject is one and the same), is not called an *inclination,* whereas this thing, as something that might exist at a single instant (while the motion is only that which might need a continuous time in order to exist), is called an *inclination*. Now, as long as the inclination is not constrained, repressed, or corrupted, the motion that necessarily results from it exists, whereas when the inclination is corrupted, its corruption is not itself the existence of another inclination, but, rather, that is something else that is perhaps joined with it. Also, when two motions come to be, the result is from two inclinations. Now, when the other inclination toward a different direction exists, [the inclination] is not itself this thing that brings about the arrival such that there would simultaneously be one and the same cause for [both] arriving at and

(١٦) وإذ قد أوضحنا حجج هؤلاء ؛ فبالحري أنْ نعرف نحن الحجّة التي لأجلها تمسكنا بأحد المذهبين ؛ فنقول : إنَّ كل حركة بالحقيقة فهي تصدر عن ميلٍ يحقّقه اندفاع الشيء القائم أمام المتحرك أو احتياجه إلى قوةٍ تمانعه . وهذا الميل ، في نفسه معنى من الأمور به يوصل إلى حدود الحركات ، وذلك بإبعاده عن شيءٍ يلزمه مدافعة لما في وجه الحركة ، وتقريب من شيء . ومحال أنْ يكون الواصل إلى حدّ ما واصلاً بلا علّة موجودة موصلة ، ومحال أنْ تكون هذه العِلّة غير التي زالت عن المستقر الأول ، وهذه العلّة يكون لها قياسٌ إلى ما يزيل ويدافع ، وبذلك القياس يسمّى ميلاً ، فإنَّ هذا الشيء – من حيث هو موصل – لا يسمّى ميلاً ، وإنْ كان الموضوع واحداً . وهذا الشيء الذي يسمّى ميلاً قد يكون موجوداً في آنٍ واحدٍ ؛ وإنّما الحركة هي التي عسى أنْ تحتاج في وجودها إلى اتصال زمان ، والميل ما لم يقسر ولم يقمْع ، أو لم يفسد ، فإنَّ الحركة التي تجب عنه تكون موجودة . وإذا فسد الميل ، لم يكن فساده هو نفس وجود ميلٍ آخر ، بل ذلك معنى آخر ربّما قارنه . فإذا حدثت حركتان فعن ميلين ، وإذا وجد ميل آخر إلى جهةٍ أخرى ، فليس يكون هو هذا الموصل نفسه ؛ فيكون هو بعينه علّة للتحصيل وللمفارقة معاً . بل يحدث –

departing from [some point, like at the top of a projectile motion's trajectory]. Instead, some other inclination must come to be that has some first [instant] of coming to be. Now, [that inclination] exists at that first [instant], since its existence does not depend upon some time that no longer is. [In this respect, inclination] is not like motion and rest, which do not have a first [instant] of coming to be,[18] since they never exist except during or after a period of time. [That] is because they require an instant before which the body did not exist at it and after which it will not exist at it. So they require[19] a prior and posterior time. [Inclination], rather, is like the nonmotion that is at each instant. So, just like that instant that might function as motion's limit, [inclination] might itself be the limiting point of the nonmotion, such that there is no motion, [and yet] it exists at some instant as a limit of the continuous motion that will exist after it. In that case, between the motion and the nonmotion, there won't need to be one instant after another, but a single instant is enough. No absurdity arises because, at that instant, there is not simultaneously motion and rest, but only one of them.

(17) The instant at which there is the first existence of the second inclination, however, is not the instant at which there is the last existence of the first inclination, since, as we have explained, it is the last existence of the first inclination at which it exists when bringing about the arrival. So, if, on the one hand, it is found to be something that brings about the arrival over a period of time, then there would, in fact, have been a state of rest. If, on the other hand, it is found to be something that brings about the arrival only in an instant, that instant will be the last only if it is the last of what exists at it, since the last of it is something bringing about the arrival, and it does not bring about the arrival when it does not occur. The two instants were not one [and the same] precisely because it is not in something's nature to be that which

18. See 3.6.3–6.

19. Reading *yaqtaḍī* with **Z** and **T** for **Y**'s *qanqaḍī* (are completed).

لا محالة – ميلٌ آخر له أول حدوث، وهو في ذلك الأول موجود، إذ ليس وجوده متعلقاً بزمانٍ ليس؛ كالحركة والسكون اللّذين ليس لهما أول حدوث، إذ لا يوجدان على وجهٍ ما إلاّ في زمان، وإلاّ بعد زمان، إذ هي مقتضية لآنٍ لم يكن الجسم قبله فيه ولا يكون بعده فيه، فيقتضي تقدماً وتأخراً زمانياً، بل هو كاللاحركة التي تكون في كل آن. فكذلك الآن الذي قد يحدّ طرف الحركة، يجوز أنْ يكون هو بعينه حدّ اللاحركة حتى يكون لا حركة، موجوداً في آنٍ هو طرف حركة مستمرة الوجود بعده، فلا يحتاج بين الحركة وبين اللاحركة إلى آنٍ وآن، بل يكفي آنٌ واحدٌ، ولا يعرض محال. لأنَّ ذلك الآن لا تكون فيه الحركة والسكون معاً، بل واحد منهما.

(١٧) وأمّا الآن الذي فيه أول وجود الميل الثاني، فليس هو الآن الذي فيه آخر وجود الميل الأول، إذ هو آخر وجود الميل الأول الذي بيّنا أنَّه يكون فيه موجوداً عندما يكون موصلاً. فإنْ كان يوجد موصلاً زماناً، فقد صحّ السكون، وإنْ كان لا يوجد موصلاً إلاّ آناً، فليس ذلك الآن آخر، إلاّ أنْ يكون ما هو له آخر موجوداً، فيه، إذ ما هو له آخر هو موصل، والموصل لا يكون موصلاً وهو غير حاصل. وإنّما لم يكن الآنان شيئاً واحداً، لأنَّ الشيء لا يكون في طبيعته ما يوجب الحصول وما يوجب اللاحصول معاً،

simultaneously necessitates occurring and not occurring such that its nature requires that, at [that single instant], there be some necessity in actuality that is not in actuality. Hence, the last instant of the first inclination is not the first instant of the second inclination.

(18) Pay no attention to whoever says that the two inclinations are together! How could there be something in which there is actually a resistance to a certain direction, or clinging to it while withdrawing from it? So one should simply not think that there is some downward inclination in a stone that is thrown upward; rather, there is a principle whose character is to produce that inclination when the obstacle [to it] is withdrawn or perhaps overcome. In the same way, there is a power and principle in water to produce coolness in the substance of the water when the obstacle is withdrawn or perhaps overcome, just as you have learned. So it has become evident that the two instants are distinct; and, between, every two instants, there is a time. It is most likely that what brings about the arrival remains, doing so for a period of time. Still, we take it as a something that brings about the arrival instantly in order that it be closer to that which requires the absence of rest. So the sophistry has been resolved, and you yourself are entrusted with basing the arguments of the First Teacher[20] upon this foundation.

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20. The reference may be to Aristotle, *Physics* 8.8.262a21ff.

فتكـون طباعه تقتضي أنْ يكون فيه اقتضاء بالفعل وأنْ لا يكون اقتضاء بالفعل، فإذن آنُ آخرِ الميل الأول، غير آن أول الميل الثاني.

(١٨) ولا تصغ إلى مَنْ يقول إنَّ الميلين يجتمعان، فكيف يمكن أنْ يكون شـيء فيه بالفعـل مدافعة جهةٍ أو لزومهـا؛ وفيه بالفعل التنحي عنها؟ فلا يظنَّ أنَّ الحجر المرمي إلى فوق فيه ميلٌ إلى أسـفل البتة، بل مبدأ من شـأنه أنْ يُحدث ذلك الميل، إذا زال العائق – وقـد يغلب. كما أنَّ في الماء قوة ومبدأ يُحدث البرد في جوهر الماء إذا زال العائق، وقد يغلـب، كما علمت. فقد بانَ أنَّ الآنين متباينان، وبين كل آنين زمانٌ، والأشـبه أنْ يكون الموصـل يبقى موصـلاً زماناً، لكننا أخذناه موصلاً آناً؛ ليكـون أقرب من الموجب لعدم السكون. فقد انحلت الشُبه، وتول أنت بنفسك بناء حجج المعلم الأول على هذا الأصل.

Chapter Nine

On the motion that is naturally prior and a catalogue of the specific differences of motions

(1) Having reached this point of our discussion, we should complete the account of motions by determining which motions most deserve to be prior. So we say, first, that motion with respect to place or position is the prior motion. That is because augmentation inevitably involves a certain motion with respect to place that accompanies quantitative motion. That is, the growing thing inevitably acquires something new, [and that new thing] is moved toward and into [the growing thing], whereas motion with respect to place and position are free of that. Also, rarefaction and condensation inevitably involve alteration. Alteration, however, exists only after the existence of some motion with respect to place and position. [This is] because a single alteration does not always exist, since it is between contraries and inevitably has some cause that previously had not been actual but then became a cause. In that case, that cause must either be something that comes to that which is to be effected, or not. If it had not yet come and then arrives and so brings about the alteration, then a motion with respect to place and position occurred. If it has come but is not acting and so, consequently,[1] needs some alteration with

1. Reading *idhan* with **Z** and **T** for **Y**'s *dhā* (possessor).

<الفصل التاسع>

في الحركة المتقدمة بالطبع
وفي إيراد فصول الحركات على سبيل الجمع

(١) وإذ قد بلغ الكلام بنا هذا المبلغ، فبالحري أنْ نختم القول في الحركات؛ بأنْ نعرف أي الحركات أولى بالتقدّم؛ فنقول: أمّا أولاً، فإنَّ الحركة المكانية أو الوضعية أقدم الحركات، وذلك لأنَّ النمو لا يخلو عن حركةٍ مكانية مع الحركة الكميّة، ولا يخلو من واردٍ على النامي، يتحرك إليه وفيه، والمكانية والوضعية تخلو عنه. والتخلْخل والتكاثف لا يخلو عن استحالة، والاستحالة لا توجد إلاّ بعد وجود حركةٍ مكانيةٍ أو وضعية، إذ كانت الاستحالة الواحدة لا توجد دائمة، إذ هي بين الأضداد ويكون لها – لا محالة – علّة لم تكن من قبل علّة بالفعل، ثم صارت علّة. فلا يخلو، إمّا أنْ تكون تلك العلّة واصلة إلى المعلول أو لا تكون، فإنْ لم تكن واصلة فوصلت حتى أحالت، فقد حصلت حركة نقليةٌ أو وضعيةٌ، وإنْ كانت واصلة، ولكن ليست بفعل، فهو إذن يحتاج إلى استحالةٍ في

respect to its act of willing or the like in order to act, the question concerning *that* alteration still remains. If it does not require [anything else in order] to come or to undergo an alteration—that is, it and its object both exist, and yet there is no action—then it is simply not something that causes alteration. So the question about alteration still remains. Our question, however, concerns corporeal alterations by corporeal causes—that is, the one that acts after not having acted only by coming into proximity after having been remote. This question also concerns finite, rectilinear locomotions as well, for they do not continue infinitely.[2] Thus, certain motions must be prior to them in order that they exist. Positional and circular local [motion] (if it exists), however, does not have this form, but it is enough that it have one single permanent mover. It also turns out that the various kinds of relations produced between the moving thing and other bodies are causes from which other motions and alterations arise.

(2) From this, it is obvious that circular motions are prior, for motions with respect to place and position are prior. Also, the latter kind of motion is prior in nobility, because only the perfection of the substance as something actualized precedes its existence. [This substance] in no way, however, excludes [this kind of motion] from its substantiality but is something that, in itself, does not cease, while only a certain relation that it has to something external ceases. Also, circular motion is unique in that it is something complete that is not susceptible to increase. There does not need to be in it intensification and weakening in the way that, among natural and forced [motions], there are those that are the fastest; and, likewise, what is called a *mean* [*speed*]; and those that are undoubtedly slowest. The body having natural circular motion is prior to [all other] bodies, and, through it, the directions of the natural motions belonging to other bodies are defined.

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2. Avicenna's point here is not to deny that there has been rectilinear motion from the infinite past and that there will continue to be so into the infinite future. Rather, his claim is that any particular rectilinear motion cannot continue infinitely. That is because there is only a finite amount of distance that any particular rectilinear motion can cover before it must reverse itself, that finite distance being the interval of the sublunar sphere. But after a reversal, there is another distinct rectilinear motion.

إرادته أو غير ذلك؛ حتى تفعل، والكلام في تلك الاستحالة ثابت. وإنْ كان لا يحتاج إلى وصولٍ ولا إلى استحالةٍ - وهو موجودٌ والموضوع موجودٌ وليس يفعل - فليس بمحيلٍ أصلاً، فالكلام في الاستحالة ثابت. على أنَّ كلامنا في الاستحالات الجسمانية عن علل جسمانية، وهي إنّما تفعل بعدما لَمْ تفعل بالقرب بعد البُعْد، والكلام في الحركات النقلية المتناهية المستقيمة هذا الكلام، فإنّها لا تكون متصلة بغير نهاية، فتحتاج أنْ تتقدمها حركات حتى توجد. وأمّا الوضعية والنقلية المستديرة - إنْ كانت موجودة - فليس الأمر فيها على هذه الصورة، بل يكفي لها محرّك واحدٌ ثابت. ويصلح أنْ تكون أصناف ما يحدث من المناسبات المختلفة، بين ذلك المتحرك وبين الأجسام الأخرى، أسباباً لانبعاث حركات واستحالات أخرى.

(٢) فبيِّنٌ من هذا، أنَّ أقدم الحركات ما كان على الاستدارة، فإنّها أقدم الحركات المكانية والوضعية، وهذا الصنف من الحركات أقدم من سائر الحركات الأخرى وبالشرف أيضاً، لأنَّه لا يوجد إلاّ بعد استكمال الجوهر جوهراً بالفعل، ولا يخرجه عن جوهريته بوجهٍ من الوجوه، ولا يزيل أمراً له في ذاته، بل يزيل نسبة له إلى أمرٍ خارج. وتُخص المستديرة بأنّها تامة لا تقبل الزيادة، ولا يجب فيها الاشتداد والضعف كما يجب في الطبيعية أن تشتد أخيراً في السرعة، والقسرية أنّ تشتد، كما يقال وسطاً، ولا شك أنها تضعف أخيراً. والجرم الذي له الحركة المستديرة بالطبع هو أقدم الأجرام، وبه تتحدّد جهات الحركات الطبيعية للأجرام الأخرى.

(3) Since we have exhausted the investigation of these notions, it is fitting that we summarize the specific differences that belong to motions. Firstly, we say: Whatever is related to a certain characteristic might have that characteristic predicated of it [in one of three ways. It might be predicated] essentially, in that that characteristic exists in it entirely—in the way, for example, that white is said of snow. Alternatively, [that characteristic] might not really exist in it entirely but only partially, in the way that seeing is said of man and black [is said] of the eye. Finally, [that characteristic] might be predicated accidentally without qualification, in that it is not in it but in something to which it is joined, just as the builder is said to write and whiteness is said to move when the white thing moves. So that is predicated of the mobile and the mover[3] essentially, either absolutely or partially—as when someone is said to write, but it is only his hand that writes, or [when] someone is moving, but it is only his hand that is moving. As for being predicated accidentally without qualification, in the way that something standing still on a ship is said to move, some are such that they simply cannot be characterized by that (like whiteness when it is said to move), while others are such that they can (like the nail that is firmly in the ship). Similarly, the mover might be accidental with or without qualifications, in the way mentioned in some previous chapters.[4]

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3. Reading *muḥarrik* with **Z** and **T** for **Y**'s preferred *mutaḥarrik* (mobile).

4. For a general discussion, see 1.12.2. For the case of the physician curing himself as a specific example of an accidental mover, see 1.5.6 and 1.9.2.

(٣) وإذ قد استوفينا تحقيق هذه المعاني، فبالحري أنْ نجمع الفصول التي للحركات، ونقول: أولاً؛ كل ما ينسب إليه صفة، فإمّا أنْ يقال تلك الصفة له بذاته، بأنْ تكون الصفة موجودة فيه كله؛ مثل ما يقال إنَّ الثلج أبيض، وإمّا أنْ لا تكون بالحقيقة موجودة في كله، ولكنها بالحقيقة في جزئه؛ مثل ما يقال إنَّ الإنسان يرى وأنَّ العين سوداء، وإمْا أنْ تقال بالعرض على الإطلاق بأنْ لا تكون فيه، بل في شيءٍ يقارنه؛ كما يقال إنَّ البنّاء يكتب، وكما يقال للبياض إنّه ينتقل عندما ينتقل الأبيض. فالمتحرّك والمحرّك إمّا أنْ يقال له ذلك لذاته مطلقاً أو للجزء، كما يقال فلان يكتب، وإنّما تكتب يده، أو فلان يتحرك؛ وإنّما تتحرك يده، وأمّا أنْ يقال بالعرض مطلقاً، كما يقال للساكن في السفينة إنّه يتحرك فمنه ما ليس من شأنه البتة أنْ يوصف بذلك؛ كالبياض إذا قيل إنّه يتحرك ومنه ما من شأنه ذلك؛ كالمسمار المسمّر في السفينة، وكذلك المحرك قد يكون بالعرض مطلقاً وغير مطلق، على ما قيل في أبواب سلفت.

(4) When the motion is in the very thing itself, then sometimes it arises from the nature of the thing, like the stone's descent, and is not from some external thing or by an act of volition or some intention. At other times, it arises from [the thing] by an act of volition; and, at still other times, [it arises] because of some external force, like the stone's ascending. Natural and volitional [motions] always share in common the fact that the term *spontaneous motion* applies to them, and that is because it does not come from something external (although that is perhaps properly said of that which is through an act of volition). Natural and forced motion might be in something other than [the category] of place and position. [That] is because there is natural alteration, like the health of someone who recovers on the natural critical day, and the cooling of hot water when, through its nature it undergoes alteration so as to become cool; and there is forced alteration, like water's undergoing alteration so as to become hot. There is also natural generation as, for example, the fetus from sperm and the plant from seeds, as well as forced generation, as, for instance, making fire by striking flint. Again, there is natural corruption, as in the case of someone's dying from old age, and forced corruption, like dying by murder and poison. There is a natural increase in the magnitude of the body, such as the growth of the young boy, while another is forced, like the growth brought on by fatty diets. There is also natural deterioration, like [that occuring] during old age, and forced deterioration, as [brought about] through illness.

(٤) والحركة إذا كانت في ذات الشيء، فقد تنبعث عن طبيعته لا من خارج ولا بإرادة ولا قصد، كنزول الحجر، وقد تنبعث عنه بالإرادة، وقد تكون بسببٍ قسري من خارج، كصعود الحجر. والطبيعي والإرادي يشتركان دائماً في أنْ يطلق عليهما لفظة الحركة الكائنة من تلقاء المتحرك، وذلك لأنها ليست من خارج، وربمّا قيل ذلك خاصة للذي يكون بإرادة. والحركة الطبيعية والقسرية قد تكون في غير المكانية والوضعية، فإنَّ ها هنا استحالة طبيعية، كصحة مَنْ يصح بالبُحْران الطبيعي، وتبرّد الماء الحار إذا استحال بطبعه إلى البرد، واستحالة قسرية كاستحالة الماء إلى الحر. وها هنا كَوْنٌ طبيعي، مثل تكوّن الجنين والنبات من المني والبزور، وكَوْنٌ قسريٌ مثل إحداث النار بالقدح، وفسادٌ طبيعيٌ مثل الموت الهرمي، وفسادٌ قسريٌ كالموت عن القتل والموت عن السُّم. وها هنا زيادة في مقدار الجسم طبيعية كنمو الصبي، وأخرى قسرية كالنمو الذي يُستجلب بالأدوية المسمّنة، وها هنا ذبولٌ طبيعي كما في الهرم، وذبولٌ قسريٌ كما بالأمراض.

(5) You should know that by *natural motion* we do not mean the motion that simply proceeds from the nature when the nature itself has that which belongs to it. The nature is a stable, fixed entity, and what proceeds from it essentially is, likewise, a stable, fixed thing that subsists and exists together with the existence of the nature. Motion, however, (that is, the motion involving a traversal) always comes to an end and always involves renewal without being stable. The motion that we are investigating undoubtedly does as well, for it requires leaving something behind. Now, when the nature essentially requires that something be left behind, it undoubtedly requires that what is left behind be something outside of the nature. In that case, whenever nothing outside of the nature happens to occur, then some intention of [the nature] to leave will not naturally occur. Therefore, natural motion does not proceed from the nature unless some unnatural state happened to occur. There won't be an unnatural state, however, unless it parallels a natural one; since *this one* is not *that one,* that one is natural. So the unnatural [state] is left behind in such a way that something is directed toward the natural [state]; and, when any natural motion is not impeded, it terminates at some natural end. When that end is fully realized, it is impossible that the mobile should undergo natural motion, because motion is a sort of leaving behind and retreating, whereas the natural end is not something naturally left behind and retreated from. So, therefore, every natural motion is for the sake of seeking a state of rest, whether in a *where,* quality, quantity, or position.[5]

5. Literally, "in a *where,* a how, a how much, or a position," all of which correspond with the noted Aristotelian categories.

(٥) ويجـــب أنْ تعلم أنَّ قولنا حركة طبيعية ليس نعني به أنَّ الحركة تصدر البتة عن الطبيعـــة ، والطبيعة بحالها التي لها ، فـــإنَّ الطبيعة ذاتٌ ثابتةٌ قارّةٌ ، وما يصدر عنها لذاتها فهـــو أيضاً ثابتٌ قارٌّ قائمٌ موجودٌ مع وجود الطبيعة . والحركة ، التي هي الحركة القطعية ، تعدم دائماً وتتجدّد دائماً بلا استقرار ، والحركة التي حقّقناها – لا محالة – فإنّها تقتضي ترك شيء ، والطبيعة إذا اقتضت لذاتها ترك شيءٍ فتقضي ، لا محالة ، ترك شيء خارجٍ عـــن الطبيعـــة . وإذا كان كذلك ، فما لم يعرض أمرٌ خارجٌ عـــن الطبيعة ، لم يعرض قصد تـــركٍ لهـــا بالطبع . فإذن الحركة الطبيعية لا تصدر عن الطبيعة ؛ إلاّ وقد عرضت حال غير طبيعيـــة ، ولا تكـــون حال غير طبيعية ، إلاّ وبإزائها حال طبيعية إذ كانت هذه غير تلك ؛ فتلـــك طبيعية ، فتكون غير الطبيعية تترك تركاً متوجهاً إلى الطبيعية . وكل حركة طبيعية إذا لـــم تُعق ، فهي تنتهي إلى غايةٍ طبيعية ، ويســـتحيل إذا حصلت تلك الغاية أنْ يتحرك المتحرك بالحركة الطبيعية ، لأنَّ الحركة تركٌ ما وهربٌ ، والغاية الطبيعية ليســـت متروكة ولا مهروباً منها بالطبع . فكل حركةٍ طبيعيةٍ إذن فهي لأجل طلب ســـكون ؛ إمّا في أيْنٍ أو في كيفٍ أو في كمّ أو في وضْعٍ .

(6) So every motion that does not come to rest is not a natural one. Hence, continuous circular motion is a non-natural [motion]. How could it be [natural]? That motion has nothing to do with the positions and places that are assumed to be something retreated from, unless it itself is what is naturally intended by that motion; but it is absurd that it would naturally retreat from something toward which it is naturally going. So circular motions either results from external causes or some non-natural and, in fact, volitional power. Now, it might be possible that the [end] result of some volitional power does not vary when the motives, obstacles, ends, and goals do not vary. In that case, there would not come to be new volitions, but they would be one and the same through which the object of the volition is reached during the motion. Also, the fact that the circular motion belongs to a simple body does not prevent that body from possessing a soul, although there are some who are troubled by [this], saying that the Peripatetics require that the soul belong only to a composite body. [The Peripatetics], however, go on to say that a simple circular motion proceeds from a soul and that it belongs to a simple body. That is because the Peripatetics did not deny that no simple body has a principle of animation, but denied only that that [simple animate] body would be one of the simple elemental ones underlying composition. So, as long as these simple [elemental] bodies neither undergo a certain composition, nor obtain a certain proper proportion, nor lessen the overpowering instances of contrariety, then neither will they be susceptible to life. If, however, a given simple body has no contrary in its nature, then it is most susceptible to life.

(٦) فكل حركة لا تسكن فليست بطبيعية. فالحركة المستديرة المتصلة إذن لا تكون طبيعية، وكيف تكون؟ وليس شيء من الأوضاع والأيون التي تُفرض مهروباً عنه بالطبع بتلك الحركة، إلاّ وهو بعينه مقصودٌ إليه بالطبع بتلك لاحركة ومحالٌ أنْ تهرب الطبيعة عن أمرٍ تؤمّه بالطبع. فالحركات المستديرة تكون إمّا ‹عن› أسبابٍ من خارج، وإمّا عن قوةٍ غير الطبع، بل قوةٍ إرادية. وقد يجوز أنْ لا يختلف ما يكون عن القوة الإرادية، إذا لم تختلف الدواعي والموانع والغايات والأغراض، فلم تتجدّد الإرادات، وكانت الواحدة منها مبلوغاً بها المراد في الحركة. ولا يمنع كون الحركة المستديرة لجسم بسيطٍ أنْ يكون ذلك الجسم ذا نفس على ما يشكَل به بعضهم قائلاً إنَّ المشائين يوجبون أنْ لا تكون النفس إلاّ للجسم المركّب، ثم يقولون بحركةٍ مستديرة بسيطة هي صادرة عن نفس، وأنّها لجرم بسيط. وذلك لأنَّ المشائين لم يمنعوا أنْ يكون في البسائط كلها متنفسٌ، بل إنّما منعوا أنْ يكون ذلك الجسم من البسائط الأُسْطُقسّية الموضوعة للتركيب، فإنَّ هذه البسائط ما لم تتركّب ولم تعتدل ولم تُسقط غلبات التضادّ، لم تقبل الحياة. فإنْ كان جسم بسيط لا ضدّ له في طبعه، فهو أقبل للحياة.

(7) Here we should define the number of ways [in which] *natural* is used, according to what is useful for the subject with which we are concerned, and then afterwards complete the discussion about natural motion. So we say that *natural* is sometimes said of the thing to which the natural feature belongs alone, while at other times it is not said relative to it alone, but relative to the natures of the whole thing taken collectively. An example of this latter sort is that the Earth is not really round when the water is removed from it. [This, in fact] is not something natural relative to earth itself, for the nature of every simple thing requires that there be no difference in it and, instead, that it must be homogeneous. So the natural simple shape must be a sphere. Still, when the feature that the nature of earth requires from its preparedness and action together is joined with the nature of the whole, the shape really belonging to it is natural—that is, a feature necessarily resulting from its nature and the nature of the whole,[6] and analogously for particular features of the whole (as will become clear in its proper place).[7] Similarly, the nutritive faculty's administration of the nutriment is unnatural to the nutriment itself [when] considered independently; but when it is related to the common nature of the whole [living thing], it is natural.

(8) [The notion of] *natural* that is proper to the thing is something proceeding from a natural power in it alone. By *natural power* we mean every power belonging to the thing itself that produces motion but is not by volition, whether it is a nature absolutely or one like the plant's soul. One of the two sorts falling under this heading is like the stone's being moved downward, which does not result from an act of volition, nor is it something whose direction varies. The second is like the growth of a

6. Avicenna's point is that, given the nature of the element earth alone, it should form a perfect sphere; however, when one considers the planet Earth with its water removed, the Earth obviously does not form a perfect sphere, but has canyons, mountains, and the like. Still, once one takes into account the actions and dispositions of earth when coupled with those of water, which jointly make up the planet Earth, the fact that the element earth does not make a perfect sphere is completely natural.

7. The reference is probably to *Kitāb al-maᶜādin wa-l-āthār al-ᶜulwīyah,* Avicenna's work mostly closely associated with the tradition surrounding Aristotle's *Meteorology.*

(٧) ويجب أن يعرف ههنا أن الطبيعي على كمّ وجه يقال، بحسب ما ينتفع به في الموضع الذي نحن فيه، ثم نتمم الكلام في الحركة الطبيعية فنقول: إنَّ الطبيعي قد يقال بالقياس إلى الشيء الذي له الأمر الطبيعي وحده، وقد يقال لا بالقياس إليه وحده، بل بالقياس إلى طباع الكل بالشركة. مثال هذا القسم هو أنَّ كون الأرض غير حقيقية التدوير، وانكشافها عن الماء ليس طبيعياً بالقياس إلى طبيعة الأرض نفسها. فإنَّ طبيعة كل بسيطٍ لا تقتضي اختلافاً فيه، بل تقتضي التشابه، فيجب أنْ يكون الشكل الطبيعي البسيط كرياً. ولكن الأمر الذي تقتضيه طبيعة الأرض من استعدادها وفعلها معاً، إذا قرنت به طبيعة الكل، كان وجود هذا الشكل له طبيعياً؛ أي أمراً يجب عن طباعه وطباع الكل، وما عليه مجرى الأمر الجزئي في الكل، على ما سنوضح هذا في موضعه. وكذلك تصرف الغذاء، بحسب تدبير القوة الغاذية، هو لنفس الغذاء غير طبيعي، ولكن إذا قيس إلى الطبيعة المشتركة للكل، كان طبيعياً.

(٨) وأمّا الطبيعي، الخاص بالشيء، فهو أنْ يكون صادراً عن قوةٍ طبيعيةٍ فيه وحده، ونعني بالقوة الطبيعية ها هنا كل قوة من ذات الشيء تحرّك لا بإرادة، كانت طبيعية صرفاً، أو كانت كنفس النبات. فيكون أحد قسمي هذا الباب على نحو تحرّك الحجر إلى أسفل؛ وهو الذي يكون لا عن إرادة، ولا أيضاً مختلف الجهة، والثاني على

growing thing, since that is not by an act of volition, but the directions do vary.[8] Also, there might be a motion to which the term *natural* is applied only equivocally (namely, that which is by volition but [which] does not vary in direction—as, for example, the motion of the first [celestial sphere]). Natural motion in this context is that which results from some power in the body itself that is directed toward the end that belongs to the nature of that body and in the way that the nature of that body requires when there is no obstacle. For example, the human hand will have five fingers that are similar at a time that they are generated and in a way that does not diverge from the required limits. Indeed, there might[9] be a motion that results from the nature but is not toward some natural end, as is instanced in the generation of the additional finger and unequal teeth. Also, a motion might not result from the nature but be toward a natural end, like one who throws a stone downward in a straight line, such that what results from the throw is that motion that would have resulted from the nature that is in the stone alone. Also, it might be uniform from beginning to end, but it is impeded. So, for instance, its motion is slower than necessary, or it has some quality that is not conducive to continuing toward the end, and this might be said to belong to it naturally (however, the proper sense is what we said initially). Also, sometimes the motion is natural, not relative to the nature proper to the thing, but relative to some external factors, for it is natural for sulfur to ignite when it meets fire,[10] and it is natural for iron to be attracted when it is near a magnet.

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8. For instance, when I was young, I grew upward; but now that I am old, I am growing outward.

9. Reading *qad* with **Z** and **T**, which is (inadvertently) omitted in **Y**.

10. Reading *nār* with **Z** and **T** for **Y**'s *ghāz* (gas), which simply cannot be correct, since it is a French loan word that entered the Arabic language relatively late.

نحو تحرّك النامي إلى نموه، فإنَّ ذلك ليس بإرادة، ولكنه مختلف الجهة، وقد تكون حركة بإرادةٍ غير مختلفة الجهة، ولا تسمّى طبيعية إلاّ باشتراك الإسم؛ كالحركة الأُولى. فالحركة الطبيعية بحسب هذا الموضع هي التي تكون عن قوةٍ في الجسم نفسه تتوجه إلى الغاية التي لطبيعة ذلك الجسم، وعلى الوجه الذي تقتضيه طبيعة ذلك الجسم، إذا لم يكن عائق، مثل تكون يد الإنسان ذات خمس أصابع في مدةٍ في مثلها تتكون، وعلى نحوٍ من التوجه غير زائغ عن الحدود الواجبة، فإنّه قد تكون حركة عن الطبيعة ولكن لا إلى غايةٍ طبيعية، مثل تكوّن الأصبع الزائدة والسّن الشاغية. وقد تكون حركة لا عن الطبيعة، ولكن إلى الغاية الطبيعية، كمَنْ يرمي حجراً إلى أسفل على خطٍ مستقيم، رمياً لا تصدر منه مثل تلك الحركة التي فيه عن الطبيعة التي في الحجر وحدها. وقد يتفق أنْ يكون من المبدأ إلى الغاية، ولكن معوّقاً مثل أنْ تكون حركته أبطأ من الواجب، أو ذات كيفية غير موافقة للاستمرار إلى الغاية. فهذه قد يقال لها طبيعية، ولكن الحقيقي هو ما قلناه أولاً. وقد تكون الحركة طبيعية لا بالقياس إلى الطبيعة الخاصّة بالشيء، بل بالقياس إلى أمورٍ من خارج؛ فإنَّ الاحتراق طبيعي للكبريت عند ملاقاة النار، والانجذاب طبيعي للحديد عند مقاربة المغناطيس.

Chapter Ten

The way in which space and other things are natural to the body

(1) We shall prove that every body requires a certain space proper to it,[1] and it does so on account of its form by which it becomes a substance or the form of that which is predominant in it. It also frequently requires a certain quantity, quality, position, or the like. So, if the space that [the body] requires is something dependent upon it that does not depart from it, [the body] would have no natural motion to the space. The same would hold if its quality or quantity has this description. So, if its space is some space that it could depart by being forcibly removed from it, then its return is natural (if it is not forcibly prevented). Alternatively, if [the body] is such as not to be removed from its space, but [if] when it initially came to be, it was not in its [proper] space, it naturally moves toward it (if it is not forcibly prevented). If its [natural] quality is something that can be forcibly taken from it, like the quality of water (I mean its coolness), then, when [that] force ceases, the thing naturally turns toward [its natural quality]; and so the heated water, for instance, undergoes alteration so as to be cool. If its [natural] quantity is something that can forcibly be taken from it—as, for example, the air that is forcibly rarefied, so that [its volume] becomes greater, or compressed, so that it becomes smaller (as we reported in the chapter on the void)[2]—then, when the force ceases, the substance moves to its [natural] volume.

1. See 4.11.1–6.
2. See 2.9.7, 20–21.

<الفصل العاشر>

في كيفية كون الحيّز طبيعياً للجسم
وكذلك كون أشياء أخرى طبيعية له

(١) فنقول، إنَّ كل جسم، فسنبيّن أنّه يقتضي حيّزاً يخصه، والمقتضى لذلك صورته التي بها يتجوهر، أو صورة الغالب فيه، وقد يقتضي كمّاً أو كيفاً أو وضعاً، أو غير ذلك. فإنْ كان الحيّز الذي يقتضيه موقوفاً عليه لا يفارقه، لم تكن له حركة طبيعية ناقلة إلى الحيّز، وكذلك إنْ كان كيفُه بهذه الصفة أو كمُّه. فإنْ كان حيّزه حيّزاً يمكن أنْ يفارقه، بأنْ يزال عنه قسراً، فإنَّه يكون له عَوْدٌ بالطبع - إنْ لم يُمنع قَسْراً - أو كأنْ يكون لم يزل عن حِيّزه، بل كان أول حدوثه في غير حيّزه، فإنَّه بالطبع ينتقل إليه إنْ لم يُمنع قَسْراً. فإنْ كانت كيفيته ممّا يجوز أنْ يسلب بالقَسْر ككيفية الماء - أعني برودته - فإنَّه إذا زال القاسر توجه إليها الشيء بالطبع، فاستحال الماء المسخّن مثلاً بارداً. وإنْ كانت كميته ممّا يجوز أنْ تُسلب بقَسْرٍ مثلاً كما يُخلْخل الهواء بالقَسْر حتى يصير أعظم، أو يضغط بالقَسْر حتى يصير أصغر - على ما أُخبرنا عنه في باب الخلاء - فإنَّه إذا زال القاسر انتقل الجوهر

Alternatively, its quantity will reach a level that it did not have when it first came to exist, but its initial existence was imperfect; and it is only by [a type of] replenishing that it becomes perfected and, indeed, through being nourished, naturally moves toward the perfection of its volume. Or again if the position of its parts is acted upon by force, like forcibly bending a straight piece of wood, then, if it is let go before breaking or splintering, it returns through its motion to the original position.

(2) Still, space may raise certain worries that other issues do not, for the body undergoes motion in a given direction that raises certain concerns for it. One of [these] is that it is moving toward that *direction;* another is that it is moved toward a certain *place;* and, again, another is that it undergoes motion to where its *collective kind* is. So the issue [of space] raises certain doubts and concerns, since it is not known to which one of these things it is moved. If water were to seek the direction and terminate its descent [only] at the lowest depths, it would neither stop short of the limit [where] earth rests, nor rise to the surface, nor settle within earth. The same would hold in the case of air, were the estimative faculty to imagine some part of it being forced toward the space of fire. It is found, however, to move from the space of fire toward its own space. You will learn that no two bodies belong by nature to one and the same space,[3] such that you could say that both earth and water seek one and the same direction and one and the same space, but [rather] it is just that earth is the more dominant and moves the farthest; and, likewise, air and fire both seek one and the same direction and one and the same place, but fire is the more dominant and moves the farthest. Now, if air were

3. See 4.11.7–10.

إلى حجمه، أو أتت كميته ممّا لا تحصل له في أول وجوده، بل كان أول وجوده وجوداً غير مستكمل، وإنّما يستكمل بالاستمداد، فإنه يتحرك إلى كماله في حجمه بالغذاء طبعاً. أو كان وضع أجزائه وضعاً مَقْسوراً؛ كما يحنى الخشب المستقيم بالقَسْر، فإنَّه إذا خلي سبيله من غير كسرٍ أو رضّ، رجع بحركته إلى الوضع الأول.

(٢) لكنه قد يَشكّل في أمر الحيّز ما لا يَشْكل في أمر غيره، فإنَّ الجسم المتحرك في جهةٍ ما تُعرّض له أمور؛ من ذلك أنّه متحرك إلى تلك الجهة، ومن ذلك أنّه يتحرك إلى مكانٍ ما، ومن ذلك إنه متحرك إلى حيث كليته، فيشتبه الأمر ويَشْكل، فلا يدري أنّه إلى أيّ واحدٍ من هذه الأشياء يتحرك. ولو كان الماء يطلب الجهة والنهاية في نزوله إلى أسفل، لما وقف دون حدّ وقوف الأرض، ولما طفا على الأرض، ولما رسب في الأرض، وكذلك حال الهواء لو توهم جزء منه مقسوراً إلى حيّز النار، فوجد ينتقل من حيّز النار إلى حيّز نفسه. وستعلم أنَّه لا يكون لحيّزٍ واحدٍ جسمان بالطبع، حتى يكون لك أنْ تقول إنَّ الأرض والماء يطلبان جهة واحدة وحيّزاً واحداً، لكن الأرض أغلب وأسبق، وكذلك الهواء والنار يطلبان جهة واحدة وحيّزاً واحداً، لكن النار أغلب وأسبق. ولو

to seek what fire seeks but [not attain it because] it just does not have the strength to keep up with [fire], then, if we placed our hands over a portion of air, we would sensibly feel it rushing upward, just like when we hold [air] underwater in a bladder. If the mobile were to seek only the place—where *place* is the [inside] surface of the surrounding body and the *natural* [*place*] is the surface of the body that surrounds by nature—then water would stop at the air, wherever it was, because it would be at the surface of the natural body that surrounds it, and ascending fire would seek to be contained by a place that is the surface of the [lunar] sphere. It is absurd that it seek this, because it touches only a portion of the surface of the sphere on one side [and so is not surrounded]. Were it to seek [wherever] the collective kind [is], the stone released at the top of a well would just hang at [the well's] upper rim and not go on to the bottom, for it would be in contact with the collective kind here in the shortest distance. Also, the stone would ascend, if our estimative faculty were to imagine that its collective kind left its location. In that case, one of two things must follow. [The first is that the ascending] would be natural, one direction being distinguished from another—but this is absurd. Alternatively, [the stone] would be acted upon by the collective kind in some other way from some other direction [than down], such that its motion toward[4] the collective kind would not be from its nature, but would be by the collective kind's attracting it. We had supposed, however, that its motion was natural; and yet it is impossible that something act upon something of the same kind *qua* same kind such that a given action and influence are natural. If it is not accidental, then, a small amount of earth, like a clod, would be attracted more quickly than a larger amount.

4. Reading *ilá* with **Z** and **T** for **Y**'s *ʿan* (away from).

كان الهواء يطلب ما تطلب النار، ولكنه يعجز عن مساوقتها إليه، لكنّا إذا وضعنا أيدينا على شطرٍ من الهواء أحسسنا باندفاعه إلى فوق؛ كما إذا حبسناه في إناء تحت الماء. ولو كان يطلب المتحرك المكان فقط – والمكان هو سطح الجسم الذي يحويه، والطبيعي هو سطح الجسم الذي يحويه بالطبع – لكان الماء يقف في الهواء حيث كان، لأنَّه في سطح الجسم الطبيعي الذي يحويه، ولكانت النار المتصعدة تطلب أنْ يشتمل عليها مكانٌ هو سطح فلك، وهذا الطلب محال، لأنَّه إنّما يماس طائفة من سطح الفلك من جهة. ولو كان يطلب الكلّية لكان الحجر المرسل من رأس البئر يلتصق بشفيرها ولا يذهب غوراً، فإنَّ الاتصال بالكل هناك أقرب مسافة، ولكان الحجر يصعد، لو توهمنا أنَّ كلّيته زالت عن موضعها، فكان حينئذ لا يخلو إمّا أنْ يكون بالطبع يميّز جهة دون جهة وهذا محال، أو يكون قد انفعل عن الكلّية انفعالاً آخر من جهةٍ أخرى، فتكون حركته إلى الكلية ليست عن طباعه؛ ولكن بجذب الكلّية إياه، وقد فرضنا حركته طبيعية. وعلى إنَّه يستحيل أنْ يفعل الشيء في شبيهه فعلاً وأثراً بالطبع، من حيث هو شبيهه إلا بالعرض، ولكانت الأرض الصغيرة كالمدرة أسرع انجذابا من الكبيرة.

(3) What ought to be believed about this is that natural motion seeks the natural space and flees from the unnatural one—not absolutely, but together with a certain proper, ordered position of the parts of the universe and a certain proper position of the body acting on account of the directions (for the direction is not itself what is intended, except for the sake of this account's being in it). [It should, moreover, be believed] that [the *where* of] the collective kind belonging to every simple [element] is not what is intended in the natural motion belonging essentially to [the collective kind's] particular instances, but it is a subject where there is what is intended—and, in fact, what we mentioned [namely, the proper order and position] is what is intended. So the seeking is directed toward only this definite end and, in fact, nothing else, whereas the flight turns out to be away from what corresponds with [that end], whatever it chances to be. So, when the place is not a natural one, even if the ordered position is natural, it flees from it. An example is the air that is absorbed and trapped in baked bricks[5] that are then placed high in the air. In this case, the brick absorbs water from below owing to [three factors:] the air's intense flight from a foreign surrounding [body], the impossibility of there being a void in it, and the tiles' necessarily sticking together. So the water replaces [the air] in the pores, as it is drawn into them owing to the air's fleeing from them, even if the ordered position in remoteness and proximity is closer to what it should be, and is like water's fleeing from the air, even if the place is natural, but the ordered position is not realized.[6]

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5. Reading *ājurrah* with **Z** and **T**, here and below, for **Y**'s *jarrah* (jar).

6. In the example, Avicenna has us imagine a situation where air becomes trapped within some earthen bricks, and then those bricks are placed high in the air. In this case, the air trapped within the bricks is, as it were, in its natural place—namely, in the air; however, there is not the proper order and position between the air in the bricks and the earth of the bricks, where that ordering and position is that earth be down, followed by water, then air. In order to achieve this order (or at least to get closer to it) the trapped air flees the surrounding earth of the bricks; however, if the air were to depart without anything filling the pores or spaces that are being left, then there would be a void, which Avicenna takes to be impossible. Consequently, moisture from the air surrounding the bricks is drawn into the pores to fill them. While the water's being surrounded by earth also does not represent the natural order and position, it is closer in proximity to that order.

(٣) فالـذي يجـب أنْ يعتقد في هذا هو أنَّ الحركـة الطبيعية تطلب الحيز الطبيعي وتهـرب من غير الطبيعـي لا مطلقاً، ولكن مع ترتيبٍ من أجزاء الكل مخصوص، ووضْع مخصوصٍ من الجسـم الفاعل للجهات. فإنَّ الجهة عينها غير مقصودة إلاّ لأجل كون هذا المعنى فيها، وأنَّ الكلّية التي لكل بسيط ليست مقصودة في الحركة الطبيعية التي لأجزائها بذاتها، ولكنها موضوعة حيث المقصود، بل المقصود ما ذكرناه، فالطلب يتوجه إلى هذه الغاية المتحقّقة فقط، ولا يصحّ إلى غيرها. وأمّا الهرب فيصح عن مقابلاتها أيّها اتفق؛ فإنّه إذا كان المكان غير طبيعي - وإنْ كان الترتيب طبيعياً - هرب منه، مثل الهواء المنتشف المحصور في آجرّة مرفوعة في الهواء، فإنَّ الجرّة تنشّـف الماء من أسفل لشدة هرب الهواء عن محيطٍ غريب، واستحالة وقوع الخلاء فيه، ووجوب تلازم الصفائح، فيخلفه الماء في مسـام الجرّة متصعداً فيها - لهرب الهواء عنها، وإنْ كان الترتيب في البُعْد والقرب قريباً مـن الواجب، وكهَرب الماء من الهواء إنْ كان المـكان طبيعياً، وليس الترتيب حاصلاً.

(4) It is worth knowing whether the fleeing or the seeking is that which produces [the element's] motion. Now, were it only the fleeing and not a seeking, then a certain direction toward which [the element is moving] would not distinguish the fleeing from the seeking. The case of water is an example in that its nature produces a certain inclination in its substance, and that inclination produces an inclination and repulsion in that which it encounters, which if it were not to produce it in itself, it would not have produced the inclination in the other. So, for example, water's natural form produces coolness in another only by a certain coolness that emanates from [water's natural form] into the body in which there is [that form], which if that [coolness] were not first emanating with respect to [the form], it would not cool another, even if its form remains. When it is provided with a certain foreign heat, it produces the contrary of its action and so burns. Likewise, when [the water] is violently heated, there arises in it the accident that necessarily brings about a fire-like form, such that it produces the action of fire involving burning and ascending, and so it burns and ascends. That, however, does not require that there be, in this body, two powers that are necessarily contraries; one of which is that form and the other of which is this accident. That is because that form does not primarily require the motion and burning, but it is by means of a certain accident—namely, that which passed away when its contrary, from which this action primarily proceeds, comes to be. Equally, the form is the principle of the upward motion only by means of some accident that appears to be related to [the motion] as a momentary disposition—namely, the inclination. One must not think that that is not on account of the accident but is, instead, on account of, for instance, those fiery

(٤) وبالحري أنْ نعرف هل الهرب هو الذي يحرّكه أو الطلب، لكنه لو كان ليس إلاّ الهـرب ولا طلب، لم تتعيّن جهة إليها الهرب دون الطلب. وحال الماء مثلاً في أنَّ طبيعته تُحدث ميلاً في جوهره، وذلك الميل يُحدث ميلاً واندفاعاً فيما يلاقيه، لولا أنَّه أحدثه في نفسه، لم يحدث الميل عنه في غيره، كحال الماء في أنّه إنّما تفعل صورته الطبيعية التبريد في غيره، بما يفيض عنها من بردٍ في جسـمها التي هي فيه، لو لم يفض ذلك أولاً فيها لم يبرد غيره – وإن بقيت الصورة – وإذا اسـتفاد حرارة غريبة، فعل ضدّ فعله، فأحرق. وكذلك إذا اشـتدت سـخونته، عرض فيه العرض الذي توجبه صورة النارية، ففعل فعل النار من الإحراق والصعود، فأحرق وصعّد، فلا يوجب ذلك أنْ يكون في هذا الجسـم قوتان يتضادّ مقتضاهما، أحداهما تلك الصورة، والأخرى هذا العارض. وذلك لأنَّ تلك الصورة لا تقتضي الحركة والإحراق اقتضاء أولياً، بل بوسـاطة عارض، وهو الذي بَطَل وحصـل ضدّه الذي هـذا الفعل يصدر عنه صدوراً أولياً. فإنَّ الصورة أيضاً إنّما هي مبدأ للحركة إلى فوق، بوسـاطة عارض يشـبه أنْ يكون بالقياس إليها ملكة وقتية وهو الميل. ولا يجـب أنْ يظنّ أنَّ ذلك ليس لأجل العارض، بل لما يخالط الماء مثلاً من ناريات، تلك

components mixed with the water that get broken up, withdraw, and turn into vapor, while the water remains cold. If that were the case, then, when we set water and oil over a flame, the oil would necessarily turn into vapor first because it has a nature more susceptible to fire and, on account of being so thoroughly mixed with it, [the oil] would undergo alteration into it. Still, it is possible that some bodies, under the influence of force, do undergo motion contrary to the nature because of what dominates in the mixture, while others, of themselves, confirm this alteration as in water vapor, for, if it were owing to the fiery component, what we said would necessarily follow. You know that there is no cause or reason that prevents the fiery component from freeing itself of the water such that it would need the accompaniment of water, unless water is such that it undergoes motion so as to agree in being like [fire's] motion. We should now demonstrate that every body has some space proper to it.

الناريــات تنقص وتفــارق وتصعد ، ويبقى الماء بارداً ؛ ولــو كان كذلك ، لكان يجب إذا طبخنا الماء والدهن أنْ يتصعد الدهن أولاً ، لأنّه أقبلَ لطبيعة النار ، ولمخالطتها والاستحالة إليها . ١٨٩ – على أنّه من الجائز أنْ تكون بعض الأجســام المقســورة تتحرك إلى خلاف الطبيعة لمخالطٍ غالب ، وبعضها لنفس تأكد هذه الاســتحالة ؛ كما في البخار المائي ، فإنّه لو كان للنارية للزم ما قلناه . وأنت تعلم أنّه لا علّة ولا ســبب لا متناع النارية من التخلّص عن الماء ، حتى تحتاج إلى أنْ تستصحب الماء ، اللّهم إلاّ أنْ يكون الماء صار بحيث يتحرك نحو حركتها موافقة لها . لكنه بالحري أنْ نبرهن على أنَّ لكل جسمٍ حيّزاً يخصّه .

Chapter Eleven

On establishing that every body has a single natural space, and [*on*] *the way space belongs to the body's collective kind and to its individual instances as well as to simple and composite* [*bodies*]

(1) We say that every account and description of a body that simply must belong to that body is something belonging to it of [itself], naturally. An example of this is space, for there is no body that does not have space as one of its concomitants, whether as a place or as some position of an ordering. [Another] example is shape; for every body is something finite, and whatever is finite necessarily has a shape. Again, it inevitably has a certain quality or form other than the corporeality, because it is either easily susceptible to impressing and shaping, or [shaping] happens with difficulty, or [the body] is not so susceptible at all, all of which is something other than being corporeal. We might also be able to prove that certain other qualities are inseparable from the body as well.

(2) So we say that, among these things and what is analogous to them, there is certainly something necessary and natural belonging to the body. That is because what occurs by coercion and force is something accidental, which happens through some external cause. Now, the intellect might still be able to know the substance of the thing even when its

<الفصل الحادي عشر>

في إثبات أنَّ لكل جسم حيّزاً واحداً طبيعياً ، وكيفية وجود الحيّز لكلّية جسم ولأجزائه ، وللبسيط والمركب

(١) نقول إنَّ كل معنى وكل صفة للجسم لا بُدّ لذلك الجسم من أنْ يكون له ؛ فانَّ له منه شيئاً طبيعياً ، وهذا مثل الحيّز ، فإنّه لا جسم إلاّ ويلحقه أنْ يكون له حيّزٌ ، إمّا مكان وإمّا وضع ترتيب . ومثل الشكل ، فإنَّ كل جسم متناهٍ ، وكل متناهٍ فله شكل ضرورة ، وإنْ كل جسم فله كيفية ما ، أو صورة غير الجسمية لا محالة ، لأنه لا يخلو إمّا أنْ يسهل قبوله للتأثير والتشكيل ، أو يعسر أو لا يقبل ، وكل هذا شيء غير الجسمية . وقد يمكن أنْ نبيّن ملازمة الجسم لكيفياتٍ أُخرى .

(٢) فنقول إنَّ هذه الأشياء وما يجري مجراها ، لا بُدّ من أنْ يكون للجسم منها شيء طبيعي ضروري . وذلك لأنَّ الواقع بالقهر والقسرْ عارض بسببٍ يعرض من خارج ، وجوهر الشيء قد يمكن أنْ يعقل ولا تعرض له الأسباب التي لوجوده منها بُدّ ، إلاّ ما كان

causes that are nonessential for its existence do not occur and there is only whatever is necessary owing to [the thing's] nature, [since] it is not at all necessary that the intellect know the body only when some forced action in the body affects it. Consequently, the nature of the body might be able to be posited as existing—that is, according to what it is in itself—when there is no force acting upon it. When it is posited like that, then it and its nature remain; and when it remains like that, it inevitably has some shape and some [location] where it is. All of that belongs to it, either from its nature or from some external cause. We posited, however, that it was not an external cause. So it remains that it has it from its nature, and that which is from its nature belongs to it as long as its nature exists. Now, its nature is not by force, for, if it were such as to be susceptible to force, that could be forcibly removed from it, whereas, if its nature is not such as to be susceptible to force, then that will not be removed from it by force.

(3) Someone could say that it is possible that the appearance of each thing acting by force provides a certain shape and place, and that remains thereafter and is removed only by the appearance of something else acting by force. In that case, it would always involve a replacement of things acting by force in just the way that it involves a replacement of accidents. Now, from that, it would not necessarily follow that one of them is something essential and inseparable. Our response is that the body has non-necessary accidents in two ways: accidents that are concomitants of [the body] in itself, and accidents that follow upon it owing to its immediate vicinity, like its being up and down, being contiguous with, and facing. The accidents that follow upon it on account of its immediate vicinity do not necessarily belong to it, considered in itself, whereas,

منها لازماً لطباعه. وليس واجباً ضرورة أنْ يكون الجسم لا يعقل إلاّ ويلحقه فعل قاسر فيه. فإذا كان كذلك، فطبيعة الجسم قد يمكن أنْ تفرض موجوداً – وهو على ما هو عليه في نفسه – وليس يقسره قاسر. وإذا فرض كذلك، بقي وطباعه، وإذا بقي كذلك، لم يكن بدّ من أنْ يكون له أيْنٌ وشكلٌ، وكل ذلك لا يخلو إمّا أنْ يكون له من طباعه، أو من سببٍ من خارج، لكنا قد فرضنا أنّه لا سبب من خارج، فبقي أنْ يكون له من طباعه، والذي من طباعه يوجد له ما دامت طبيعته موجودة ولم تُقسر. فإنْ كانت طبيعته – بحيث تقبل القَسْر – أمكن أنْ يزول ذلك عنه بالقَسْر، وإنْ كانت طبيعته بحيث لا تقبل القَسْر، لم يزل ذلك عنه بالقَسْر.

(٣) فإنْ قال قائلٌ إنّه يجوز أنْ يكون كل قاسر يرد، فإنّه يعطي شكلاً ومكاناً، ثم يبقى ذلك فلا يزول إلاّ بقاسرٍ آخر يرد، فلا يخلو دائماً عن قاسر على التعاقب، كما لا يخلو عن الأعراض بالعاقب، وليس يلزم من ذلك أنْ يكون واحد منها ذاتياً لا يفارقه، فنقول: إنَّ الجسم تعرض له الأعراض التي ليست لازمة على وجهين: أعراضٌ تلحقه في ذاته، وأعراضٌ تلزمه من مجاوراته؛ مثل كونه فوق وتحت ومماسّاً ومحاذياً. والأعراض التي تلزمه لمجاوراته لا تصير ضرورية له باعتبار ذاته، والأعراض الأخرى فإنَّه لا يجب

while [the body] need not be devoid of the other accidents, their not being in it is, nonetheless, only possible. If its being devoid of them were impossible, such that [the body] subsists only by some of them existing in it, then they would be forms, not accidents. The fact is that accidents occur only after the thing exists as a substance such that the thing might exist, while each one of them does not. So it is possible to posit the substance of the body without any of them. As for [the accidents] owing to the immediate vicinity—namely, being contiguous with and what is analogous to that—they do not follow upon the body owing to its nature, but to its existing together with some other body. So, then, it is not at all necessary that the body be what essentially and actually bears some state that neither constitutes its essence nor entails what constitutes its essence. So the concern has been resolved.

(4) The case of things acting by force is just like the accidents, because the things acting by force do not constitute the essence of [the body]. What acts by forces, then, arises externally so as to provide a certain state without which that body would not have that state. Now, none of this is something necessarily belonging to the essence or what follows upon the essence. So the estimative faculty's imagining the body without anything acting upon it by force is not impossible relative to the nature of the body, whereas its imagining the body without possessing some *where* or space proper to it is impossible relative to the nature of the body. So the body, in its nature that belongs to it, necessarily entails that it have some space that it would have even if there were nothing acting by force (which might not occur). The same holds for the shape, the quality, and the like, as well as the position of the parts (if it has actual parts). So every body has a natural space; and if it has a place, then its space is a place.

أنْ يخلو منها ، بل يجوز أنْ يكون فيه عدمها فقط ، ولو كانت مما يستحيل خلوّها عنه ، بحيث لا يقوم إلاّ بوجود شيء منها فيه ، لكانت صوراً لا أعراضاً . بل الأعراض هي التي تعرض بعد تجوهر الشيء ، بحيث يجوز أنْ يوجد الشيء وكل واحدٍ منها معدوم ، فيمكن فرض جوهر الجسم دون شيء البتة منها . وأمّا المجاورات والمماسّات ، وما يجري مجرى ذلك ، فليس تلزم الجسم لطبيعته ، بل لوجوده مع جسم آخر . فليس إذن يجب – لا محالة – أنْ يكون الجسم لذاته حاملاً بالفعل لحالٍ ممّا لا يقوّم ماهيته ، ولا يلزم ما يقوّم ماهيته ، فقد انحل التشكّك .

(٤) وحال القواسر حال هذه الأعراض ، لأنَّ القواسر لا تقوّم ماهيته ، فإنَّ القاسر هو الذي يرد من خارج فيفيد حالاً ، لولاه لما كان لذلك الجسم تلك الحال ، وليس شيء من هذه واجباً أنْ يكون من الماهية أو لازماً للماهية . فتوهم الجسم – ولا قاسر يقسره ليس ممتنعاً بالقياس إلى طبيعة الجسم ، وتوهّم الجسم غير ذي أينٍ يخصه أو حيّزٍ ممتنع بالقياس إلى طبيعة الجسم . فالجسم يلزمه – في طبيعته التي له – أنْ يكون له حيز ، ذلك الذي لولا القاسر الذي يجوز أن لا يكون ، لكان له ، وكذلك الشكل والكيف وغير ذلك ، وكذلك وضع الأجزاء ، إنْ كان له أجزاء بالفعل . فكل جسمٍ فله حيّزٌ طبيعي ، فإنْ كان ذا مكان ، كان حيّزه مكاناً .

(5) One might say that earth is a simple body and [that] its nature requires that there be dryness in it. So [the dryness] either does or does not require that it have some shape. On the one hand, if it requires that it have some shape, then it must require a circular shape, owing to its simplicity. In that case, concerning[1] the dryness that assists what [earth's] nature requires, when some part of earth is deprived of the circular shape insofar as some other shape is imposed upon it, it would be necessary that[2] its nature return it to its circular [shape]. It is not found, however, to be like that. On the other hand, if the dryness prevents that and interferes with the nature of that part and what it requires, and [yet] the dryness proceeds from [the earth's] nature, then one and the same nature necessarily requires two mutually exclusive things; but this is impossible.

(6) Dryness, we say, emanates from it only in order to preserve the natural shape that its nature requires. So, from the fact that it preserves the shape of [the body], it necessarily follows that it preserves in each part the extension of what it is shaped into that the nature of [the dryness] primarily requires. So, when something acting by force disfigures a part of its shape, the rest of it cannot be sensibly aware of what happened, but needs to preserve what the nature [of the dryness] required. So, if the nature [of the dryness] turned around and required some yet different extension, the nature would be contradicting what it primarily requires [namely, to preserve any given shape]. In that case, then, it is doing what the nature primarily requires. So this scenario [namely, that the earth's dryness should preserve only a circular shape] would be the contrary of what [the nature] primarily requires and at variance with what the dryness requires, which is what the nature requires. It is not inconsistent that, in some accidental state, the nature requires that which

1. Reading *ammā* with **T** for **Z**'s and **Y**'s vowelled *immā* (either).
2. Reading a simple *an* with **Z** and **T** for **Y**'s *aw an* (or that).

(٥) ولقائـل أنْ يقول: إنَّ الأرض جرم بسـيط، وتقتضي طبيعته اليُبْس الذي فيه، فلا يخلو إمّا أنْ يقتضي له شـكلاً أو لا يقتضي، فإنْ اقتضى له شكلاً فيجب أنْ يقتضي شكلاً مستديراً لبسـاطته. فحينئذ أمّا أنْ يكون اليبس يساعد مقتضى طبيعته، فيجب أنْ تكون الأرض، إذا سلب جزء منها الشكل المستدير، بأنْ تشكّل شكلاً آخر، أنْ يعود بطبيعته فيسـتدير، وليس الموجود كذلـك. وإنْ كان اليبس يمنع ذلك، ويحول بين طبيعة ذلك الجزء ومقتضاه، واليبس صادرٌ عن طبيعته، فيجب أنْ تكون طبيعة واحدة تقتضي معنيين متفاوتين متقابلين، وليس هذا بجائزٍ.

(٦) فنقول إنَّ اليبس إنّما يفيض عنه ليحفظ ما تقتضيه طبيعته من الشـكل الطبيعي حفظاً قوياً جداً، فإذا حفظ شكله لزم من ذلك أنْ يحفظ في كل جزء ما توجبه طبيعته إيجاباً أولياً، من انبسـاط الذاهب إلى شكله. فإذا ثُلم شيءٌ من شكله بقسْر القاسر لم يكن للباقي منه حسّ شعورٍ بما حدث، بل كان عليه أنْ يستحفظ ما أوجبته الطبيعة. فإنْ عادت الطبيعة فأوجبت انبساطاً آخر، كانت الطبيعة هي المناقضة لموجبها الأول، فكان حينئذ مقتضى الطبيعة، بهـذه الحال ضدّ مقتضاها الأول، ومخالفاً لمقتضى اليبس الذي تقتضيـه الطبيعة. ولا يبعد أنْ تكون الطبيعة تقتضي - في حال عارض - أمراً مناقضاً

contradicts and opposes what it requires in its regular state. In that case, then, the two required things are not mutually exclusive contraries proceeding from one and the same power in one and the same state, such that there would be an absurdity. Instead, one of them proceeds from the power while it is in its natural state, while the other proceeds from it while it is in an unnatural state. That is, for example, like the state of rest that happens as a result of the nature when it is in a natural state, while motion happens to result from it when it is in an unnatural state. As for when a portion of some [elemental] component other than earth undergoes alteration into earth, its alteration is first into some nonspherical shape. That, then, is on account of external impediments and the difference of the parts in priority, posteriority, and immediate vicinity during the generation into earth.

(7) Having clarified this objective of ours, we ought to explain natural place, how it belongs to bodies, and how it belongs to what is simple and composite. We say: It is only fitting that we want to know whether some body or other could have two natural places or a single place, and whether two bodies can be at rest in it naturally. We would also like to know the state of simple bodies that have distinct parts: namely, does each one of [the parts] have some numerically different place that is absolutely proper to it, such that each one of them has some natural place different from that of another? How would the place of *this* become different from the place of *that* and proper to it to the exclusion of the other? How are those places related to the place that belongs to the whole? Again, we want to know the state of the composite body with respect to its natural where, for it certainly has some natural place. So what is that natural place? If it is a place of a single part, then the other parts won't be in their natural place.

ومقابلاً لما تقتضيه، في حال كونه سالماً. فليس إذن المقتضيان بمتضادين متمانعين صادرين عن قوةٍ واحدةٍ بحالٍ واحدة، حتى يكون محالاً، بل أحدهما يصدر عن القوة وهي على حالتها الطبيعية، والآخر يصدر عنها وهي بحالٍ غير طبيعية. وذلك مثل السكون يعرض عن الطبيعة إذا كانت على حالٍ طبيعية، ثم تعرض عنها الحركة إذا كانت بحالٍ غير طبيعية. وأمّا الجزء من عنصرٍ غير الأرض - إذا استحال إلى الأرض - فاستحال أولى استحالته إلى شكلٍ غير كُري، فذلك لموانع من خارج ولاختلاف الأجزاء في التكوّن أرضاً، اختلافاً في التقدّم والتأخّر والمجاورات.

(٧) وإذ قد أوضحنا غرضنا هذا، فبالحري أنْ نبيّن أنَّ المكان الطبيعي كيف يكون للجسم، وكيف يكون للبسيط منه وللمركّب، ونقول إنّه يخلق بنا أنْ نعرف هل يجوز أنْ يكون جسمٌ من الأجسام له مكانان طبيعيان، أو مكان واحد، وله جسمان يسكنانه بالطبع وأنْ نعرف حال الأجسام البسيطة التي لها أجزاء متمايزة، ولكل واحدٍ منها مكان آخر بالعدد يخصّه لا محالة، فيكون لكل واحدٍ منها مكان طبيعي غير الذي للآخر، وأنّه كيف يصير مكان هذا غير مكان ذلك، ويختص به دون الآخر وكيف نسبة تلك الأمكنة إلى المكان الذي للكل. وأنْ نعرف حال الجسم المركّب في أينه الطبيعي، فإنَّ له مكاناً طبيعياً لا محالة، فما ذلك المكان؟ فإنّه إنْ كان مكان جزءٍ واحدٍ، كانت الأجزاء الأخرى في غير مكانها.

(8) We say that it is impossible for a single body to have two natural places, except in the way that there are certain potential spaces in the entirety of the place of the whole. It occurs in whichever of [the spaces] that it does because of a special property that naturally belonged to it—like the clod of earth, for the space closest to that of the earth that is adjacent to [the clod] is natural to it. As for [having] two distinct places, that is impossible. [That] is because what a single individual requires is a single individual thing, whereas what the whole, composed of homogeneous parts, requires is what the entirety of all those parts requires. Now, it is not impossible for the bodies whose natures are alike to be continuous because of their nature. In fact, if it is impossible, it would be so only because of some accident that happens, whereas, in their nature they are such that it is possible that they should be continuous. Since their continuity is not impossible, how could their being contiguous be impossible? Should they be continuous or contiguous, nothing impossible has occurred. When they are continuous and contiguous, then when the entirety as something natural seeks the natural place, it is as a single thing, which is the entirety of these natures (in fact, this entirety consists of these natures). So it necessarily seeks the entirety of the space that is the space of this entirety. In fact, this space is due to this entirety as if it were an entirety that is a collection of each and every one of the spaces. So, then, the spaces of bodies that are alike in nature are the parts of a single space, and any particular body from that entirety has some space appointed to it from that entirety on account of the cause of that cause. As for the need of [a body] to exist in [some space] when it first comes to be and to be naturally suited to it, it is necessary, whereas [the body's] specific proximity—such as the fire that is moved upward to some part of the space of fire's collective kind itself—is only because of its being nearer to it.

(٨) فنقول: إنّه لا يجوز أنْ يكون لجسم واحدٍ مكانان طبيعيان، إلاّ على جهة أنَّ في جملة مكان الكل أحيازاً بالقوة، أيّها وقع فيه بسببٍ مخصّص كان طبيعياً له، كالمَدَرة فإنَّ أقرب حيّزٍ من حيّز الأرض يليها هو طبيعياً لها، وأمّا مكانان يتباينان فليس يمكن ذلك. فإنْ مقتضى الواحد بالشخص، من حيث هو واحد بالشخص، أمرٌ واحدٌ بالشخص، ومقتضى الكل المتشابه الأجزاء جملة مقتضى جميع الأجزاء. والأجسام المتشابهة الطبائع لا يستحيل عليها الاتصال لطبيعتها، بل - إنْ استحال - فإنّما يستحيل لعرضٍ يعرض وهي في طبيعتها؛ بحيث يجوز عليها، أنْ لو كانت متصلة، وإذ لا يستحيل اتصالها، فكيف يستحيل تماسّها؟ لو اتصلت أو تماسّت لم يعرض شيء مستحيل. وإذا اتصلت وتماسّت كانت الجملة - وهي تطلب المكان الطبيعي من حيث هي طبيعة واحدةٌ - هي جملة هذه الطبائع، بل هذه الجملة من الطبائع. فيجب أنْ تطلب جملة من الحيّز، هي حيّز هذه الجملة، بل هذا الحيّز لهذه الجملة، كأنَّه جملة تجتمع من أحياز واحدٍ واحد. فإذن الأجسام المتشابهة الطبائع فإنَّ أحيازها كأنها أجزاء حيّزٍ واحدٍ، ويكون لجسم معيّنٍ من تلك الجملة حيّز يتعيّن له من تلك الجملة، لعلّة تلك العِلّة. أمّا وجوده فيه أولاً عندما حدث، وهو موافق له في الطبع، فوجب لزومه، وأمّا اختصاصه بالقرب، فإنَّ النار إنّما تتحرك إلى فوق وإلى جزءٍ من حيّز كلّية النار بعينه، لأنّه هو أقرب إليه.

(9) Someone might ask: If our estimative faculty were to imagine fire at the center of the celestial sphere, no part of it having an inclination toward some direction, what would happen to it with respect to its nature? Would it rest naturally—but that is absurd—or would it move toward some direction, no direction having been specified? We say that it would happen to be at rest, but by force. [That] is because a certain empty space would be formed at its center when [the fire] extends out equally from [the center] in [all] directions until each part of the extending mass encounters the natural place closest to it. In that case, however, the surrounding air and the like would not[3] permit [the fire] to interpenetrate it, since this penetration would not progress by piercing through [the air], because *piercing* is in one direction to the exclusion of another, whereas this would be an extending out in every direction. Thus, [the fire] would stay at rest by force. Furthermore, it is impossible that a void come to be at the center when it is pierced, whereas this force [namely, the fire's force to pierce through the air in order to move toward its natural place] would be a certain accidental force resulting from the nature.[4] This is really odd, since the nature would require something impossible to happen owing to certain accidents that occurred. So that would lead to something completely outside the natural order.[5] We do not know and deny the impossibility of this accident because we did not initially know and deny the impossibility of its effect on the subject. When the antecedent is possible, however, the consequent is as well; so, if the consequent is impossible, the antecedent is, too. So it has become apparent how the single body has a single place or single space by nature, and the way in which the space of the whole is related to the space of the parts, one to another, where these are the simple [elements].

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3. Reading *lā* with **Z** and **T**, which has been (inadvertently) omitted in **Y**.
4. Reading simply *ʿan* with **Z** and **T** for **Y**'s preferred *min khārij ʿan* (external to).
5. Literally, "a foreign jurisdiction."

(٩) ولسائلٍ أنْ يسأل، إنّا لو توهمنا النار في مركز الفلك، لا ميل لجزء منها إلى جهة، فماذا كان يعرض لها في طبعها، أسكونٌ بالطبع - وذلك محال - أو حركة إلى جهة، ولا مخصّص لجهة؟ فنقول: كان يعرض لها السكون ولكن بالقَسْر، لأنّها كانت تقتضي أنْ يفرج عن فرجةٍ، في واسطتها، تنبسط عنها إلى الجهات بالسواء، إلى أنْ يلقى كل جزء من المنبسط ما هو أقرب إليه من المكان الطبيعي. لكن الهواء المحيط وغير ذلك، كان حينئذ لا يمكّنها من أنْ تداخله نافذة هذا النفوذ، إذ هذا النفوذ لا يتأتى بالخرق، لأنَّ الخرق يكون في جهةٍ دون جهة، وهذا انبساطٌ في كل جهة، فتكون ساكنة بالقَسْر وأيضاً فإنَّ الخلاء ممّا لا يجوز أنْ يحدث في الوسط عند انخراقه، وهذا القَسْر قَسْرٌ عارضٌ عن الطبع، وهو عجيب جداً، فإنَّ الطبع يقتضي أمراً صار غير ممكن لعارضٍ عرض، فأدى ذلك إلى حكمٍ غريب. ونحن لا ندري استحالة هذا العارض ولا نمنعها، لأنّا لم ندر بعد استحالة المعروضٍ له في الموضوع مقدماً ولا نمنعها، ولكن إذا جاز المقدّم جاز التالي، فإنْ امتنع التالي امتنع المقدّم. فقد ظهر أنَّه كيف يكون للجسم الواحد مكان واحد بالطبع، أو حيّز واحد بالطبع، وأنّه كيف تكون نسبة حيّز الكل إلى حيّز الأجزاء بعضها إلى بعض، وهذا للبسائط.

(10) As for composite [bodies], their composition is from either two simple [elements] or more. If it is from two simple [elements], then either they are equal in power or one of them dominates. If they are equal in power but the position of one them does not chance to be opposite the side of the other, then they are not united, but are held together only by something acting by force to join them together. If their motions are in opposing directions and each one is equally distanced from its [natural] place, then they would balance each other out while each one forcibly acts upon the other. So they would be at a standstill, unless something breaks in and helps one of them. Alternatively, they may be at the shared limiting point between the two spaces, at which they might then naturally be at a standstill. If the power of one of them dominates and it brings the force to bear on the mix, the natural place is that of the dominant [element]. If [the compound] is from more than two simple [elements] but, among them, one dominates, then the [natural] space is that of the dominant [element]. If they are equal, then the two simple elements dominate whose direction is one relative to the subject[6] in which there is the composition. Also, the composite will be at the closest of the two spaces to the space where the composition occurs, but not going beyond it. [That follows] since the attraction from it toward the two sides is equal, and it does not overcome the check put on it by the simple [element] that seeks that space when the two attractions are at variance. Perhaps there is not a true mixture of the simple bodies by their [simply] being attached to one another except [in the following cases]: [(1)] There is a dominant one that joins and forcibly acts upon the other parts, preventing them from moving to their proper spaces. [(2)] Alternatively, the parts have become so small that they cannot act so as to pierce the bodies that are between them and their collective kinds. [(3)] Finally, there is some power forcibly acting upon the collection other than the powers of the simple [elements]. Let us now prove that every natural body has some principle of motion such that every body has some natural motion and that [that principle] is as a single species only.

6. **Z** and **T** read *mawḍiʿ* (location).

(١٠) وأمّا للمركّبات، فإنَّ تركيبها لا يخلو إمّا أنْ يكون عن بسيطين، أو عن أكثر من بسيطين، فإنْ كان عن بسيطين، فإمّا أنْ يكونا متساويين في القوة، أو أحدهما أغلب، فإنْ كانا متساويين في القوة، ولم يتفق أنْ كان وضع أحدهما بحذاء جهة الآخر؛ تفرّقا، ولم يحتبسا إلاّ بقَسْر جامع. وإنّ تواجهت حركتاهما، وبُعْد كل واحدٍ عن مكانه كبُعْد الآخر، تقاوما وقسر كل واحدٍ الآخر فوقفا، إلاّ أنْ يطرأ على أحدهما مُعينٌ، أو يكونا في الحدّ المشترك بين الحيّزين، فيجوز أنْ يقفا فيه بالطبع. وإنْ غلب فيه قوة أحدهما، والقَسْر على المزج حاصل، كان المكان الطبيعي مكان الغالب، وإنْ كان عن أكثر من بسيطين، وفيهما غالب كان الحيّز للغالب. وإنْ تساوت غلب البسيطان اللذان جهتهما واحد بالقياس إلى الموضوع الذي فيه التركيب، وحصل المركّب في أقرب الحيّزين من حيّز وقوع التركيب ولم يتجاوزه، إذ الجذب عنه إلى الجانبين سواء، والإمساك فيه عن البسيط الذي يطلب ذلك الحيّز لا يبطله، يخالف الجذبين. وعسى أنْ لا يصح امتزاجٌ من الأجسام البسيطة تتلازم به، إلاّ وهناك غالبٌ يجمع ويقسر الأجزاء الأخرى، مانعاً إياها عن الحركة إلى أحيازها الخاصة، أو تكون الأجزاء قد تصغّرت تصغّراً لا يمكنها أنْ تفعل في الأجسام التي بينها وبين كلياتها خرقاً، أو تكون قوة قاسرة على الاجتماع، غير قوى تلك البسائط. فلنبيّن الآن أنَّ لكل جسمٍ طبيعي مبدأ حركة، حتى يكون لكل جسمٍ حركة طبيعية، وأنّه على نوعٍ واحدٍ فقط.

Chapter Twelve

Establishing that every natural body has a principle of motion with respect to either place or position

(1) We say that every body either is or is not able to be forcibly moved from the location in which it is. If it is able to undergo locomotion away from the location in which it is, then, in its substance, either it has some inclination toward some space or it has no such inclination. Whatever the case, every body has some natural place or space at which its nature requires it to be, differing in that [respect] from the rest of the bodies, not by its corporeality, but only because there is some principle and power in it disposing it toward that place. So, when that power requires that place, and its corporeity[1] as such does not prevent it from undergoing locomotion and motion, then there is nothing in it contrary to its power or what its power requires demanding some other space. [That] is because, in a single body whose parts are not at variance, there cannot be two contrary powers. Otherwise, they would require two mutually exclusive actions, since the powers' being powers are in accordance with their action. When their actions are mutually exclusive, their

1. Normally, when speaking of corporeality, Avicenna uses the Arabic *jismīyah,* which is derived from *jism,* which is his standard term for the *physical* (or, perhaps, *composite*) body found in the sublunar realm; however, here he uses *jirmīyah,* derived from *jirm,* which is his preferred term for a *celestial* (or, perhaps, *simple*) body. His use of this different term is perhaps to note the fact that some of the celestial bodies, such as the outermost celestial sphere, are incapable of undergoing anything put positional (as opposed to local) motion. To mark the difference, I have used the admittedly artificial distinction between corporeality (*jismīyah*) and corporeity (*jirmīyah*).

<الفصل الثاني عشر>

في إثبات أن لكل جسم طبيعي مبدأ حركة وضعيةٍ أو مكانية

(١) نقول إنَّ كل جســم لا يخلو إمّا أنْ يكون قابلاً للنقل عن موضعه الذي هو فيه بالقَسْر، أو غير قابلٍ، فإنْ كان قابلاً للنقل عن موضعه الذي هو فيه؛ فإمّا أنْ يكون له في جوهره مَيْلٌ إلى حيّزٍ، أو لا يكون له مَيْلٌ إليه البتة. لكن كل جسمٍ فله مكانٌ طبيعي، أو حيّز طبيعي تقتضي طبيعته الكوْن فيه، وإنّما خالف سائر الأجسامٍ في ذلك لا بجسميته، بل لأنَّ فيه مبدأ وقوة معدّة نحو ذلك المكان. فإذا كانت تلك القوة مقتضية لذلك المكان، وجرميتــه غير ممتنعة – بما هي جرمية – عن الانتقال والحركة، فلا مضادة فيه لقوته ولا لمقتضى قوته، تقتضي حيّزاً آخر. لأنّه لا يجوز أنْ يكون في جسمٍ واحدٍ، غير مختلف الأجزاء، قوتان تتضادّان أو تقتضيان فعلين متمانعين، إذ القوى كونها قوى بحسب فعلها، وإذا تمانعت أفعالها تمانعت طبائعها، فاستحالت أن تكون معاً لجسم فإنَّ الجسم الذي فيه

natures are mutually exclusive, and so it is impossible that they simultaneously belong to some body. So the body in which there is a given power is that in which there is a principle of a certain action that proceeds inevitably, if there is no impediment. If the body is such that that action does not proceed from it (even if there is no external impediment), then that power is not in it. So, when there are two contrary powers in it, two contrary actions would, in fact, proceed, which is absurd. So, then, it is absurd that, in a simple, isolated body or in a dominant body of some compound, there should be two powers, one requiring a given place and the other impeding [the body] from it. Again, then, from what motion requires, the body is something able to move. So, when the body is forcibly removed from its natural place, it necessarily follows that it undergoes motion [back] toward its natural place once the external agent acting by force is removed. Something else that proves this is that any body in which there is no principle of inclination would undergo locomotion from a given *where* or position that it has instantaneously, which is absurd. The simple fact is that every body must be susceptible to the production of motion and a new inclination, and so there is a natural principle of inclination in it with respect to the very thing to which it is susceptible, whether a certain *where* or a position.

(2) Let us first single out for discussion the production of motion with respect to place as a way of making clear what is intended by what is most obvious, even if the explanation of motion with respect to place and position are doctrinally the same. We say that bodies found possessing inclination are like heavy and light: the heavy is what inclines downward, while the light inclines upward. Whenever there is an increase

قوة ما هو الذي فيه مبدأ فعلٍ ما ، يصدر لا محالة ، إنْ لم يكن عائق ، وإنْ لم يكون الجسم بحيث يصدر عنه ذلك الفعل – إنْ لم يمنع مانعٌ من خارج – فليس فيه تلك القوة. فإذا كانت فيه قوتان متضادّتان صحّ صدور فعلين متضادّين ، وهذا محال. فإذن من المحال أنْ يكون في جسم بسيطٍ مفرد ، أو في غالب جسم مركّب ، قوتان واحدة تقتضي مكاناً ، والأخرى تمنع عنه. ثم الجسم قابل للحركة – من مقتضى الحركة – فيلزم أنَّ الجسم إذا قسر على مفارقة مكانه الطبيعي أنْ يتحرك إلى مكانه الطبيعي ، عندما يفارق القاسر من خارج. وممّا يُبيِّن هذا أيضاً أنَّ كل جسم ليس فيه مبدأ مَيْلٍ ما ، فإن نقله عما هو عليه من أيْنٍ أو وضْعٍ يقع لا في زمان ، وذلك محال ، بل يجب أن يكون كل جسم يقبل تحريكاً وإمالة طارئة ، ففيه مبدأ مَيْلٍ طبيعي في نفس ما يقبله ، كان أيْناً أو وضعاً .

(٢) ولنعيّن الكلام أولاً في التحريك المكاني على سبيل إيضاح المقصود فيما هو أظهر ، وإنْ كان المكاني والوضعي في مذهب البيان واحداً ، فنقول إنَّ الأجسام الموجودة ذوات المَيْل ، كالثقيلة والخفيفة. أمّا الثقيلة فما تميل إلى أسفل ، وأمّا الخفيفة فما تميل إلى فوق ، فإنّها كلّما ازدادت ميلاً كان قبولها للتحريك النقلي أبطأ ، فإنَّ نقل الحجر العظيم

in their inclination, their ability to produce locomotion is slower. So [for example] displacing a large, heavy stone is not like displacing a small, little one, and pushing a little air [such as a partially inflated bladder] under water is not like pushing a lot of air [such as a fully inflated bladder]. When small bodies are overwhelmed—for example, when a single mustard seed, a piece of straw, or a splinter of wood is thrown and does not pass through the air the way that the heavy body does—the reason for it is not that the heavier thing is more susceptible to being thrown and dragged. On the contrary, it is because some of these, owing to their smallness, do not receive from what propels them a power that can move both them and what is adjacent to them sufficiently to make them[2] capable of cutting the air. Moreover, the quick depletion [of that power] is due to the cause (which will be introduced in its proper place)[3] that depletes the acquired, accidental, and motive powers. For example, a single spark would be extinguished by the cause that depletes an acquired heat before a large fire would be so depleted. Also, some rarefied things are not able to pass through the air, but, instead, the air through which they pass interpenetrates them and is a cause for the depletion of their acquired power. You will learn that whatever opposes what passes through it is the thing that depletes the power of the motion.[4] This is like rarefied fire and water, for they are more susceptible to alteration. Now, if largeness and increased weight were the reason for the projectile's [capacity] to

2. Literally, "to have an effect on their strength," reading *shiddah* (strength) with **Z** and **T** for **Y**'s (inadvertent) *ḍiddah* (contrary?).

3. Although Avicenna had a somewhat detailed discussion of the causes that affect the speed of a mobile at 2.8.11–12, to which he appeals later in the same chapter to explain how an impressed power might be depleted, here he is clearly using the future tense, and so it would seem that he is referring to some future discussion. The reference may simply be to his passing remarks at 4.14.2.

4. Ibid.

الشديد الثقل أو جرّه، ليس كثقل الحجر الصغير القليل الثقل وجرّه، وزج الهواء القليل في الماء ليس كزجّ الهواء الكثير. وأمّا ما يعتري الأجسام الصغيرة، مثل الخردلة ومثل التبنة ونحاتة الخشب، من أنها لا تنفذ عند الرمي في الهواء نفوذ الثقيل، فليس السبب فيه أنَّ الأثقل أقبل للرمي والجرّ، بل لأنّ بعض هذه لصغرها لا تقبل من الدافع قوة محرّكة لها ولما يليها، تبلغ من شدّتها أنها تقدر بها على خرق الهواء، ومع ذلك فيكون سريع الاستحالة إلى البطلان من السبب الذي يُعرف في موضعه؛ وهو السبب الذي يبطل القوى المستفادة العرضية والقوى المحرّكة، كما أنَّ الشررة تطفأ قبل النار الكثيرة، من السبب الذي يبطل الحرارة المستفادة. وبعضها يكون متخلخلاً لا يقدر على خرق الهواء، بل يداخله الهواء الذي ينفذ فيه، ويكون سبباً لإبطال قوته المستفادة. فإنك ستعلم أنَّ مقاومة المنفوذ فيه هو المبطل لقوة الحركة، وهذا كالنار المتخلْخلة والماء المتخلْخل، فإنّه أقبل للاستحالة. ولو كان السبب في قبول الرمي الأبعد هو الكِبر وزيادة الثقل، لكان كلما ازداد المرميّ ثقلاً وكبراً،

be thrown farther, then whenever the projectile's size and weight were increased, it would be [capable of being] thrown even farther, which is contrary to fact. Instead, when only heavy and light, but no other causes, are considered, then the ability to move the smaller magnitude is greater, and there is a faster motion. So the ratio of the distances and times covered by things undergoing motion—both those moved by force and those having a natural inclination—is proportional to the relation between one inclination and another, except that the periods of time are inversely proportional to the distances. In the case of distances, the more intense the inclination, the greater the distance covered, whereas, in the case of time, the greater the inclination, the shorter the time. Now, if there is absolutely no inclination, and [if] the forcibly moved object is moved for a period of time, and [if] that period of time is proportional to a given time of a motion possessing a forced inclination—in which case it is proportional to a given ratio of one inclination (should it exist) to an inclination possessing the inclination of the forcibly moved object—then what has absolutely no inclination in it would be just as susceptible to the force as what does have a given inclination (should it exist). In that case, however, what has no impediment would be proportional to what does have some impediment (were it to exist), thus resulting in a contradiction exactly like the one we addressed in the case of the void, and for the very same reason.[5]

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5. See 2.8.11–13. Roughly the same argument as appears here is also found in a slightly more developed form in *al-Ishārāt wa-l-tanbīhāt,* ed. Forget (Leiden, 1892), 109–110). "Indication: the body in which there is neither a potential nor actual inclination is not susceptible [110] to a forcible inclination by which it is moved, and, in general, it will not be forcibly moved. If this were not the case, then let x be forcibly moved in a given time [t_1] [and along] a given distance [d_1] and let y, for example, in which there is a given inclination and resistance [i_1], be moved. Clearly, then, y will be moved [d_1] in a longer time. Now, let z [have] an inclination [i_2] weaker than that inclination [i_1] which, as a result of the same mover, covers a [greater] distance [d_2] in the same time [t_1], whose ratio to the first distance [d_1] is the ratio of the time as the one possessing the first inclination [t_2] and the time of the one lacking the inclination [t_1] such that it is forcibly moved the same distance in the same time of the one lacking the inclination. Thus, there will be two forced motions [x and z], z having a resistance in it and x not having a resistance in it, that are of comparable states with respect to speed, which is absurd. Note: You must note here that there is not some indivisible time [i.e., 0 amount of time] such that, during, it a certain motion having no inclination might occur and would have no ratio to a given time of a motion possessing an inclination."

كان أقبل للرمي، والأمر بخلاف ذلك، بل إذا اعتُبر الثقل والخفّة ولم تعتبر أسبابٌ أخرى، كان الأقل مقداراً أقبل للتحريك القسري وأسرع حركة. فتكون نسبة مسافات المتحركات بالقَسْر ولها مَيْل طبيعي ونسبة أزمنتها على نسب المَيْل إلى المَيْل، لكن النسبة في المسافات بعكس النسبة في الأزمنة. أمّا في المسافات، فيكون الأشد ميلاً أطول مسافة، وأمّا في الزمان فيكون ذلك أقصر زماناً. وأمّا إذا لم يكن مَيْلٌ أصلاً، وتحرّك المقسور في زمان، ولذلك الزمان نسبة إلى زمان حركة ذي الميل بالقَسْر، ويكون على نسبة، لو وجد، إلى ميل ذي الميل المتحرّك بالقَسْر، فيكون قبول ما لا مَيْل فيه أصلاً للقَسْر، كقبول ذي مَيْلٍ مّا لو وجد، فيكون الذي لا مانع له، على نسبة ذي مانعٍ مّا لو وجد. ويعرض مثل ما قلنا في باب الخلاء من الخُلْف، وعلى ذلك الوجه بعينه.

(3) Something that proves that is that the influence upon what undergoes forced rectilinear or circular motion varies, being stronger and weaker. When that [influence] varies, the strong one is obviously obeyed, while the weak one hinders. Now, the hindering factors do not belong to the body *qua* body, but through something in it that seeks to maintain its state of place and position, where this is the principle that we are explaining. So, in every body undergoing forced locomotion, there is a principle of a particular inclination. It has already been proved in the case of locomotion with respect to place. In the case of forced locomotion with respect to position, if that body is able to undergo local motion from its place, then [the need for a principle of inclination] is obvious as well. If it is not able, then it certainly has some power by which it stays fixed in its place, which necessarily follows upon it, and is specific to it, and is not [due to] its corporeality.

(4) So we say that there is also a principle of motion in this body, which is evident when it is considered next to what was learned about the body that is able to move locally from its location. That is because [the body that moves with respect to position] has a certain numerically [distinct] position either in that which surrounds it or around that which it contains, whether in *that* or around *this*. So it has that, either from some cause in itself and from its natural form, or from some cause outside of the nature. It is absurd that it itself should require that. Indeed, none of the parts that are posited in it, and its various directions, and

(٣) وممّا يبيّن ذلك، أنَّ المقســور على الحركة المستقيمة أو المستديرة، يختلف عليه تأثير الأقوى والأضعف. وإذا اختلف ذلك، فظاهرٌ أنَّ القوي مطاوعٌ والضعيف مُعاوقٌ، وليســت المعاوقات للجســم - بما هو جسم - بل بمعنىً فيه يطلب البقاء على حاله من المكان والوضع، وهذا هو المبدأ الذي نحن في بيانه. فكل جسم منتقلٍ بالقَسْر ففيه مبدأ ميلٍ ما. أما الانتقال المكاني فقد بيّناه، وأمّا الانتقال القسري الوضعي ‹فإنَّ› ذلك الجسم، إنْ كان قابلاً للنقل عن مكانه فقد ظهر، وإنْ كان غير قابلٍ، فله لا محالة قوة بها يثبت في مكانه، وتلزمه وتختص به، وهي غير جسميته.

(٤) فنقول إنَّ هذا الجسم فيه مبدأ حركة أيضاً، ويستبين إذا اعتبر قريباً ممّا اعتبر به أمر الجسم القابل للنقل عن موضعه. وذلك لأن له وضعاً ما بالعدد فيما يحويه، أو حول ما يشتمل هو عليه، أو في ذلك أو حول هذا. فلا يخلو إمّا أنْ يكون له ذلك عن علّةٍ في ذاته وعــن صورته الطبيعية، أو عن علّةٍ خارجةٍ عن الطبيعة. ومحال أنْ تقتضي ذلك ذاته، فإنَّ الأجزاء التي تفرض فيه، والجهات المختلفة التي تكون له، والأجزاء التي تفرض فيما

the parts that are posited in that with which it is in contact, are any more suited—I mean that some part of it is in a given direction—to being contiguous with any given particular part, since the whole does not vary. So the nature of the body does not require the same position, since there is nothing that some of the homoeomerous parts deserve by their nature that the other homoeomerous parts do not equally deserve; rather, all of that might belong to every one of [those parts]. This is not like what belongs to the parts of bodies that are able to be separated [from a given place], for we find that every posited part in [a body that can be so separated] can be specified by something proper to it. [That] is either because the existence of [the part] first occurs *there;* or because it is the nearest of the locations to the one at which it existed; or [because] it underwent locomotion to it, departing from its natural space. Having some existence at which it first is or undergoing forced local motion to it is not specific to every part inasmuch as it is in it, either by the nature considered alone or by force, but owing to the nature joined with some specifying feature.[6] As for that which is unable to depart from its place, neither does this status hold for it nor can this interpretation be brought in line with it, <because it can be said that this part of earth, as a result of its being an individual, required that it be in this place, since this part actually exists in [this place], whereas this status does not apply to the body in which there are no actual parts.>[7] When that is the

6. Avicenna's point is that when the parts of, for example, earth undergo local motion, such that one part of earth leaves behind some other parts, that departing part comes to have some specifying feature, which is a result of the local motion, by which it can be distinguished from some other part of earth. Such specifying factors, as Avicenna notes, are like the following: the earth, which was *here,* for example, in my compost heap, is now *there,* for example in my garden; or the water that is in a certain cloud was high in the sky but now lower and so closer to the region of water; or this clod of earth is different from that one thrown in the air since that one is not in its natural location. In contrast, when there is only positional motion, the parts retain their same relative positions vis-à-vis one another, and so there is no specifying factor that results from the positional motion by which one part can be distinguished from another.

7. *Because it can be said . . . no actual parts:* This clause, which occurs in **Y**'s text, is absent in **Z**'s text and appears as an addition to **T** in the margins.

يماسّه، ليس شيء منها أولى بشيء منها ؛ أعني أنّه ليس جزء يكون منه في جهة ؛ أولى بمماسّة جزء بعينه، إذ الجميع غير مختلف. فطبيعة الجسم ليس تقتضي الوضع بعينه، إذْ المتشابهات لا يستحق بعضها بطبعه شيئاً من المتشابهات بعينه دون بعض، بل يكون جميع ذلك جائزاً لكل واحدٍ منها . وليس هذا كما يكون لأجزاء الأجسام القابلة للتفرّق، فإنَّ كل جزء يفرض نجده متخصصاً بما تخصّص به، لأنَّ أول وجوده وقع هناك، أو لأنّه أقرب المواضع من موضع وجد فيه أو نقل إليه خارجاً عن حيّزه الطبيعي، أمّا لوجودٍ يكون الأول فيه، أو لوقوعٍ الانتقال بقاسرٍ إليه فيكون اختصاص كل جزء بما هو فيه، لا بالطبع المجرّد ولا بالقَسْر، بل للطبع المقترن بمعنى مخصّص. وأمّا الذي لا يقبل مفارقة مكانه، فليس حكمه هذا الحكم، ولا يجري عليه هذا التأويل، لأنه يمكن أنْ يقال إنَّ هذا الجزء من الأرض اقتضى بشخصيته أنْ يكون في هذا المكان، إذ هذا الجزء موجود فيه بالفعل، وأمّا في الجسم الذي لا جزء فيه بالفعل فلا يستمر هذا الحكم فيه. فإذا كان كذلك، لا

case, none of the parts of that body can be specified by something proper to it, whether by the nature taken alone or the nature joined to some state involving force that some cause necessitates. Now, were there some impure mixture of a cause acting by force and what is required from its nature [such that there results] something that is required by certain causes proper to the parts of the elements by their spaces, then, if there were not that cause [acting by force] or [if] it ceased, it would not be in the nature of [that part] that it be specified. So, in its nature—in every state and however you wanted to dispose of the divisions—[the part] might or might not have that [instance of] facing and being contiguous with [some given direction that it is in]. Also, in its nature, it is able to move with respect to position.[8] We have already explained, however, that, in everything that is able to move from a certain thing, whether a *where* or a position, there is a principle of motion and a natural inclination. So, in this body, there must be a principle of inclination with respect to position.

(5) Know that what is intended by the explanation and examination we have presented is this: Every body in which there appears the production of some inclination whose principle is not in it naturally, but proceeds either from some external cause or a conjoined soul (which produces motion according to some intention and brings about a certain inclination that was not in the body), undergoes motion as a result of that [principle] only when there is a prior inclination in [the body]. The discussion

8. Avicenna's point, which is admittedly convoluted, might more easily be explained with a simple example. Imagine that you are holding a perfectly homogeneous sphere or ball in front of you. There is nothing about the nature of that sphere that requires that the "part" facing you have that and only that position. That very part could have been pointing toward your feet, toward the ceiling, or away from you. Consequently, there is nothing about the nature of the sphere that requires that its "parts," never change their relative position. So, by its nature, the sphere is able to rotate while never leaving the place or space in which it is rotating so as to have undergone locomotion.

يكـون جزء من أجزاء ذلك الجسـم متخصّصاً بما تخصّص بـه بالطبع مفرداً ، ولا بالطبع مقارناً لحالة قسرية أوجبها سببٌ. ولو كان هناك شوْبٌ من سببٍ قاسرٍ ومقتضٍ من طبعه أمراً اقتضى أسـباب تخصّص أجزاء الأُسْطُقسْات باحيازها ، لكان في طبعه أنْ لا يكون متخصصاً به ، لو لم يكن ذلك السـبب أو زال. فيكون في طبعه على كل حال ، وكيف تصرّفت الأقسام ، جواز أنْ يكون على تلك المحاذاة والمماسّة وأنْ لا يكون ، ففي طبعه أنْ يقبـل نقلاً في الوضع. وقـد بيّنا أنَّ كل قابل نقل عن أمرٍ ما – أيْنٌ أو وضْعٌ – ففيه مبدأ حركةٍ ومَيْل طبيعي ، فيجب أيضاً أنْ يكون في هذا الجسم مبدأ مَيْل في الوضع.

(٥) واعلـم أنَّ المقصود فيما وضح بما شـرحناه من البيان والمكشـوف عنه ؛ هو أنَّ كل جسـم تطرأ عليه إمالة لم يكن مبدؤها فيه بالطبع ، بل تصدر عن سـببٍ خارج ، أو نفسٍ مواصلة تحرّك بحسـب القصد وتحدث ميلاً لم يكن في الجسـم ، فليس يصح أنْ يتحرك الجسم عن ذلك ، إلاّ وفيه ميل متقدم. فإنّ الكلام في التحريك المبتدأ ، الواقع بقصد

concerning the principle for the production of motion that occurs through the intention of the soul is just like the one concerning its inclination that occurs though some external cause. So [for example] you see that the animal soul produces various motions in [the body] owing to the body of [the animal], while the power is the same depending on [how] more and less heavy the inclination in the body is (where you find a certain resistance owing to the heavier [inclination]). So you find that the argument stands. Also concerning this, you should consult the discussions in the things that will follow[9] and so find in them what is more to your liking, if you desire more details.

(6) Having clearly explained that there is a principle of motion in every natural body, and that there is a principle of circular, positional motion in the body that does not depart from its natural place, we say: It is impossible that, in a single body, there should be a principle of rectilinear motion and a principle of circular motion such that, when it is in its natural location, it is moved with respect to position, whereas when it is somewhere other than its natural place, it is moved toward [its natural place], whether or not there is in it a principle of inclination to move circularly.[10] If it does not [have an inclination for circular motion while it is away from its natural place], and then it comes to be in its natural place, and [yet] this inclination is not produced, then it would necessarily follow that there is no principle of circular motion in it, whether it is in or out of its place. If this inclination is produced in it, then this inclination is not something innate to it, following upon its

9. The phrase "the things that will follow" translates the Arabic *al-lawāḥiq,* which can also be translated *Supplements* or *Appendices* and so could refer to Avicenna's *al-Lawāḥiq*, an apparently lost commentary on the *Shifāʾ* written by Avicenna himself, which he conceived while writing the *Shifāʾ*. While I can find no convincing arguments one way or the other as to whether the reference in the present context is to that work, the issue of how the body effects the actions produced by the soul is taken up throughout Avicenna's *Kitāb al-nafs,* the psychological section of the *Shifāʾ* (e.g., 2.3, where he speaks of tactile sensation). For discussions of Avicenna's *al-Lawāḥiq,* see Dimitri Gutas, *Avicenna and the Aristotelian Tradition* (Leiden: E. J. Brill, 1988),140–44; and David C. Reisman, *The Making of the Avicennan Tradition* (Leiden: E. J. Brill, 2002), 247.

10. The position may be that of John Philoponus as found in his *Contra Aristotelem;* see, for instance, *Against Aristotle, on the Eternity of the World,* trans. Christian Wildberg (Ithaca, NY: Cornell University Press, 1987), frag. 12*.

النفس، كالكلام في ميله الواقع بسببٍ من خارج. فإنك ترى نفس الحيوان يختلف تحريكه لبدنه، والقوة واحدة بحسب ما في بدنه من الميل الثقيل، الزائد والناقص، وتجد للزائد مقاومة ما، فنجد الكلام قائماً، ثم في هذا مباحث يجب أنْ ترجع فيها إلى اللواحق، فتجد ما يقنعك فيها، إنْ كنت في الإسهاب أرغب.

(٦) فقد بانَ واتضح أنَّ كل جسم طبيعي ففيه مبدأ حركة، وأنَّ الجسم الذي لا يفارق مكانه الطبيعي ففيه مبدأ حركة وضعية مستديرة؛ فنقول إنّه لا يجوز أنْ يكون في جسمٍ واحدٍ مبدأ حركة مستقيمة ومبدأ حركة مستديرة، حتى يكون - إذا كان في موضعه الطبيعي - تحرّك في الوضْع، وإذا كان في غير مكانه الطبيعي تحرّك إليه على الاستقامة، لأنه عندما يتحرك إلى مكانه بعينه بالاستقامة لايخلو، إمّا أنْ يكون فيه مبدأ مَيْلٍ إلى حركةٍ مستديرة أو لا يكون، فإنْ لم يكن، فإذن حصل في مكانه الطبيعي ولم يحدث هذا الميل، وجب من ذلك أنْ لا يكون فيه مبدأ حركة مستديرة، لا في مكانه ولا

substance, but something it comes to have in its natural place, the cause of which is nothing but its being contiguous with its natural place according to a certain position, or its occurring in a natural space according to a certain position. That [instance of] being contiguous with as well as that of occurring, [at the natural place] does not require that there be some inclination from one state to a like state; but neither do [these instances] require some flight from itself to something like itself. So what necessitates[11] this inclination is not [the body's] arriving at the space. Regardless of whether you take the necessitation to be by means of some nature or not, when [the nature's] body is present in some natural space, this inclination, in that case, proceeds from [the nature]; for the point of investigation and the account concerning the whole of that is the same. Likewise, you cannot say that the soul that produces motion obtains there, in the production of the motion and inclination, some principle after not having it, because the intention and act of volition occur after not having occurred, since this has already been denied. It is clearly impossible that something like it occurs, unless there is some principle of inclination in the nature. So that inclination must be necessary even if it is from the soul, in which case its being necessary would be from a perpetual natural act of volition as long as that body exists. Accordingly, the state of what moves rectilinearly is necessarily not such that it sometimes undergoes motion and sometimes rests such that it is moved into some place different from its place and rests in its place, where both belong to it naturally. So, likewise, perhaps this body can

11. Reading *mūjib* with **Z** and **T** for **Y**'s *yūjibu*, whose sense would be "that inclination does necessitate [the body's] arriving at the space."

خارجاً عن مكانه. وإنْ حدث فيه هذا الميل، كان هذا الميل ليس غريزياً تابعاً لجوهره، بل أمراً يحدث له في مكانه الطبيعي، ولا تكون العلّة فيه إلاّ مماسّته لمكانه الطبيعي على وضْعٍ مّا، أو حصوله في حيّزٍ طبيعي على وضعٍ مّا، وتلك المماسّة وذلك الحصول لا يوجبً ميلاً عن حالٍ إلى مثلها، بل لا يوجب هرباً عن ذاته إلى مثل ذاته. فليس إذن موجب ذلك الميل موافاة الحيّز، سواء أخذتَ الإيجاب إيجاباً بتوسط طبيعة، أو أخذته إيجاباً بلا توسّط طبيعة، إذا حصل جسمها في حيّزٍ طبيعي، صدر عنها حينئذ هذا الميل، فإنَّ البحث في ذلك كله واحدٌ والكلام واحد. ولا أيضاً لك أنْ تقول: إنَّ النفس المحرّكة تأخذ هناك في التحريك والإمالة أخذاً مبتدأ بعد ما لم يكن، لحدوث القصد والإرادة، بعد ما لم تكن، فقد مُنع هذا أيضاً. وبيّنٌ أنّه غير ممكن أنْ يقع مثله؛ إلاّ وهناك مبدأ مَيْلٍ في الطبع، فيجب أنْ يكون ذلك الميل لازماً، وإنْ كان عن نفسٍ فيكون لزومه عن إرادةٍ طبيعيةٍ دائمة، ما دام ذلك الجسم موجوداً. ولا يلزم – على هذا – حال المستقيم من أنّه تارة يتحرك وتارة يسكن، يتحرك في غير مكانه، ويسكن في مكانه، وكلاهما طبيعي له. فكذلك

move rectilinearly into some place other than its [own] while moving circularly in its place, where both would be natural with respect to the two states. This, however, is not necessary precisely because rectilinear motion is not absolutely natural, as we have explained it;[12] rather, the natural is the *where* that the thing's nature requires when there is no impediment. So, when it departs, this nature requires the return to [its natural place] and to some particular location of it, where the principle of the two is one and the same.

(7) As for circular motion, the principle that we established is [such] that it naturally requires [the circular motion], always and however it might be, if [the circular motion] is absolutely natural. If it is not absolutely natural, but is like the rectilinear [motion] that the nature requires when there is a certain accidental factor, which would be the loss of the natural position, then it must stop whenever it is found. [In this case,] some given particular position would be natural, but the situation is not like that. [That is] because it is not the case that, just as a certain *where* is more suited to the body than another, so, likewise, from the position [the body] has with respect to the *where* (which is like [any other *where*]), one position would be more suited to it than another. Clearly, then, this inclination does not come to be upon reaching the natural place; rather, if there is [this inclination], it is according to the other sort—namely, that it is always, together with [the body]. So, when there is some principle of rectilinear motion in the body, it must be possible for this body to depart

12. See 4.10.3.

ربّما جاز أنْ يكون هذا الجسم تستقيم حركته في غير مكانه، وتستدير حركته في مكانه، ويكونان كلاهما طبيعيين في اختلاف الحالين، وإنّما لا يلزم هذا؛ لأنَّ الحركة المستقيمة ليست طبيعية على الإطلاق على ما شرحناه، بل الطبيعي هو الأين الذي تقتضيه طبيعة الشيء، إذا لم يكن عائق، فإذا فارق اقتضت هذه الطبيعة الردّ إليه، وإلى موضعٍ معيّنٍ منه، ويكون المبدأ فيهما واحداً.

(٧) وأمّا الحركة المستديرة فإنّ المبدأ الذي أثبتنا أنّه يوجبها بالطبع، يوجبها كيف كان ودائماً، إنْ كانت طبيعية على الإطلاق، وإن كانت ليست بطبيعية مطلقة، بل هي كالمستقيمة التي تقتضيها الطبيعة عند عارض؛ كان ذلك عند فقدان الوضع الطبيعي، فيجب أنْ يقف عند وجدانه، وكان يجب أنْ يكون الطبيعي هو وضْعٌ ما بعينه، إلاّ أنّه ليس كذلك. فإنّه ليس كما أنَّ أيْناً أولى بالجسم من أينٍ، فكذلك من الوضع الذي له في الأين المتشابه، وضْعٌ أولى به من وضْع. فبيّنٌ أنَّ هذا المَيْل لا يكون حادثاً عند الوصول إلى المكان الطبيعي، بل إنْ كان فيكون على القسم الآخر، وهو أنّه يكون معه دائماً، فإذا كان في الجسم مبدأ حركة مستقيمة، وجب أنْ تجوز مفارقة هذا الجسم لمكانه الطبيعي،

from its natural place in order to undergo rectilinear motion from the unnatural [place back] toward [its natural place]. Now, when a single, simple body is in some place other than its natural one, there must be two inclinations in it: an inclination to [move] rectilinearly, and an inclination from it to [move] circularly. In that case, there would simultaneously exist, in one and the same substance, opposing things. They, however, are not analogous to the opposing things that undergo mixing such that there is a mean among them, for means are like a certain mix of two extremes. Now, powers undergo mixture so as to produce a mean only when each one of them is such that it can to a greater or lesser [extent] be turned toward the other direction. The result, then, is not two powers, but there is one power that is weaker and less intense than the two extremes. Being rectilinear and circular, however, are not susceptible to increase and decrease such that the rectilinear quality of [the body] would gradually become circular, or, being circular, become rectilinear, and, during the time of that becoming and existing in the intermediary state be something neither rectilinear nor curved. The fact is that, if what is rectilinear can quit being rectilinear and [can] itself become something circular, it would quit being rectilinear and embrace the quality of circularity all at once, without it being said that it had quit being rectilinear and, voilà!, had gradually become circular, being a little too zealous!—or, likewise, it quit being circular to be rectilinear.

حتى يتحرك عن غير الطبيعي إليه بالاستقامة. وأن يكون في جسم واحدٍ بسيطٍ، إذا كان في غير مكانه الطبيعي، مَيْلان مَيْلٌ إلى الاستقامة، ومَيْلٌ عنه إلى الاستدارة فيكون في جوهرٍ واحدٍ أمور متقابلة موجودة معاً، وليست مما يجري مجرى متقابلاتٍ تمتزج حتى يكون بينها وسطٌ، فإنَّ الوسائط أُمور كأنها مَزْج من الطرفين. وإنّما تمتزج القوى امتزاجاً يؤدي إلى الوسط، إذا كان من شأن كل واحد منها أنْ يقبل الأقل والأكثر قبولاً، يصرف إلى الجهة الأخرى، فيكون الحاصل ليس قوتين، بل قوة واحدة هي أضعف وأنقص من الطرفين. ولكن الاستقامة والاستدارة لا يقبلان الاشتداد والتنقص، بأن تأخذ الاستقامة قليلاً قليلاً إلى الاستدارة، أو الاستدارة إلى الاستقامة، وهو في زمان ذلك الأخذ والوجود في التوسّط لا في مستقيمٍ ولا في مُنْحنٍ. بل المستقيم إنْ أمكنه أنْ يفارق الاستقامة، ويصير بعينه مستديراً، كانت مفارقته الاستقامة دفعة، ومواصلته الاستدارة دفعة، من غير أنْ يقال قد فارق الاستقامة وهو ذا قد استدار قليلاً وهو يمعن فيه، أو فارق الاستدارة إلى الاستقامة كذلك.

(8) The curve found in the arcs [of a circle] does not provide a pathway from being rectilinear to being circular, nor does being circular produce one of them. So, when neither being rectilinear nor being circular is able to become more or less so, then, likewise, neither are the two powers over them so susceptible. So no power is produced that is an intermediate between what is rectilinear and what is circular, and neither is this collection by way of being a mixture. So, obviously, in one and the same body, there is not simultaneously a principle of rectilinear motion and a principle of circular motion. From this and what went before, it comes together that, in the body that delimits directions, there is a principle of circular motion but no principle of rectilinear motion. [That] is because these two principles are not joined together, and [additionally] because it has been proven about that body that neither in its entirety nor in its parts can it turn out to depart from its natural location, whereas, among the bodies situated in it, there are principles of rectilinear motion away from it and toward it. So, inasmuch as there is some direction in nature, there are three kinds of motions: one is around the middle, another is away from the middle, and the third is toward the middle, <whereas, when you take into account the directions by supposition and convention, the motions exceed this number, but they are not natural.>[13] Having completed the explanation of natural motion, it is fitting that we investigate non-natural motion.

13. This sentence has apparently been transposed and made the last sentence of the chapter, but its placement seems more natural here.

(٨) وأمّا الانحناء الموجود في القطوع، فليس سبيلاً من الاستقامة إلى الاستدارة، ولا استدارة تؤدي إلى أحدهما . فإذا كانت الاستقامة والاستدارة لا تقبلان الأشد والأضعف؛ فكذلك لا تقبلهما القوتان عليهما ، فلا تحدث قوة متوسطة بين المستقيم وبين المستدير ، ولا يكون أيضاً هذا الاجتماع على سبيل الامتزاج. فيظهر أنه لا يكون في جسم واحدٍ مبدأ حركة مستقيمة ، ومبدأ حركة مستديرة معاً . ويجتمع من هذا وممّا قبله أنَّ الجسم المحدّد للجهات فيه مبدأ حركة مستديرة وليس فيه مبدأ حركة مستقيمة؛ لأنَّ هذين المبدأين لا يجتمعان ، ولأنَّ ذلك الجسم قد بانَ من أمره أنّه لا يصح على كلّيته ، ولا على أجزائه ، مفارقة موضعه الطبيعي . وأما الأجسام الموضوعة فيه؛ ففيها مباديء حركات مستقيمة عنه وإليه ، فتكون – حيث تكون جهة في الطبع – ثلاثة أصناف من الحركات؛ واحدة حول ‹ا› وسط ، وأخرى عن الوسط ، وثالثة إلى الوسط . وإذ قد بالغنا في تعريف حال الحركة الطبيعية ، فحريّ بنا أنْ نحقّق حال الحركة غير الطبيعية ، وأما إذا اعتبرت الجهات بالفرض والوضع ، فتزيد الحركات على هذه العدة ، ولكن لا تكون طبيعية .

Chapter Thirteen

Accidental motion

(1) Some unnatural motion is said to be essential and some accidental. The accidental [motion] of something *x* does not involve *x* itself primarily departing from a *where,* position, quantity, or quality. Instead, *x* is connected with some other thing *y* so as to accompany it, such that, when *y* has some state to which [*x*] is related[1] that is replaced, the [motion] of *x* is accidental. As you have learned,[2] [accidental motion] occurs with respect to the *where* and position in two ways. On the one hand, what is said to undergo accidental motion may, in itself, be in some place or possess some position and be susceptible to motion, but it does not depart its place or position. Instead, it is that in which it inheres that departs its place, while that one accompanies it. So, owing to the motion of that in which it is, it necessarily comes to be in some [definite] position toward which one can point that is different from the one in which it was, or it has some other position relative to the directions. On the other hand, it might not be of the sort that has a *where* or position and can undergo motion.

(2) Examples of what accidentally happens to move from a certain *where* or position (that is, the sort that can undergo motion) are [the following]. [An example of motion] with respect to the *where* would be like that which is at rest in a box, maintaining its place, but the box is being carried along; [or], again, someone standing still aboard a ship while the ship is being carried along. [An example] concerning position is when our estimative faculty imagines a sphere within a sphere—the

1. Reading *yansibu* with **Z** and **T** for **Y**'s *fa-nasaba* (and so/then is related to it).
2. See 4.9.3.

<الفصل الثالث عشر>

في الحركة التي بالعرض

(١) نقــول إن الحركة غير الطبيعية منها ما يقال بالذات، ومنها ما يقال بالعرض. أمّا الذي بالعرض فهو أن يكون الشيء لم يلحقه في نفسه مفارقة أينٍ أُولى، أو وضعٍ أول، أو كيفٍ أو كم، بل هو مقارن لشيء آخر مقارنة لازمة، فإذا تبدل لذلك الشيء حالٌ ينسب إليــه كانت له بالعرض. أمّا فــي الأين والوضْع، فهو على وجهين على ما علمتَ؛ فإنّه إمّا أن يكون ما قيل إنّه متحركٌ بالعرض هو في نفسه في مكانٍ وذو وضْع وقابل للحركة، إلاّ أنّه لم يفارق مكانه أو وضعه، بل الشــيء الذي هــو محمول فيه قد فارق مكانه، وهذا ملازمٌ له. فيلزم أنْ يقع له - لأجل حركة ما هو فيه - حصولٌ في جهةٍ تقع إليها إشارة، غير الجهة التي كان يقع عليه الإشــارة، أو يقع له وضْعٌ آخر بالقياس إلى الجهات؛ وإمّا أنْ لا يكون من شأنه أنْ يكون له أينٌ ووضْعٌ، ولا من شأنه أنْ يتحرك.

(٢) مثــال الذي يعرض له ما يعرض للمنتقل من مفارقة أينٍ ووضْع، وهو من شــأنه أنْ يتحــرك؛ أمّا في الأين كالمنقول في الصندوق وهو ســاكنٌ فيه حافظٌ لمكانه، والقاعد في السفينة والسفينة تنقله. أمّا في الوضْع، فإنّا إذا توهمنا كرة في كرة، وقد ألصقت بها

one having been attached to the other by either rivets, glue, nature, or the like—and the outer sphere moves, such that the relation of its parts to the parts of that which surrounds it changes, such that it undergoes real motion with respect to position. The inner, attached sphere would, in fact, exactly follow [the outer sphere] in that every part of it is attached to some part whose relative position is changing. In that case, its relative position would be changing, albeit accidentally, since the relative position of the part of the inner sphere to what surrounds it is not changing in the way that the relative position of the parts of the surrounding sphere are changing in relation to the parts of its place. So, if the position is considered only relative to the parts of what surrounds that which is situated in it and what is surrounded by that which is situated around it—and, in general, to the parts of what is contiguous with that which has a position, whether being in contact with what surrounds (as in the case of the sphere within a sphere) or being in contact with what is surrounded (as in the case of the outermost celestial sphere relative to that which is inside it with which it is in contact)—then the inner sphere has not changed its position. If the position is not considered with respect to what is [immediately] contiguous, but, instead, with respect to the directions with which it is parallel and facing, then the inner one has essentially changed its position also. [That] is because the parts of [the inner sphere] did change with respect to the [directions] that they were facing when that which surrounds [those parts] changed. Indeed, it is fitting that the position it has by taking the whole into account does essentially change, whereas its position relative to what contains it does not change. Position is of two sorts: one position takes into account the whole, while the other takes into account a given thing.

بمسامير أو بغراء ، أو بالطبع ، أو بغير ذلك ، فحرّكت الكرة الخارجة حتى تغيّر نسبة أجزائها إلى أجزاء المحيط بها ، تغيّراً هو حقيقة الحركة في الوضْع ، فإنَّ الكرة الداخلة الملصقة بها قد تعرض لها متابعة في أنَّ كل جزء منها يلزم جزءًا ينتقل فينتقل ، ولكن بالعرض ، إذ لا تنتقل نسبة ما بين أجزاء الكرة الداخلة وأجزاء المحيط بها ؛ كما تنتقل نسبة أجزاء الكرة المحيطة مع أجزاء مكانها . فإنْ كان اعتبار الوضْع ، إنّما هو بحسب القياس إلى أجزاء المحيط الموضوع فيه والمحاط به الموضوع عليه ، وبالجملة إلى أجزاءٍ مّا تماسّ ذا الوضْع مماسّة محيط ، كما لكرةٍ في كرة ، أو مماسّة محاطٍ كما للفلك الأعلى بالقياس إلى ما يماسّه في داخله ، فلا تكون الكرة الداخلة قد تبدل وضعها – وإنْ كان الوضع ليس باعتبار المماسات ، بل باعتبار الموازيات والمحاذيات في الجهات – فتكون الداخلة قد تبدل أيضاً وضعها بالذات . فإنَّ الأجزاء منها قد استبدلت المحاذيات مع استبدال المحيط ذلك ، بل الأولى أنْ يكون قد تبدل الوضع الذي له بحسب الكل بالذات ، ولم يتبدل الوضع الذي له ، بالقياس إلى ما يحويه . والوضْع وضعان ، وضْعٌ بحسب الكل ، ووضْعٌ بحسب شيء .

(3) What we believe about the higher atmosphere's[3] moving together with the motion of the sphere of the Moon is of this sort, for that motion is not by force, as is supposed.[4] That is because, if there were this force, it would be the kind that moves the mobile owing to what it encounters and what pushes it. Now, when one sphere is around another and then is moved, but does not stick to any part of what is below it, but slides over a smooth surface,[5] not encountering any opposition in the direction of its motion such that something standing in its way must get pushed back, then nothing precludes the inner one from being at rest while the outer one undergoes motion around it, passing along its surface unobstructed. The cause of the former motion is that any part of the fire you posit can have some part of the celestial sphere assigned to it as the natural place toward which it moves naturally and at which it rests so as to be inseparable from it, [since] it is attached to it *naturally,* so that it must be inseparable from it (even though the attachment necessitated by glue or rivets is separable). So, when the place moves, there is, inseparably connected with it and naturally following it, that which has its natural place in it, holding on to what it encounters of it. So the motion of the higher atmosphere relative to the celestial sphere accidentally moves with respect to position. Now, if water, while it is in the air, were to attain the natural ordered position that we explained before[6] together with its attaining the natural position (I mean the natural surrounding surface) such that no shuffling about or inclination remains in it, nor

3. The Arabic *huwāʾ* is Avicenna's preferred term for the element air; however, it also can mean *atmosphere.* Since, strictly speaking, it would be the element fire that is in contact with the sphere of the Moon such as to move together with it (a point that Avicenna will specifically make shortly), as well as the fact that he uses the specific locution *al-jaww al-ʿālī* (higher atmosphere) later, *higher atmosphere* seems preferable to *higher air* as a translation here.

4. Aristotle's discussion in his *De caelo* 2.7 (esp. 289a19–28) of the celestial sphere's motion producing friction in the upper atmosphere at least suggests this position; also see *Meteorology* 1.3 (esp. 341a1–2). It is far from clear whether Aristotle in fact held this position, and I have not had the opportunity to check the Arabic commentary traditions surrounding the *De caleo* and *Meteorology* to see if this position was ascribed to him.

5. Literally, "something simple on an extended ground."

6. See 4.10.3.

(٣) ومن هذا القبيل ما نعتقده من حركة الهواء العالي مع حركة فلك القمر؛ فإنَّ تلك الحركة ليست كما يظنّ عن قَسْرٍ، وذلك لأنَّ هذا القَسْر إنْ كان، كان من جنس تحريك المتحرّك لما يلاقيه ويدفعه. وإذا كانت كرة على كرة، فإنها إذا تحركت ولم تتشبث بشيءٍ ممّا تحتها، بل زحفت على بسيطٍ غير مقاومٍ في جهة حركتها، حتى يلزم أنْ يندفع القائم في وجهها باندفاعها، فلا مانع من أنْ تسكن الداخلة منهما، وتتحرك الخارجة عليها؛ ماضية على سطحها من غير انغلاق. فالسبب إذن في تلك الحركة أنَّ كل جزء تفرضه من النار قد تعيّن له جزء من الفلك كالمكان، وهو بالطبع يتحرك إلى المكان الطبيعي له ويسكن عنده، لازماً إياه ملتصقاً به التصاقاً طبيعياً يوجب من لزومه إياه، وإنْ زال ما يوجبه الإلصاق بالغرى والمسامير. فإذا تحرّك المكان لزمه وتبعه ما هو بالطبع متمكنٌ فيه حافظٌ لما يلاقيه منه، فتكون حركة الجو العالي، بالقياس إلى الفلك، حركة بالعرض في الوضع. ولو كان الماء – وهو في الهواء – مصيباً للترتيب الطبيعي الذي بيّناه قبل، مع إصابته الموضع الطبيعي، أعني السطح المحيط الطبيعي، حتى لم يبق فيه ارجحنانٌ

were there any variation in the parts of the earth over which it exists, then [the water] would follow the motion of the air in whichever direction it was moved. As it is, though, water does not, for the most, part attain the natural place according to the way that is natural; but, instead, most of it is still teeming in the lowest region. Also, there is variation from below in some of its parts. So, when [water's motion] follows the motion belonging to air, its parts in the higher region follow it, but with a rippling effect, whereas the noted cause accidentally affects the [water] in the lower region, from which it happens to become, as it were, differentiated [into parts]. The higher atmosphere, however, attains the natural place in the natural way. So its being inseparable and attached are appropriate to it. In contrast, because of mountains and strong winds, the air happens to have something additional that requires a differentiation of it into its parts. This explains the case of accidental motion. From this, then, the calumny that some[7] raise comes crashing back down. They said: If the motion belonging to fire is forced but is an everlasting motion, then an everlasting force has existed; but this is at odds with what you believe.[8] If this [circular] motion is natural, but the body [undergoing] it has some other natural motion, like rising, then a simple body has two natural motions; but you have denied that.[9] This is just an instance of a mobile that, [although] it is the sort that can be moved essentially, it is [currently] undergoing accidental motion.

(4) An example of something undergoing accidental motion that is not the sort that can be moved [essentially] would be something conjoined [to a body] not as one body to another but as something or other existing in the body, whether a form in its material or an accident in the body. So, because of the body, [these forms or accidents] happen to

7. The reference seems to be to part of Philoponus's argument in book 1 of his *Contra Aristotelem*.

8. See, for example, 2.9.18, where the denial of an everlasting force is, at least, presupposed.

9. See 4.12.6.

ومَيْلٌ، ولا اختلف أجزاء ما يقوم عليه من الأرض، لكان يتبع حركة الهواء في أي الجهات تحرّك. لكـن الماء ليس مصيباً - في أكثر الأمر - المكان الطبيعي على الوجه الذي هو طبيعـي، بـل في أكثر الأمر به انضغاط بُعْدٍ إلى السُـفْل، واختلاف في بعض أجزائه من تحـت، فإذا تبع الحركة الهوائية، تبع‹ت› ها أجزاؤه العالية في كثير من الأمر على سـبيل التموّج؛ وأمّا السـافلة فيعرض لها السبب المقول، فيعرض من ذلك كالتميّز. والجو العالي يصيـب المكان الطبيعي على الوجـه الطبيعي، فيحق عليه لزومه والالتصاق به، على أنَّ الهواء قد عرض له أيضاً - بسبب الجبال والرياح - أمرٌ أوجب تميّزاً مّا في أجزائه؛ فهذا بيان حال الحركة بالعرض. ويسـقط من هذا تشـنيعٌ أورده بعضهم فقال: إنْ كانت الحركة التي للنار قَسْـرية، وهي حركة دائمة، فقد وجد قَسْـرٌ دائم، وهذا خلاف لرأيكم، وإنْ كانت هذه الحركة طبيعية، ولجسـمها حركة أخرى بالطبع كالسمو، فيكون لجسمٍ بسيطٍ حركتان طبيعيتان، وقد منعتم من ذلك - فهذا مثال ما يكون المتحرك بالعرض من شـأنه أنْ يتحرك بالذات.

(٤) وأمّا مثال المتحرّك بالعرض الذي ليس من شـأنه أنْ يتحرك، فهو أن يكون هذا المقارن ليست مقارنته مقارنة جسم لجسم، بل مقارنة شيءٍ من الأشياء الموجودة في الجسم صورة في هيولاه، أو عرضاً في الجسم؛ فتصير له - بسبب الجسم - جهة تختص بها

have a [general] direction that is specified by pointing toward the [body] itself. [These forms or accidents] also have certain [accidental] parts like the parts of the body that are specified in that they are adjacent to what is conjoined with the body to which the body [that they are in] is adjacent.[10] So they happen to have, as it were, a *where* and position on account of the body's *where* and position. So, when the body comes to have some other place, the direction that occurred by pointing changes; or, when it comes to have some other position, a state of some given part changes, since it happened to that thing like the parts. So it is said that it has moved with respect to either the *where* or the position.

(5) Now, if the soul is a certain form that resides in the matter of the body, then, when the body happens to undergo accidental motion, the soul accidentally follows. The same also holds for the rest of the changes that happen to that part alone in which the soul resides. If there is some part of the soul that is not conjoined with [the body] in the sense of being impressed into the body in which it is, then it does not undergo motion, not even accidentally. <Because of this, we judge that the human soul is not impressed into matter, since it is not changed by the changes that happen to the body, whereas, if it were impressed into it, it would be changed by the body's changing, as is known.>[11] It has been asked:[12] Why is it said of the soul that it accidentally undergoes motion

10. In other words, since, for example, my body has certain parts, the form of humanity in me or the accident of whiteness in me has certain accidental parts. Also, since part of me, namely, my feet, are next to the ground, while another part of me, namely my head, is in the air, the form of humanity in me or the accident of whiteness in me will accidentally be next to the ground or in the air.

11. This entire sentence does not appear in either **Z** or **T**, and only appears in two MSS consulted by **Y**, one dating from the fourteenth and the other from the fifteenth centuries, and so both are rather late.

12. While Aristotle briefly discusses accidental motion in *Physics* 8.4, nothing like the present question is raised there. It is possible that one of Aristotle's later commentators raised the issue, but I have not be able to find anything like the present question in the extant commentaries available in Arabic. The issue of the soul's accidental motion is also taken up in Aristotle's *De anima* 1.3; but neither he nor Themistius (whose paraphrase of *De anima* would be the most likely source) takes up the question of the soul's undergoing accidental alteration, which is the issue raised here.

الإشـــارة الواقعة إلى ذاته. وتصير له أجزاء كأجزاء الجسم تختص بأنْ تلي ما يليه الجسم من الأجسام المقارنة له، فتصير له كالأْين لأْين الجسم، وكالوضع لوضع الجسم. فإذا حصل للجســم مكانٌ آخر تبدلت الجهة المصابة بالإشــارة، أو إذا حصــل له وضعٌ آخر تبدلت حــال جزء مّا، إذ صار لذلك الأمر كالأجزاء، فقيل إنه قد انتقل في الأْين أو في الوضع.

(٥) وإن كانت النفس صورة قائمة في مادة البدن، فإذا عرض للبدن الحركة بالعرض لحقت النفس بالعرض، وكذلك سائر التغيّرات التي تعرض لذلك الجزء الذي تقوم فيه النفس وحــده، وإنْ كان من النفس ما ليس مقارنته بأنْ ينطبع في البدن الذي فيه، فإنّه لا يتحرك ولا بالعرض. فلهذا نحكم بأنَّ النفس الإنسانية غير منطبعةٍ في المادة، إذ لا تتغيّر بما يعرض للبدن من التغيّرات، ولو كانت منطبعة فيها لكانت تتغيّر بتغيّر البدن، كما علم. وقد سئل أنّه لِمَ كانت النفس يقال لها إنّها تتحرك بالعرض في الأْين، ولا يقال لها تســوّد بالعرض في

with respect to where, but it is not said of it that it accidentally becomes tanned during the body's becoming tanned? Our own response is to say that the fact of the matter requires that when the former turns out to apply to the soul accidentally, then the latter one does as well (or, to be more precise,[13] when the tanning is with respect to the primary organ itself, in which the soul is), even if one of them is brought about in the normal course of things. As it is, though, the locomotion of that in which there is the soul (should the soul be impressed [into matter]) appears more frequent than the appearance of its other alterations. That is because people take it as the norm that when the body leaves some target area that is being pointed toward, what accompanies it leaves as well, but another instance of pointing toward [the body] will pick it out [again] (even should it be an imperceptible feature of the body). When a tan comes to be in the body and remains in it, [people] are less inclined to notice its coming to be in something else [other than the body], and being joined with it, when that [other] thing is imperceptible. It is as if, on account of the idle prattle that they hold—namely, that everything needs to occupy space—they have decided that whatever exists (whether perceptible or imperceptible) needs to occur in some space, but that a tan needs only what receives it, not acknowledging the existence of anything toward which one cannot point. So this is the reason that the two scenarios are different in the mind of the masses; but, since the reason is not necessary, neither is what it requires.

13. Reading *wa-dhālika idhā* with **Z** (and in close parallel with **T**'s *fa-dhālika idhā*) for **Y**'s *dhāka idh* (this one since).

اســـوداد البدن؟ ونحن نجيب فنقول: إن التحقيق يوجب أنه إذا صحَّ إطلاق ذلك على النفس بالعرض، صحّ إطلاق هذا وذلك إذا كان السواد في العضو الأول الذي فيه النفس بعينـــه، وإن كان أحد الأمريـــن أوقع في العادة. ولكن ظهور ثُقْلة ما فيه النفس – إنْ كان منطبعة به – أكثر من ظهور سائر استحالاته، وذلك لأنَّ الناس يحكمون بأن الجسم إذا زال عن إصابة إشارة مّا، زال ما معه، فصار إليه إشارة أخرى تخصه، ولو كان الشيء غير محسوس الجسم. وأما السواد فإنّه إذا حصل في الجسم واستقر فيه، لم يلتفتوا إلى حصوله في شيء آخر ومقارنته له؛ إذا كان ذلك الشيء غير محسوس. كأنهم يوجبون الحصول في حيّزٍ لكل موجودٍ كان محسوساً أو غير محسوس، ولا يوجبون التسوّد إلاّ لقابله؛ لغلبة إيجاب التحيّز عندهم لكل شـــيء ما، لا يؤمنون بموجود لا إشارة إليه، فهذا هو السبب الذي اختلف به الأمران عند الجمهور، ولأنّه ســـبب غير واجب، فمقتضاه غير واجب.

(6) Since you have now learned the situation with respect to *where* and position, judge[14] the remaining categories in the same way. So something is, for instance, said to become black accidentally when it itself is not the subject of the blackness. Instead, [the subject] is some other body to which it is joined or mixed, whether it is some body in which it is an accident or some body that is in itself in the subject but is not being considered in itself—like when we say that the building has become black. [That] is because the primary[15] subject of blackening is not some substance accompanied by the structure. In fact, [the blackness] is accidental to the substance accompanied by the structure (if this substance is susceptible to blackening), but it might be said of the substance, even though it is not a primary subject of blackness. The fact is that [blackness's] primary subject is something in [the substance], but not like some part of it—namely, it is the surface. So it is believed that the primary subject of blackness is the surface, and [the blackness] belongs to the body on account of the surface. Since we have addressed motion that is accidental, let us discuss non-natural motion that is essential—namely, motion that is by force. We'll then follow that up with a note about spontaneous motion.

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14. Reading *uʿḥkum* with **Z** and **T** for **Y**'s *fa-mā ḥakama* (what was judged).
15. Reading *al-awwal* with **Z** and **T**, which **Y** (inadvertently) omits.

(٦) وإذ قد علمت الحال في الأين والوضْع، فاحكم بمثلها في سائر الأبواب؛ فإنّه يقال إنَّ الشيء مثلاً يسوّد بالعرض، إذا كان الموضوع للسواد ليس هو، بل جسمٌ آخر يقارنه أو يخالطه، أو جسمٌ هو عرض فيه، أو جسمٌ هو بعينه في الموضوع، وليس هو هو بعينه بالاعتبار. كقولنا إنَّ البناء قد اسوّد؛ فإن السواد ليس موضوعه الأول جوهراً مع البنائية، بل الجوهر مع البنائية عرض له، إن كان هذا الجوهر ‹هو› القابل للسواد. وقد يقال للجوهر، إذا كان ليس موضوعاً أولاً للأسود؛ بل موضوعه الأول شيء فيه لا كجزء منه وهو السطح، فإنَّ السواد يعتقد أنَّ موضوعه الأول هو السطح، ولأجل السطح يوجد للجسم. وإذ قلنا في الحركة التي بالعرض، فلنقل على الحركة غير الطبيعية التي بالذات، وهي الحركة التي بالقَسْر، ثم نقول في الحركة التي من تلقائها.

Chapter Fourteen

On forced motion and the mobile's spontaneous motion

(1) As for non-natural motion that nonetheless exists in the very thing described as [moving], there are those that are by force and those that are spontaneous. Let us begin by discussing those by force. We say that motion that is by force is that whose mover is external to what is being moved and is not something that its nature requires. This might either be something simply outside of the nature (as, for example, the motion produced in dragging a stone along the face of the Earth), or it might be contrary to that which is by nature such as, moving the stone upward or heating water. Motion also might be outside of nature with respect to quantity (as you have learned)[1] as, for example, the increase of size brought on by inflating or intentionally fattening something up, as well as the deterioration caused by sickness. As for the deterioration due to old age, in one way it is natural and in another not. It is natural relative to the nature of the universe for it is just part of the natural course of events of the universe and is necessary. It is not natural relative to the nature of that body, but is due to the weakening of that nature and its being ravaged. Also, it seems that the recovery that occurs on the critical day is a natural alteration, whereas that which is not in this way is by a non-natural alteration. Likewise, death owing to maturation is natural in one way, while [death] by disease and murder is not at all natural.

1. Cf. 4.9.4.

<الفصل الرابع عشر>

في الحركة القَسْرية وفي التي من تلقاء المتحرّك

(١) وأمّــا الحركة غير الطبيعيــة، ولكنها مع ذلك موجودة في ذات الموصوف بها؛ فمنها بالقَسْر ومنها ما يكون من تلقائه. ولنتكلم أولاً في التي بالقَسْر، فنقول إنَّ الحركة التي بالقَسْر، هي التي محركها خارج عن المتحرك بها وليس مقتضى طبعه. وهذا إمّا أنْ يكون خارجاً عن الطبع فقط، مثل تحريك الحجر جرّاً على وجه الأرض، وإمّا أنْ يكون مضادّاً للــذي بالطبع، كتحريك الحجر إلى فوق وكتســخين الماء. وقــد تكون حركات خارجة عن الطبع في الكم كما علمت؛ مثل زيادة العظم الكائن بالأورام، أو بالســمن المجتلب، والذبول الذي يكون بســبب الأمراض. وأمّا الذبول الذي للسّن فهو من جهة طبيعي، ومن جهةٍ ليس بطبيعي، فهو طبيعي بالقياس إلى طبيعة الكل، فإنه أمرٌ تجري عليه طبيعة الكل ويجب، وليس طبيعياً بالقياس إلى طبيعة ذلك البدن، بل هو لعجز تلك الطبيعة واستيلاء الغاصب عليها. ويشبه أنْ تكون الصحة التي بالبحران باستحالةٍ طبيعية، والتي تكون لا على تلك الجهة باستحالةٍ غير طبيعية، وكذلك الموت الأجلي طبيعي من وجه، والمرضي والقتلي غير طبيعي البتة.

(2) Forced motion with respect to place may be by either pushing or pulling, while carrying is more like accidental motion. Forced rotation is something composed of [both] pushing and pulling, while rolling sometimes results from two external causes and sometimes from a natural inclination together with a forced pushing or pulling. As for that which occurs when [the mover] becomes separated from the mobile—as, for example, the projectile or what is set rocking—the learned are divided into various schools of thought about it. Among them are those who think that [(1)] it is because the pushed air comes back around behind the projectile, at which [point] it comes together with a power that presses that which is in front of it forward.[2] There are others who say that [(2)] there is something pushing the air and the projectile simultaneously, but [that] the air is more susceptible to the pushing and so is pushed more quickly and thus pulls what is placed in it along with itself. Again, others think that [(3)] the cause of that is a power that the mobile acquires from the mover, remaining in it for a while until continuous collisions with that with which it comes into contact deplete [that power] and it becomes worn down.[3] So the more it becomes weakened by that, the greater the influence of the natural inclination and the collision is upon it, until the power becomes depleted; and then the projectile proceeds in the direction of its natural inclination.

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2. Aristotle at *Physics* 8.10.266b27–267a20, and again at *De caelo* 3.2.301b23–30, suggests that projectile motion involves the mover's imparting an initial motion to the projectile and the surrounding medium, such as the air. The initially moved air, a^1, in turn moves the projectile a bit, as well as putting into motion some air adjacent to it, a^2, after which a^2 then moves the projectile, as well as setting into motion some more air, a^3, and so on until some final amount of air, a^n, can no longer set both the projectile and some further air into motion, at which point the motion ceases. I have not been able to find in Aristotle's physical writings anything as elaborate as the two suggestions, mentioned here and in the immediately following sentence, concerning how the air moves the projectile. They may both be attempts by later commentators to flesh out Aristotle's rather bare-bones explanation of projectile motion.

3. This appears to be John Philoponus's theory of *rhopē*, or impetus; see, for example, his *In Phys.* 641.13–642.20.

(٢) والحركات المكانية القسْــرية ، فقد تكون بالجذب وقد تكون بالدفع . وأمّا الحمْل فهو بالحركة العرضية أشــبه ، والتدوير القســري مركب من جذبٍ ودفع ، والدحرجة ربما كانت عن ســببين خارجين ، وربمــا كانت عن مَيْلٍ طبيعي ، مع دفعٍ أو جذبٍ قســري . وأمّــا الذي يكون ، مع مفارقة المحــرّك ، مثل المرمي والمرجوج ، فإنَّ لأهل العلم فيه اختلافاً على مذاهب . فمنهم مَنْ يرى أنَّ الســبب فيه رجوع الهواء المدفوع فيه إلى خلف المرمي ، والتئامــه هناك إلتئاماً بقوةٍ تضغط ما أمامه . ومنهم مَنْ يقول إنَّ الدافع يدفع الهواء والمرمي جميعاً ، لكن الهواء أقبل للدفع فيندفع أســرع فيجــذب معه الموضوع فيه . ومنهم مَنْ يرى أنَّ الســبب في ذلك قوة يســتفيدها المتحــرّك من المحرّك ، تثبت فيه مــدة إلى أنْ تبطلها مصاكّات تتصل عليه ممّا يماسّه وتنخرق به . فكلما ضعف بذلك ، قوي عليه الميل الطبيعي والمصاكّة ، فأبطلت القوة ، فمضى المرمي نحو جهة ميله الطبيعي .

(3) The supporters of air's motion [that is, position (2),] say: It is no exaggeration at all that the motion of air can become powerful enough to carry along stones and large bodies. Indeed, a very loud sound sometimes brings about an avalanche, and there are mountains that, when yelled at, come crashing down to their very bases. Also, thunder levels large buildings and topples small mountains, and a deafening roar splits boulders. There are even those people who, by numerous and prolonged trumpet blasts, capture fortresses built on summits. [Against position (1), they ask]: Now, how can we say that the air comes back around to the rear, coming together in such as way that it presses what is in front of it forward? What is the cause of its forward motion when [the air] comes together so that it pushes what is in front of it? [Against position (3), they ask]: How could we maintain that the mover lends some power to the mobile? That is because the power must be either natural, psychological, or accidental. Yet it is none of these, since you [who support this position] have maintained that the power producing upward motion is in the substance of fire, in the sense of the form, whereas it is an accident when it is the stone [moving upward]. So how can a single nature be [both] an accident and a form? Also, were the mover to impart a power, the action of [the power] would be at its strongest at the beginning of its existence and then, thereafter, it should begin to fall off. What [we] find, however, is that its action is strongest during the middle of the motion. If the cause of this motion, however, is the air's carrying along the projectile, then a cause might be found for that—namely, that the air is attenuated by the motion, and so [the projectile] moves more quickly, [since] the motion belonging to the projectile more effectively pierces through the air through which it is passing. This cause, however, is not found in this case [of impressed power].

(٣) قــال أصحاب القول بتحرك الهواء ، وليس يعظم أنْ تكون حركة الهواء تبلغ من القوة ما يحمل الحجارة والأجســام العظيمة ، فــإنَّ الصوت العظيم ربّما دكَّ أنْفاً من الجبل ، وها هنا جبالٌ إذا صيح فيها انحطم أركانها . والرعد يهدّ الأبنية المشيدة ويقلب قلل الجبال ، ويفلق الصخور الصمّ . ومن الناس مَنْ يفتتح القلاع المبنية في القلل بتكثير البوقات والإلحاح عليها . وكيف يمكننا أنْ نقول إن الهواء الراجع إلي خلف التأم إلتئاماً ضغط ما قدّامه إلى قُــدّام ، وما ســبب حركته إلى قدّام عند الالتئام حتى يدفــع ما قدّامه؟ وكيف يمكننا أنْ نقول إنَّ المحرّك أعار المتحرك قوة ، وذلك لأنّها لا تخلو من أنْ تكون إحدى القوى التي هي الطبيعية والنفسانية والعرضية؟ وليست طبيعية ولا نفسانية ولا عرضية ؛ لأنَّ القوة المحرّكة إلــى فوق زعمتــم أنّها في جوهر النار ، بمعنى الصــورة ، وإذا كانت في الحجر عارضاً ، فكيــف تكون طبيعة واحدة ، عرضاً وصورة؟ ولو كان المحرّك أفاد قوة لكان أقوى فعلها في ابتداء وجودها ، ثم كان يجب أنْ تأخذ في الانســلاخ ، والموجود هو أنَّ أقوى فعلها في الوسط من الحركة . وأما إنْ كان علّة هذه الحركة حمل الهواء للمرمي ؛ فقد يوجد لذلك علّة ؛ وهو أنَّ الهواء يتلطف بالحركة فيزداد ســرعة وانخراقاً لما ينفذ فيه من الهواء الناقل للمرمي ، ولا توجد هذه العلّة هناك .

(4) There is a group who has maintained [a theory] of engenderment.[4] They claimed that it is of the nature of motion that [another] motion be engendered after it, and of the nature of tendency that a tendency be engendered after it. They, however, did not deny that the motion ceases and then is followed by a state of rest, and then, thereafter, a motion is engendered as a result of the tendency. This really is the most atrocious of the accounts. [That] is because what is engendered inevitably is something that comes to be after not being; but whatever comes to be after not being has some originator that is a cause of the coming to be. Now, if that cause is a cause inasmuch as it exists, then the first motion must exist together with the second, whereas, if it is [a cause] inasmuch as it does not exist, there would necessarily always be some cause of the motion. If, despite that, the cause is the tendency's continued existence, then why do you allow a subsequent state of rest when the principle of the motion actually exists as it should and there is no obstacle to the motion, either from the mobile or in the distance [to be covered]? If the tendency also does not exist, the discussion about it is the same as the one about motion.

(5) As it is, when we independently investigate the issue, we find that the most sound school of thought is of those who think that the mobile acquires an inclination from the mover [position (3)], where the inclination is what one sensibly perceives when one forcibly tries to bring to rest some natural or forced [motion]. In this case, one senses the pushing power, which is able to be more or less than another; for sometimes it is greater, while, at other times, less than what[5] undoubtedly

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4. The doctrines of *tawallud* (engenderment) and *iᶜtimād* (tendency) were standard among many early Mutᶜazilī mutakallimūn; see, for instance, al-Ashᶜarī, *Maqālāt al-Islāmīn wa ikhtilāf al-muṣalīn,* 300–15. Al-Ghazālī also discusses the doctrine in his *Iqtiṣād;* for a translation and discussion, see Michael E. Marmura, "Ghazali's Chapter on Divine Power in the *Iqtiṣād,*" *Arabic Science and Philosophy: A Historical Journal* 4 (1994): 279–315; reprinted in Michael E. Marmura, *Probing in Islamic Philosophy: Studies in the Philosophies of Ibn Sina, al-Ghazali and Other Major Muslim Thinkers* (Binghamton, NY: Global Academic Publishing, 2005), 301–34.

5. Reading with **Z** and **T** *fa-marratan takūnu ashadd wa-marratan takūnu anqaṣ mimmā* (for sometimes it is greater, while, at other times, less than what), which is (inadvertently) omitted in **Y**.

(٤) وقد قال قوم بالتولّد، وقالوا لأنَّ من طبع الحركة أنْ تتولّد بعدها حركة، ومن طبع الاعتماد أنْ يتولّد بعده اعتماد، ولم يمنعوا أنْ تكون الحركة تعدم ثم يتبعها سكون، ثم يتولد عن الاعتماد بعد ذلك حركة، وهذا أشنع ما يقال، فإنَّ المتولّد لا محالة شيء حادث بعد ما لم يكن، ولكل حادث بعد ما لم يكن؛ محدثٌ هو علّة للحدوث. وتلك العِلّة، إنْ كانت عِلّة بأنْ توجد؛ وجب أنْ توجد الحركة الأولى مع الثانية، وإنْ كانت بأنْ تعدم؛ وجب أنْ تكون دائماً علّة للحركة. وإن كان السبب، مع ذلك، بقاء الاعتماد، فلِمَ تجوّزون سكوناً يلحق، ومبدأ الحركة موجود على ما ينبغي بالفعل، وليس هناك مانع عن الحركة من المتحرّك ولا في المسافة؟ وإنْ كان الاعتماد أيضاً يُعدم، فالكلام فيه كالكلام في الحركة.

(٥) لكنا إذا حقّقنا الأمر، وجدنا أصح المذاهب مذهب مَنْ يرى أن المتحرك يستفيد مَيْلاً من المحرّك، والميل هو ما يُحسّ بالحسّ إذا حوول أنْ يسكّن الطبيعي بالقَسْر، أو القَسْري بالقَسْر الآخر، فيحسّ هناك من القوة على المدافعة التي تقبل شدّة ونقصاً فمرة تكون أشدّ ومرة تكون أنقص مما لا يشك في وجوده في الجسم، وإنْ كان الجسم

exists in the body, even if the body is at rest by force. Furthermore, the school of thought of those who think that the air is pushed forward and in turn pushes [the projectile] forward has missed the mark. How could it have hit the mark, when the discussion concerning the air is just the same as the one concerning the projectile? That is because this air that is pushed forward either continues to be moved at the same time that the mover comes to rest, or it does not. If it does not continue [to be moved], then how does it pass through [the air] carrying [the projectile] along? If it continues [to be moved], then the discussion concerning [how it continues to be moved] still remains. Next, if [the air] moves faster, and thus should penetrate a wall more forcefully than the arrow does—for in their view, the arrow penetrates only through the power of what causes it to penetrate: namely, from the motion of the air that is faster—and yet [if] the air is obstructed and deflected by those things that stand in its way, then why is the arrow not obstructed and deflected? If the reason is that what is adjacent to the tip of the arrow is obstructed, while what is adjacent to the arrow's notch still retains its power, then the arrow should be swifter than the air, whereas they maintained that the air is swifter. If the arrow is swifter, then the air that is adjacent to the arrow should not have enough pushing power to cause the arrow to penetrate the wall that stands in its way, if it were not being pushed from behind. [That] is because the arrow's penetrating the wall cannot be said to be like its penetrating the air, for, in their opinion, the air carries and pushes [the arrow] along by [itself] being pushed [forward]. If that is

ســاكناً مما قُسِــر . ومذهب مَنْ يرى أيضاً أنَّ الهواء يندفع فيدفع ، مذهبٌ غير ســديد . وكيف يكون ســديداً والكلام في الهواء كالكلام في المرمي؟ ذلك لأنَّ هذا الهواء المدفوع إمّا أنْ يبقى متحركاً مع ســكون المحرك ، أو لا يبقى ، فإنْ لم يبق ، فكيف ينفذ ناقلاً؟ وإنْ بقي ، فالكلام فيه ثابت . فإنْ كان أســرع حركة ، فيجب أنْ يكون نفوذه في الحائط أشــدّ من نفوذ السهم – فإنْ السهم إنما ينفذ عندهم بقوة مُنْفِذَةٍ ، هي من حركة الهواء الذي هو أســرع – والهواء يُحبس ويرد عن الأمور القائمة في وجهه ، فلِمَ لا يحبس الســهم ويرد؟ فإن كان الســبب فيه إنَّ الذي يلي نَصْل الســهم يُحبس ، والذي يلي فُوقه يكون بعد على قوته ، فقد وجب أنْ يكون السهم أسبق من الهواء ، وجعلوا الهواء أسبق ، فإنْ كان السهم أســبق فيجب أن لا يكون للهواء الذي يلي الســهم ، من قوة الاندفاع ما ينفذ السهم الممنوع بالحائط ، لولا دفعه من خلف . فإنَّ نفوذ السهم في الحائط لا يجوز أنْ يقال إنَّه كنفوذه في الهــواء ، فــإنَّ الهواء يحمله ويدفعه عندهم باندفاعه ، وإنْ كان ذلك من جذب الســهم ما

from the arrow's pulling what is behind it in such a way that it turns around and pushes what is pulling it, then what is being pulled would be pulled with a greater strength than that which necessarily belongs to what is doing the pulling. If this strength is a power or inclination, then the claim in favor of that [namely, of an acquired inclination] turns out to be the case, whereas, if it is a mere consequence [of its cause], then it ceases when its cause ceases. So, if [the strength] continues, then a power and inclination are the cause. Also, why is it that the things that happen to be in this air around the immediate vicinity of the arrow fall to the ground, and the air does not carry them along? Indeed, the air prevents heavy things that are carried along in it from falling to the ground[6] precisely because of the motion's strength, which [even] uproots the heavy thing; and when strong winds rush through tree limbs, they break them; and yet it does not carry an arrow along, should it be placed in it?! It would be fitting, then, that this air that moves the large stone should be empirically confirmed[7] by small bodies in the vicinity of what necessarily produces calm [winds]. These folks presume that when they say that the air is moved faster and so produces intervening motions in the parts of the air that are straight ahead and [in] the arrow that is situated in [those parts], they have said something of consequence; but it is not [so]. That is because this motion might be produced in one part after another of the air that is straight ahead. In that case, however, the ones that are being moved undergo motion after the mover quits acting; but you attacked [this] claim, even if their motion is together. Alternatively, [the intervening motions in the parts of the air] might be together, and the original mover is either moved together with them or

6. Reading *rusūb* with **Z** and **T** for **Y**'s *rasūl* (messenger), which probably is just a typographical error.

7. Reading *ikhtibār* with **Z** and **T** for **Y**'s *ikhtiyār* (choice).

خلْفــه جذباً يعود به دفعاً لجاذبه، فيكون المجذوب أشــدّ انجذاباً من الجاذب الملازم له. وهذه الشــدة – إنْ كانت قوة ومَيْلاً – فقد حصل القول بذلك، وإنْ كانت متابعة فقط؛ فتزول مع زوال سببها، فإنْ بقيت فيكون السبب القوة والمَيْل. وما بال الأشياء، التي يتفق حصولها في هذا الهواء اللصيق بالســهم ترســب ولا يحملها الهواء؟ فإنَّ الهواء إنّما يمانع الثقال المحمولة فيه عن الرســوب بحركةٍ شــديدةٍ يصير بها مقاوماً لخرق الثقل، والرياح إذا هبّت على أغصان الشــجر هشــمتها، مع أنها لا تحمل سهماً، لو وضع فيها. فهذا الهواء الــذي ينقل الحجــر الكبير، بالحري أنْ يكون إختباره بقرب الأجســام الصغار ممّا يوجب كســرها. وهؤلاء يظنّون أنهم إذا قالوا إنَّ الهواء يتحرك أسرع؛ فتحدث حركات متشافعة في أجزاء الهواء قُدُماً، والسهم موضوع فيها؛ إنّهم قالوا شيئاً، وليس كذلك. وذلك لأنّه لا يخلو إمّا أنْ تحدث هذه الحركة في أجزاء الهواء قُدُماً، شيئاً بعد شيء، فيكون المتحرك منها يتحــرك بعد هدوء المحرك؛ فقد انتقضت الدعوى، وإنْ كانت حركتها معاً، فإمّا أنْ تكون معاً والمحرك الأول يتحرك معها، أو هو واقف. فإنْ كان مع حركة المحرّك الأول فيجب

comes to a stop. If it is together with the motion of the original mover such that the arrow must stop after it, and if it is after its motion, then the doubt still remains—namely, that there is a motion and a cause by which the motion continues to exist that is different from the initial mover.

(6) As for the report that the forced mover increases in power in the middle, there is no harm in that when the power is a [mere] posit. Also, the motion of the air is of no use in [explaining the varying speed of the projectile], since the difficulty still stands. That is because the original objector can ask: Why is it that this air is faster only during the middle of the time of the motion? Indeed, if that is because [the air] acquires a greater rarefaction as a result of the motion, then it would be more appropriate that what is borne along in it is not affected by it. [That] is because [the air] will take up a larger volume and will become weaker in strength. Now, what is larger in volume and weaker in strength moves slower than what is not like that [when] the imparted motion is one and the same. If the rarefaction under consideration belongs only to the air that is passed through and not to what is passing through it, then why is this friction in the middle more capable of bringing about a decomposition and attenuation than the friction at the beginning? Certainly, if either what produces the friction or that which the friction acts upon were the same thing during the whole process, then that would make sense. [In that case,] either what produces the friction would be like a drill, since it becomes hotter according to how long it is used and so is more powerful according to the attenuation, or the influence on

أنْ يقف السهم بعده، وإنْ كان بعد حركته، فقد بقي الشك؛ وهو أنَّ هناك حركة وسبباً به تستمر الحركة، هو غير المحرّك الأول.

(٦) وأمّا حديث ازدياد المحرّك القسري قوة عند الواسطة، فليس يضير في ذلك فرض القوة ولا تنفع فيه حركة الهواء، وذلك لأنَّ الإشكال فيه قائم. وذلك لأنَّ للمتشكك الأول أنْ يقول إنَّ هذا الهواء ما باله إنّما يكون في أوسط زمان الحركة أسرع؟ فإنه إنْ كان ذلك لا ستفادته بالحركة تخلخلاً أكثر، فهو أولى بأنْ لا ينفعل عنه المنقول فيه لأنّه يصير أكبر حجماً وأضعف قواماً. والأكبر حجماً والأضعف قواماً، فإنّه يكون عن تحريكٍ واحدٍ بعينه، أبطأ حركة مما ليس كذلك، وإنْ كان التخلخل المعتبر إنما هو للهواء المنفوذ فيه لا للنافذ، فلِمَ كانت هذه المحاكّة في الوسط أقوى في التحليل والتلطيف من المحاكّة التي في الابتداء؟ نعم؛ لو دامت المحاكّة على شيءٍ واحدٍ يلقى إمّا الحاكّ وإمّا المحكوك، لكان لذلك معنى أمّا الحاكّ فكالمثقب، فإنّه على طول المزاولة يصير أسخن، فيكون على التلطيف أقوى، وأمّا المحكوك فلأنَّ دوام الحكّ عليه يكون ممّا يزيده تأثيراً بعد تأثير. وها

what is acted upon by the friction would increase more and more, owing to the continuous application of friction to it. In the present case, however, there is no single thing producing the friction or being acted upon by the friction. Instead, in their view and according to the logical conclusion of their theory, [the air] must be moved like a chain being pushed forward, where each part that is posited is some particular agent producing friction in some particular object. Perhaps the way of presenting this cause of the increase in the class associated with power is more obvious. So it could be that, when the friction on the projectile occurs over and over again, it is constantly becoming hotter and is still becoming hotter while the acquired power is becoming weaker. The attenuation acquired by the heating, however, either will correct for or counterbalance what is lost by the weakening, as long as something in the power remains. So, when the power is successively pounded upon and loses its strength, the friction also weakens and reaches a degree at which it does not correct for the pounding influence. Still, concerning that, we have not completely made up our mind about this cause, even if it might be one of the auxiliary causes of the increasing [speed] at the middle.

(7) Since it has become clear how there is forced motion, how many kinds [of it] there are, and that all motion results from a certain power in the mobile by which it is moved[8] whether forced, accidental, or natural—let us now discuss the motion that is said of what undergoes spontaneous motion. Among the theoreticians, there have been differences of opinions and bickering over this issue. [Yet] this topic does not merit the level of scrutiny and dispute that has occurred among them;[9] for [the whole of]

8. Reading *yandafiʿu* with **Z** and **T**, which would make "mobile" the subject of the verb, as opposed to **Y**'s *tandafiʿu,* which would make "motion" (or less likely, but still possible, "power") the subject of the verb.

9. Cf. Aristotle, *Physics* 2.4 for the early *endoxa,* and then 2.5–6 for Aristotle's preferred account of spontaneity.

هنـا لا الحاكّ ولا المحكوك واحد ، بل عندهـم – وعلى قياس قولهم – يجب أنْ يتحرك كسلسـلةٍ مدفوعة قُدُماً ، ويكون كل جزء يفرضه حاكّاً بعينه ، لمحكوك بعينه . وعسى أنْ يكون وجه إعطاء هذه العلّة لهذا التزيّد في الباب المنسـوب إلى القوة أوضح . فعسـى أنَّ الحاكّ إذا تكرّر على المرمي أكثر يسخن أكثر ، فلا يزال يتسخن بالحاكّ أكثر ، والقوة المستفادة تضعف ، إلاّ أنَّ التلطيف المستفاد بالتسخين يكون متداركاً أو موفياً على المعنى الذي يفوت بالضعـف ، ما دام في القوة ثبات ما . فإذا ترادف الحاكّ على القوة واسـترخت ؛ ضعف أيضاً الحاكّ ، وبلغ مبلغاً لا يفي بتدارك تأثير الحاكّ . على أنّا لا نعوّل في ذلك على هذه العلّة كل التعويل ، وإنْ كان قد يجوز أنْ يكون ذلك من إحدى معنيات العلل المزيدة في الوسط .

(٧) فقد اتضح أنَّ الحركة القسـرية كيف هي ، وعلى كم قسم هي ، وانَّ كل حركة فعن قوة تكون في المتحرك ، بها يندفع ؛ إمّا قَسْـرية وإمّا عرضية ، وإمّا طبيعية . فلنتكلم الآن على الحركة التي يقال إنّها من تلقاء المتحرك ؛ فقد وقع في أمرها بين أهل النظر تخالفٌ وتشـاجر ما كان من حق هذا المعنى أن يقع من التفتيش عنه والمناقشـة فيه ما وقع بين

that comes down to naming, some having stipulated one meaning [for the term], while others [have chosen] another. Each one of them can stipulate whatever [sense] he uses without any of them bickering among themselves about it. So there are those who stipulate that what is being[10] moved spontaneously is that whose subject naturally undergoes a motion different from that [spontaneous] motion, and yet that [spontaneous] motion is not the result of some external cause. On these thinkers' supposition, plants would be included in the class of what is moved spontaneously, whereas the celestial sphere would be excluded from what undergoes spontaneous motion. Still others deny that the celestial sphere is excluded from that. There are also those who stipulate that [the celestial sphere] cannot even undergo motion. In that case, if this is taken absolutely, then the celestial sphere is also not included among what undergoes spontaneous motion. If there is added to it *it cannot move when it wishes* without additionally stipulating that it is the sort of thing that can wish, then the celestial sphere would be included in it. When it is something that either does not wish at all or cannot wish, then the necessary consequent of that need not occur if (counterfactually) it were to wish. There are also those who make no stipulation except that the motion proceed from an act of volition. You are under no compulsion to choose any of the uses, should you wish [not to], for it is nothing more than arguing semantics.

10. Omitting **Y**'s *al-muḥarrik* (the mover), which appears only in two MSS consulted by **Y** and does not appear in either **Z** or **T**.

طبقات أهل النظر. فإنّ معوّل ذلك على الإسم، فقد جعله بعضهم لمعنى، وبعضهم لمعنى آخر، ولكلٍ منهم أن يجعل ما جعله، وليس لأحدٍ منهم أنْ يشـــاجر فيه غيره. فمنهم مَنْ جعل المتحرك من تلقائه ما لموضوعه أنْ يتحرك بطبعه حركةً غير تلك الحركة، وتلك الحركة مع ذلك ليس عن ســـببٍ من خارج. فعلى وضـــع هؤلاء يدخل النبات في جملة المتحرك مـــن تلقائه، ويخرج الفلك من أنْ يكـــون متحركاً من تلقائه. وهم مع ذلك يمنعون أنْ يخرج الفلـــك من ذلك. ومنهم مَنْ شـــرط أن يكون له، مع ذلـــك، أنْ لا يتحرك. فإنْ أُخذ هذا مطلقاً، لم يكن الفلك أيضاً داخلاً في المتحرك من تلقائه. وإنْ زيد عليه، وله أنْ لا يتحرك إذا شـــاء، من غير زيادة شـــرط أنَّ من شأنه أنْ يشـــأ دخل فيه الفلك، وليس إذا كان لا يشـــاء أمراً البتة، أو لا يجوز أنْ يشـــاء، يلزم من ذلك أنَّ مقتضاه لا يكون لو شاء. ومنهم مَنْ لم يشـــترط إلاّ أن تكون الحركة صادرة عن الإرادة. وأنت غير مجبرٍ على اختيار أي الاستعمالات شئت، فإنه ليس إلاّ مشاجرة في التسمية فقط.

Chapter Fifteen

The states of motive causes and the interrelations between the motive and mobile causes

(1) Since we have discussed at great length what we wanted to say about motions and the mobile, it is fitting that we talk about the states of the movers. So we say that, falling under the head of *mover,* there are those that produce motion essentially and others that do so accidentally. We have already differentiated the accidental mover in past remarks,[1] explaining in how many ways they occur; and [how] sometimes it is something that moves itself accidentally, while at other times it moves another accidentally, and sometimes it produces motion naturally, while at other times [it does so] by force. As for what produces motion essentially, some [movers act] through an intermediary—as, for example, the one who works wood by means of an adz—while others are without an intermediary. [In the case of] that which is through an intermediary, the intermediary might be a single thing or many. Some intermediaries are not spontaneous movers, but produce motion only for the sake of that which precedes them that set them in motion. If [the intermediary] is continuous with the mover, like a human's hand, then it is called an *instrument,* while, if it is distinct, it is called a *tool.* In practice, though, there is often no distinction between the two terms. Other

1. See 1.12.2 and 4.9.3.

<الفصل الخامس عشر>

في أحوال العِلل المحرِّكة والمناسبات بين العلل المحرِّكة والمتحركة

(١) وإذ قد استوفينا القول، بحسب غرضنا في الحركات والمتحركات، فحريٌّ بنا أنْ نتكلم على أحوال المحركين، فنقول: إنَّ المحرِّك منه ما هو محرِّك بالذات ومنه ما هو محرِّك بالعرض، والمحرِّك بالعرض قد فصّلنا أمره في الأقاويل الماضية، وبيّنا أنّه على كم وجهٍ يكون؛ وأنّه قد يكون الشيء محركاً لذاته بالعرض، وقد يكون محركاً لغيره بالعرض وقد يكون محركاً بالطبع، وقد يكون بالقَسْر. وأمّا المحرِّك بالذات فمنه ما يكون بواسطة؛ مثل النجار بواسطة القَدُّوم، ومنه ما يكون بغير واسطة. والذي بالواسطة، فربما كانت الواسطة واحدة، وربّما كانت كثيرة. وما كان من الوسائط ليس محركاً من تلقائه، بل إنّما تحرّك لأجل أنَّ ما قبله يحرِّكه، فإنْ كان متصلاً بالمحرّك - كاليد للإنسان - سُمي

intermediaries spring into motion of themselves but, nevertheless, have some other principle producing the motion, on account of which they are an intermediary. In this case, [this other] is most appropriately the mover of [the intermediary], although it is a mover as an end (such as, for example, an object of love), or the contrary of the end (such as, for example, an object of fear that is fled). Some of [these ends] are movers that produce motion inasmuch as they are moved, while others produce motion inasmuch as they are not moved. What produces motion inasmuch as it is moved does so by being contiguous with [what is being moved]. Its action is completed by its coming to rest, at which point it is likewise potentially moved.

(2) Because it is impossible for an infinite number of bodies to exist, it is impossible that there be infinitely many movers simultaneously. So it is impossible that every mover be something moved, and so the [whole] thing terminates either at some unmoved mover or some first-moved mover. [That] is because there is no circle in producing motion and being moved, or in causing and being caused. [That follows] since the circle requires that x be a starting point of y, and y is a starting point of x, and so one thing would be prior to what is prior to itself. Now, either the principle of the first-moved mover's motion is in it (and so it undergoes motion essentially), or it is distinct from it and not in it. As we have said,[2] however, there is a principle of motion in every body. So if it is distinct and produces motion in a way that conforms with what a given principle of bodily motion requires, then either that motion proceeds from both [the principle and the body] jointly and yet the principle that is in the body can produce the motion alone, or the principle that is in the body cannot produce the motion alone. On the one hand,

2. See 4.12.

أداة، وإن كان مباينـاً سـمي آلة، وربّما لم يميّز بين اللفظين في الاسـتعمال. وما كان من الوسائط ينبعث من نفسه إلى الحركة، ومع ذلك فله مبدأ تحريك آخر لأنّه واسطة، فالأولى أنْ يكـون محرّكه مع أنّه محرِّك غاية مثل المحبـوب، أو ضدّ الغاية مثل المخوف والمهروب عنـه. والمحركات منها ما يحرك بأنْ يتحرك، ومنها مـا يحرك لا بأنْ يتحرك، والمحرك بأن يتحرك يحرك بالمماسّـة، ويتم فعله بالسكون منه، ويكون أيضاً من حيث يتحرك بالقوة.

(٢) ولا سـتحالة وجود أجسـام بلا نهاية، يسـتحيل أنْ تكون متحركات معاً بلا نهاية. فيسـتحيل أنْ يكون كل محرّكٍ متحركاً، فينتهي الأمر إلى محرّكٍ لا يتحرك، أو إلى أول محـرّكٍ متحرك، إذ لا دور في التحريك والتحرّك والعلّية والمعلولية، إذ الدور يوجب أن يكون الشـيء مبدأ لأمر، ذلك الأمر مبدأ له، فيكون أسـبق من الأسبق بذاته. وأول محـرّكٍ متحرّك، إمّا أن يكون مبدأ حركته فيه؛ فيكون متحركاً بذاته، أو يكون مباينا له وليس فيه، ولكن في كل جسـم مبدأ حركة، كما قلنا. فإنْ كان المباين، يحرّك التحريك الموافـق لما يقتضيه مبدأ حركة الجسـم، لم يخل إمّا أنْ تكـون تلك الحركة تصدر عنهما جميعاً بالشـركة - ومع ذلك فإنَّ المبدأ الذي في الجسم له أنْ يحرّك وحده - وإمّا أنْ لا

if that principle cannot produce the motion alone, then it is not a principle of motion in the body. It was said, however, that it was, which is a contradiction. Now, you know that in every body there is a principle of motion, which we have demonstrated;[3] and so, if the principle of motion can produce motion alone, then the distinct thing is not some mover *qua* what the motion strives after, but, rather, a mover in one of the [following] ways. It might be inasmuch as it provides the body with that principle by which it is moved, and so, through that principle, it moves the body. Alternatively, it might provide [the body] with some other power that mutually helps it in producing the motion and is added to [the body]. Another possibility is that it might produce motion because it is an end and paradigm, or [because it is an] object of imitation, or on account of both things. So, if the distinct thing produces motion in generically the same way that the principle of the body's motion does, like its partner, then, if the distinct thing produces motion different from the motion consistently produced, it is something acting by force, whether a body or not a body.

(3) There was a group[4] who said that what moves fire upward is what makes the matter to be fire. So, when it makes [the matter] to be fire, it makes it something completely prepared for that motion, such that it is moved upward after having been in remote potency. One does not do himself any favors by insisting on that, however. That is because the principle that gives the fire the complete preparedness for that motion

3. See 4.12.

4. The reference may be to John Philoponus; cf. his *Contra Aristotelem,* frag. 109. Unfortunately, Philoponus's commentary on book 8 of Aristotle's *Physics,* which is the primary source for much of the discussion in this chapter, exists only in an extremely fragmented state and does not include anything relevant to the issue Avicenna is raising here.

يكون للمبدأ الذي في الجسم أنْ يحرّك وحده، فإنْ لم يكن لذلك المبدأ أنْ يحرّك وحده؛ فليس مبدأ حركة في الجسم، وقد قيل ذلك، هذا خُلْف. وأنت تعلم أنَّ كل جسم ففيه مبدأ حركة، قد برهنا على ذلك. فإن كان لمبدأ الحركة أنْ يحرّك وحده، لم يكن المباين محركاً على أنّه مزاول للحركة، بل محرّك على أحد الوجوه. إمّا بأنّه يعطي الجسم ذلك المبدأ الذي به يتحرك، فيحرّك الجسم بذلك المبدأ أو يعطيه قوة أخرى تعاضده على ذلك التحريك وتزيد فيه، أو يكون محركاً لأنّه غاية ومثال أو مؤتمّ، وإمّا للأمرين جميعاً. هذا إنْ كان تحريك المباين من نوع تحريك مبدأ حركة الجسم كالمشارك له، فإنْ كان المباين يحرّك خلاف التحريك الموافق؛ فهو قاسرٌ، إمّا جسم وإمّا غير جسم.

(٣) وقد قال قومٌ إنَّ محرّك النار إلى فوق هو جاعل المادة ناراً، فإذا جعله ناراً جعله تام الاستعداد لتلك الحركة، بعد أن كان بقوةٍ بعيدة، فتحرّك إلى فوق. لكن الإصرار على ذلك غير جميل؛ وذلك لأنَّ المبدأ الذي يعطي النار تمام الاستعداد لتلك الحركة، فقد

might then provide the principle by which it is moved—namely, the power by which it is moved (as you have learned).[5] If this complete preparedness, in itself, necessitates the emergence into act, then, in itself, it is a principle of the motion and a mover, for by *mover* we understand nothing more than the thing that is the principle of motion in this way. So it will be the Giver of Forms by which a given body is moved, producing motion by means of a form, and the form producing motion through itself, without an intermediary. From that, it is not necessary that the form be something that produces motion owing to itself, since it produces motion as a whole when there is some matter possessing a form of corporeality. That is because the universe is not one of the parts. So the body that is essentially the universe produces motion essentially while moving itself for the sake of that motion accidentally, since it is not something that undergoes motion essentially.[6] Even if it were something that undergoes motion essentially, the universe's motion—that is, some part of it—would not require that it move from its natural location (namely, [that it] depart from the universe's surrounding vicinity. Instead, it would only undergo accidental motion, as you have learned;[7] and something may be an accidental mover of itself. Now because there is always motion here—and the more so since the Heavens are something that has [always] been manifested—there is some first mover of infinite power; and, as such, [it] is neither a body nor in a body.

5. See 4.14.5.

6. In other words, the cosmos considered as a whole produces motions in all the parts within it, which change their position with respect to the cosmos as a whole; however, this internal change of position is merely an accidental motion of the cosmos considered as a whole (see 4.13.2). The cosmos as a whole does not, in itself, undergo any local or positional motion, since (1) it has no natural position that it could change (see 2.3.14), and (2) there is nothing outside of it that could determine its position, so that, instead, it is what determines the positions of everything else (3.14.9–10).

7. See 4.13.2.

يعطيه المبدأ الذي به يتحرك؛ وهو – كما علمت – القوة التي بها يتحرك، وهذا إنه كان الاستعداد التام يوجب بنفسه الخروج إلى الفعل، فيكون بنفسه مبدأ للحركة ومحرّكاً – فإنّا لسنا نفهم من المحرّك إلاّ الأمر الذي هو مبدأ الحركة على هذا النحو، فيجب أنْ يكون واهب الصور التي بها يتحرك جسمٌ ما، محرّكاً بالصورة، والصورة محركة بذاتها بلا واسطة. ولا يجب من ذلك أنْ تكون الصورة محرّكة لذاتها، لأنّها تحرّك كُلاً ومادة ذات صورة مجسّمة. وذلك لأنَّ الكل ليس هو أحد الأجزاء، فهو يحرّك الجسم الذي هو الكل بالذات، ويحرّك ذاته لأجل تلك الحركة بالعرض، لأنّه ليس ممّا يتحرّك بالذات، ولو كان ممّا يتحرّك بالذات، لما كان انتقال الكل – وهو جزء منه – يوجب انتقاله عن موضعه الطبيعي وهو غير مفارقٍ لما جاوره من الكل، بل كان، كما علمت، متحركاً بالعرض، وقد يكون الشيء محرّكاً لنفسه بالعرض. ولأن ها هنا حركة دائمة، ما دامت السماء قد ظهر أمرها، فهاهنا محرّك أول غير متناهي القوة، فليس بجسمٍ ولا في جسم.

(4) We ought now to mention the interrelations between movers and mobiles. Let us posit a given mover, mobile, distance, and time. Let us also examine the mover *qua* principle of natural motion, principle of pulling, principle of pushing, and something that carries; and [let us] consider the kinds of interrelations that necessarily follow. Let us also posit some mover that has moved some mobile along the [posited] distance for a given period of time and consider whether half of the mover would move the same mobile[8] along the [same] distance for a period of time half of that, or less, or greater.

(5) Now, we say that it does not necessarily follow that [half of the mover] would move [the mobile] at all, for it might be that what alone moves that mobile from its present condition is only the collective power of the mover. So, when it is halved, then it can play a certain contributing role while not necessarily and inevitably producing motion. An example would be the ship that a hundred men can drag two parasangs[9] in one day. In this case, it does not follow that fifty men must be able to move it at all. For this reason, it does not necessarily follow that, when the hum of a swarm of bees produces a sound, each bee will produce an audible sound. Again, when there comes to be a hollow in a rock as a result of a hundred drops [of water], it does not necessarily follow that each drop produces some sensible effect. Instead, each drop could have a certain contributing role in counteracting the hardness, and so, when the contribution is completed, another [drop] acts in the hollowing process, and continuing in that way until a sensible cavity comes to be. There are even movers that when halved, do not retain their power, such as an animal. With respect to motions that involve inclination, this contributing factor gradually counteracts the inclination inherent in them until a foreign inclination enters into them that the power that is in the inclination cannot eliminate.[10]

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8. Reading simply *al-mutaḥarrik* with **T** for **Z**'s *fī al-mutaḥarrik*, which has basically the same meaning "whether half of the mover would produce motion *in* the mobile…" and Y's *al-muḥarrik al-mutaḥarrik*, which might mean "whether half of the mover would move the mover that moved itself," but may simply be a typographical error.

9. Approximately seven miles (or eleven kilometers).

10. Reading *tamḥīqihi* with **Z** and **T** for **Y**'s *tamḥīqah* (?), which is probably a typographical error.

(٤) فينبغي الآن أنْ نذكر المناسبات التي بين المحركات والمتحركات. لنضع محرّكاً ومتحرّكاً ومسافة وزماناً، ولنمتحن المحرّك على أنّه مبدأ لحركةٍ طبيعيةٍ، وعلى أنّه مبدأ جذب وعلى أنّه مبدأ دفع، وعلى أنه حاملٌ، ولنتأمل ما يلزم من أصناف المناسبات. ولنضع محرّكاً حرّك متحركاً في المسافة زماناً، ولنتأمل هل نصف المحرّك يحرّك المتحرّك بعينه في المسافة زماناً، نصف ذلك أو أقل أو أكثر

(٥) فنقول: إنه لا يلزم أنْ يحرّكه شيئاً، فإنّه يجوز أنْ يكون المستقل بتحريك ذلك المتحرّك عن حاله إنّما هو مجموع قوة المحرّك، فإذا اتصفت كان لها أنْ تُحْدث إعداداً، ولم يجب أنْ تحرّك لا محالة؛ مثل السفينة التي تجرّها ‹مئة› نفسٍ في يومٍ واحدٍ فرسخين، فلا يلزم أنْ يقدر الخمسون، لا محالة، على نقلها شيئاً. ولهذا ليس إذا حدث صوتٌ عن صَرّة جاورسٍ يلزم أنْ يحدث عن كل جاورسةٍ صوتٌ لا يسمع، أو إذا حدث عن ‹مئة› قطرة نَقْرة في الصخر، يلزم أن تكون كل قطرة تفعل شيئاً لا يُحسّ، بل عسى أنْ يكون لكل قطرة إعداد مّا في إبطال صلابة، فإذا تمّ الإعداد فعل الآخر من النقر، وانْ يستمر على ذلك المنهاج، حتى يحدث قعر محسوس، على أنَّ ها هنا من المحركات ما إذا نصّف لم تبق له قوته، كالحيوان. وهذا الإعداد في الحركات الميلية هو إبطال المَيْل المستقر فيها قليلاً قليلاً، حتى يدخل عليها مَيْلٌ غريب تعجز عن تمحيقه القوة المميّلة التي فيه.

(6) When we posit that the mobile is halved, the common opinion is that the mover [either] moves the mobile twice the distance in that time [or] along the [same] distance in half of that time. In what the independent investigator puts forth, however, he does not put much weight in that [common opinion]. In the case of the natural mover, it is not true that the mover remains in itself when the mobile is halved. That is because the natural power is accidentally divided by dividing that in which it is. So, when the mobile[11] is halved, then the whole[12] of the mover is not moving it, but only the half of it that exists in it—that is, unless it is according to conjecture and approximation.

(7) As for what carries, the power of the carrier might not be sufficient to cover twice the distance across which the load was carried, even if there were no load at all. In that case, how could it be necessary when it is accompanied by half of the weight? If what carries does so by means of a natural motion, then, upon finding its natural terminus, it would not pass beyond it with the load. Also, its natural distance between the two natural directions would be double for it only if it began at the [very] middle. Again, in the case when the load has a certain inclination other than the inclination of [what is carrying it], [that contrary inclination] slows [the carrier] down. Even then, it is not able to conserve this ratio, because the motion of natural things is not uniform from beginning to end. The fact is that, whenever it approaches its extreme, it moves faster, and so [the mobile's] state does not remain uniform in the two halves, whether with or without a load.

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11. Reading *mutaḥarrik* with **Z** and **T** for **Y**'s *muḥarrik* (mover).

12. Rejecting **Y**'s conjectural emendation of *li*, which would have the sense of "it is not possible for the whole mover to move it."

(٦) فـإذا فرضنـا التنصيف في المتحرك، فالمشـهور هو أن المحـرّك يحرّك نصف المتحرّك في ضعف المسـافة في ذلك الزمان، وفي المسـافة في نصف ذلك الزمان، وأمّا المحقّـق فغيره اعتبر ذلك فيما يورده. أما في المحرّك الطبيعي، فإنّه لا يصحّ أنْ يبقى المحرّك بحاله، والمتحرّك به قد تنصّف، وذلك لأنَّ القوة الطبيعية يعرض لها أن تنقسم بانقسام ما هـي فيه، فإذا تنصّـف المتحرّك لم يكن كلية المحرّك أنْ تحرّكه بل النصف الموجود منه فيه إلاّ على سبيل التخمين والتقدير.

(٧) وأمّا الحامل؛ فيجوز أنْ تكون قوة الحامل لا تفي بأنْ تقطع ضعف المسافة التي حمل فيها ما حمل ولو كان فارغاً، فكيف يلزم ومعه نصف الثقل؟ وإنْ كان الحامل يحمل بحركةٍ طبيعية؛ فإنّه عند وجود نهايته الطبيعية، لا يتعداه بالمحمول ولا تتضعّف له مسافته الطبيعية التي بين الجهتين الطبيعيتين، اللّهم إلاّ أنْ يقع الابتداء من الوسـط. فحينئذ إنْ كان المحمول عليه له مَيْلٌ غير مَيْله، أحدث فيه بُطْئاً، إلا أنَّ ذلك لا يحفظ هذه النسـبة، لأنَّ حركة الطبيعيات لا تتفق من الابتداء إلى المنتهى، بل كلّما أمعن ازداد سـرعة، فلا تتفق حاله في النصفين، كان فارغاً أو حاملاً.

(8) The same status of what carries holds for what pushes while remaining attached [to what it pushes], whereas what pushes so as to produce projectile motion might have a greater effect on what is heavier than it does on what is lighter. In that case, it would have a greater effect on what is doubled than on what is halved; and so, again, that ratio is not maintained. Also, given that the speed does not remain constant at its limiting points but is slower at the end of it while, purportedly, the middle is stronger, this ratio is not preserved. The same holds for what pulls, for what pulls sometimes has the form of what carries by dragging [the load]. At other times, it pulls [in the sense of *attracts*] through a power; but the power emanating from the attracting agent has a limit at which its influence on the distant, attracted object terminates and beyond which it can have no influence. So it does not necessarily follow that, whenever we make a mobile smaller, the mover attracts it [either] from a farther place [or] in half the time. It is, indeed,[13] the common opinion that it moves that mobile in the same way through half the distance, but it is not necessary. [That] is because what is traversed during the two halves of the time of the projectile motion (whether forced or natural) need not be equal, since you have learned that the motion varies with respect to speed.

(9) As for the mover in relation to half the distance, the common opinion is analogous to what has been mentioned [namely, that half the mover would move the same mobile half the distance], but the fact of the matter is as we have reported it. As for half the mover with respect to half the mobile, the common opinion is that the ratio is preserved. As it is, though, the mover might not be halved so as to preserve its power. Also, it might be slower for the whole to move the whole, for the

13. Reading *fa-ʾinna* with **Z** and **T**, which is omitted in **Y**, who conjectures, however, that there should be a simple *fa*.

(٨) وأمّـا الدافع اللازم؛ فحكمه حكم الحامـل، وأمّا الدافع الرامي فربما عرض أنّه يفعل في الأثقل أشدّ ممّا يفعله في الأخف، فيفعل في الضعف أشدّ ممّا يفعله في النصف، فلا تبقى تلك النسبة على أنَّ المرمي لا تتشابه السرعة والبُطْء في حدوده، بل المتأخر منه أبطأ، ويقال إنَّ الوسـط منه أقوى؛ فلا تكون هذه النسبة محفوظة. كذلك الجاذب؛ فإنَّ الجـاذب قد يكون على صورة الحامل الجار، وقد يكون جاذباً بالقوة، وللقوة الفائضة عن الجـاذب حدّ إليـه ينتهي تأثيره في المنجذب البعيد منه. فما خرج عن ذلك لا يلزم أنْ يؤثّر فيه، فلا يلـزم أن يكون، كلما جعلنا المتحرّك أصغر، جذبه - من مكانٍ أبعد - المحرّك في نصف الزمان فإنّ المشـهور أنّه يحرّك ذلك المتحرّك بعينه في نصف المسـافة، وليس يجب. فإنّه ليس يلزم أنْ يتسـاوى المقطوع في نصفي زمان المرمي؛ لا في القَسْري ولا في الطبيعي، لما علمتَ من اختلاف الحركة في السرعة والبُطْء.

(٩) وأمّا المحرّك في نصف المسافة، فالمشهور على قياس ما قيل، والحقّ ما أخبرنا عنه. وأمّا اعتبار نصف المحرّك بنصف المتحرّك، فالمشـهور حفظ النسبة، لكن يجوز أنْ لا يتنصّـف المحرّك حافظاً لقوته، ويجوز أنْ يكون أبطأ من تحريك الكل للكل فإنَّ اجتماع

combination and increase of the power might be a consequence of the strength [of the whole] whose relation to the strength of the part is greater than the ratio of size to size.[14] Concerning half the mover in half the time, the common opinion is that the ratio is preserved. According to what you have learned, however, it would be more fitting that it is not preserved. Also analogous to what you have learned is the case of bringing about half the motion in half the distance. From the cases of halving, you also know those of doubling.

(10) There is still one last school of thought that we have related to you on several occasions—namely, that halving by the mover results in its not producing any motion and by the mobile in its not being moved.[15] These interrelations among the mover, motion, mobile, distance, and time might be considered insofar as they are finite as well as infinite,[16] since when any of these is finite, the others are as well, because a given finite part of one parallels a finite [part] of the other. Now, the parts comparable to that part must be exhausted whenever an infinite is taken in parallel with what is being exhausted of the finite, for, if [the finite] continues on, there was not an exact mapping between [the parts of the finite and the infinite]. In that case, why would there not be an infinite motion in a finite period of time or along a finite space, or why wouldn't the time [of the motion] be infinite while a space is finite? The fact is that one finite thing accompanies another, and, from the mapping process, [the finite always] lacks some excess that is in the infinite. If there were no excess, and [if] instead, the infinite is exhausted with the finite in the way that the supposition requires, then the infinite would be finite.

◆

14. The point is that the ratios between strength and volume need not correspond. Thus, halving the volume may not entail halving the strength; and, in fact, it might reduce the strength by more than half.

15. It would seem that Avicenna has in mind Zeno-like paradoxes here; see 3.3.14 and 3.5.3.

16. Reading *wa-ghayr mutanāhīyah* (as well as infinite) with **Z** and **T**, which **Y** (inadvertently) omits.

القوة وتزيّدها قد يستتبع من الحمْية ما هو أزيد نسبة إلى حمية الجزء، من نسبة العِظم إلى العظم. وأمّا نصف المحرّك في نصف الزمان؛ فالمشهور حفظ النسبة، والأوْلى أنْ لا تُحفظ على ما علمت، وأمّا نصف التحريك في نصف المسافة فذلك أيضاً على قياس ما علمتَ، وأنت تعلم التضعيفات من التنصيفات.

(١٠) على أنَّ ها هنا مذهباً آخر حكيناه لك مرات، وهو أنَّ التنصيف يؤدي بالمحرّك إلى أنْ لا يحرّك، وبالمتحرّك إلى أنْ يتحرك. وقد يقع اعتبار هذه المناسبات بين المحرّك والحركة والمتحرّك والمسافة والزمان من حيث هي متناهية وغير متناهية، إذ أيّ هذه إذا تناهى، تناهى الآخر، لأنَّ جزءًا من المتناهي منه يكون بإزاء متناهٍ من الآخر، وأمثال ذلك الجزء يجب أن تفنى ما أُخذ غير متناهٍ بإزاء فناء المتناهي. فإنّه أنْ بقيَ لم تكن بينهما مطابقة، فلمْ تكن الحركة غير المتناهية في زمانٍ متناهٍ، أو في مسافةٍ متناهيةٍ، أو لمْ يكن زمانٌ غير متناهٍ مع مسافةٍ متناهيةٍ، بل كان متناه مع متناهٍ وخلا فضل ما ليس بمتناهٍ عن المطابقة. وإذا لم يفضل بل فني غير المتناهي مع المتناهي، على ما أوجبه المفروض، كان غير المتناهي متناهياً.

Glossary of Arabic–English Terms

ابداً	eternal	**1**.14.4
لأجل	for the sake of	**1**.14.4; **4**.15.1
اثر	effect	**1**.7.1
تأثير	influence, to	**2**.8.14; **3**.10.passim; **4**.12.3
تأثّر	influenced, to be	**3**.10.passim
مؤثّر	influence (active)	**1**.6.2; **3**.8.3
متأثّر	influence (passive)	**1**.6.2
تأخير	posteriority	**1**.3.9
تأخّر	posteriority/posterior	**1**.10.6; **2**.2.6; **4**.6.4, 8.16, 11.6
متأخر	later	**2**.10.10, 11.2–4, 12.7, 13.10
اداة	instrument	**4**.15.1
ارض	earth	**1**.8.2–3; **3.**4.10, 5.5, 7.2, 8.8, 10.13, 14.10; **4**.6.4, 9.7
اسطقسّ	element	**1**.2.3, 2.6, 3.2, 10.7; **3**.4.2, 8.11, 10.2, 12.3

اصل	foundation	**3**.5.8, 10.11; **4**.6.7
افق	horizon	**1**.8.2; **3**.13.6, 14.9
تأليف	aggregation	**3**.3.1, 3.3, 4.3, 5.2
مؤلّف	aggregate	**3**.3.1, 12.4
الله	God	**1**.13.15
انّ	fact that	**1**.8.2
انسانّية	human-ness	**1**.8.4–5
الة	tool	**3**.12.5
اوّل	first	**3**.6.4–6
آن	instant/now	**2**.1.3, 3.19, 8.22, 12.passim, 13.1; **3**.3.9, 5.8, 5.10, 10.1, 10.5, 10.10, 11.2; **4**.4.1
اين	where	**1**.14.8; **2**.1.2, 2.1, 3.10, 3.12, 12.6; **4**.11.2, 11.4, 12.1, 12.6, 13.4
برحان	critical day	**4**.9.4, 14.1
بخت	luck	**1**.13–14.passim
بخار	vapor	**1**.14.4; **3**.7.3; **4**.10.4
تبخير	evaporation, to cause	**1**.14.4
تبخّر	evaporation	**1**.14.14
ابداع	creation, atemporal	**1**.3.2–3; **3**.11.1, 11.3
مبدأ	starting point	**2**.1.5; **3**.10.5, 11.2

مبدأ	principle	**1**.passim; **2**.9.12; **3**.8.11, 10.11; **4**.12.1
– اسطقسّي	principle, elemental	**1**.13.5
– متمّم	principle, completing	**1**.10.3
– مشير	principle, guiding	**1**.3.11
– صورية	principle, formal	**2**.5.5
– عنصري	principle, material	**2**.5.5
– معين	principle, auxiliary	**1**.3.11
– غائي	principle, final	**1**.3.11; **2**.5.5
– فاعلي	principle, efficient	**1**.3.11, 10.4, 15.6; **2**.5.5; **3**.11.1
– فيض	principle, emanative	**4**.4.3, 4.5
– قريب	principle, proximate	**1**.11.4; **3**.10.15
– مادّي	principle, material	**1**.12.4, 15.6
– مهيّئ	principle, preparing	**1**.10.3
مبدع	Creator	**3**.11.3
بدن	body	**1**.5.8, 10.7; **3**.12.5; **4**.12.2, 13.5
بديهة	light of reason	**2**.5.8, 6.4
بذر	seed	**1**.5.1; **2**.3.3
بارئ	Creator	**3**.11.1; **4**.4.3
برد	coolness	**4**.8.18, 10.4

برودة	coolness	**1**.5.8, 6.2; **4**.10.1
تبريد	cooling	**2**.9.20
تبرّد	cold, to become	**2**.3.18
برهان	demonstration	**1**.8.2; **3**.2.10
بسيط	simple	**1**.1.15; **2**.5.3; **3**.10.14; **4**.11.7
انبساط	extension	**1**.5.8, 8.5; **3**.13.2; **4**.11.9
بصر	vision	**1**.8.1
ابصار	vision, sensory faculty of	**3**.13.4
بطء	slow	**3**.10.5
بَعد	after	**2**.11.4–5, 12.1
بُعد	interval	**2**.6.2, 6.4, 7.3–9, 13.3; **3**.2.5, 4.3, 8.5–6, 8.9, 13.2, 14.1
بُعد	remoteness	**1**.2.11; **2**.12.4; **3**.11.2, 14.1
بغت	suddenly	**2**.13.8
بقاء	survive	**1**.13.5
بين	between	**3**.2.11
بيّن بنفسه	self-evident	**3**.4.16
مباينة	separation	**4**.8.13
تأتي	succession, (follow in)	**3**.1.1, 2.6, 3.9, 4.3
تلو	consequent	**1**.10.7

تمام	completeness	**4**.2.6
تمام	perfection	**2**.5.5
– خاصّ	perfection, proper	**2**.5.5
– مشترك	perfection, common	**2**.5.5
تامّ	complete	**4**.2.1
ثبات	persistence/permanent	**1**.12.8; **2**.13.7; **3**.9.6
غير ثبات	impermanent	**2**.13.7
ثابت	stable	**4**.9.5
ثقل	weight/heaviness	**1**.6.2, 11.2; **2**.5.5, 9.21; **3**.10.2; **4**.12.2
ثقيل	heavy	**3**.4.14, 13.7; **4**.12.2
تجدّد	renew(al)	**2**.8.16, 11.6, 12.4; **3**.11.2; **4**.9.5
جذب	pulling/attraction	**1**.12.3, 14.7; **3**.10.12; **4**.10.2, 11.10, 14.2, 15.4
مجرّد	abstracted	**1**.8.2–3
جرم	body	**3**.10.13; **4**.11.5
– بسيط	simple body	**4**.11.5
– مستدر	circular body	**2**.13.3
– سماوي	heavenly body	**1**.7.3, 8.2
– صغير لا يتجزأ	atom	**1**.13.4
جرمية	corporeity	**4**.12.1

جزء	part	**2**.3.15; **3**.5.2, 6.6, 8.11, 10.1
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A Note on the Types

The English text of this book was set in BASKERVILLE, a typeface originally designed by John Baskerville (1706–1775), a British stonecutter, letter designer, typefounder, and printer. The Baskerville type is considered to be one of the first "transitional" faces—a deliberate move away from the "old style" of the Continental humanist printer. Its rounded letterforms presented a greater differentiation of thick and thin strokes, the serifs on the lowercase letters were more nearly horizontal, and the stress was nearer the vertical—all of which would later influence the "modern" style undertaken by Bodoni and Didot in the 1790s. Because of its high readability, particularly in long texts, the type was subsequently copied by all major typefoundries. (The original punches and matrices still survive today at Cambridge University Press.) This adaptation, designed by the Compugraphic Corporation in the 1960s, is a notable departure from other versions of the Baskerville typeface by its overall typographic evenness and lightness in color. To enhance its range, supplemental diacritics and ligatures were created in 1997 for exclusive use in this series.

The Arabic text was set in DecoType Professional NASKH, designed by Thomas Milo (b. 1950), a pioneer of Arabic script research, typeface design, and smart font technology in the digital era. The Naskh calligraphic style arose in Baghdad during the tenth century and became very widespread and refined during the Ottoman period. It has been favored ever since for its clarity, elegance, and versatility. Milo designed and expanded this typeface during 1992–1995 at the request of Microsoft's Middle East Product Development Department. His designs pushed the existing typographic possibilities to their limits and led to the creation of a new generation of Arabic typefaces that allowed for a more authentic treatment of the script than had been possible since the advent of moveable type for Arabic.

BOOK DESIGN BY JONATHAN SALTZMAN

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