## Ancient Commentators on Aristotle

GENERAL EDITOR: RICHARD SORABJI

# THEMISTIUS: On Aristotle Physics 5–8

Translated by Robert B. Todd

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## Preface

#### Richard Sorabji

In Books 5 to 8 of the *Physics* Aristotle repeatedly insists on the continuity of place, time and motion. He rejects the rival view that place, time and motion consist of indivisible units, whether points or atoms. If they did, he objects in *Physics* 6.1, an indivisible body would have to move by disappearing from one indivisible place and reappearing in another, without ever having been in between. For it could not have moved *part* of the way out of an indivisible place, if an indivisible place is defined as having no parts. The resulting motion would consist of imperceptibly small jerks, like those on a cinema screen. Aristotle also argues that if there were indivisible places, there would have to be time atoms as well. Although I do not believe that this follows,<sup>1</sup> it is true that any clock in these circumstances would have to move in jerks.

Themistius tells us of some of the first reactions to Aristotle's arguments. He is the first extant source to report (184,9-185,3) that a few years after Aristotle's death the atomist Epicurus simply accepted cinematographic motion, and Themistius applies to Epicurus Aristotle's objection that time atoms would also be required, although there is evidence that Epicurus accepted this consequence too (P. Herc. 698, Fr. 23 N, in W. Scott, Fragmenta Herculanensia, p. 290; Sextus Math. 10.142-54; Simplicius in Phys. 934,25-6).<sup>2</sup>

Aristotle's belief in the continuity of place, time and motion required him to address problems about the sizeless instant of change, e.g. from rest to motion, or motion to rest. Aristotle's instant is not a short period, but the sizeless boundary of a period. If the carriage departs or arrives at the sizeless instant of noon, is it at rest or in motion at that instant? Aristotle's answer was that there can be neither moving nor resting at an instant. For moving and resting each imply change or stability of position over a whole *period* (*Physics* 6.3; 6.6; 6.8). But, as Themistius recognized in another connection (196,12-13) there is such a thing as *having* moved at an instant. So we can still ask the question whether the departing carriage would *have* moved at noon. We can also ask whether the carriage at noon would be at or away from its starting point or finishing point. For such questions Aristotle allowed an asymmetry (*Physics* 6.5, 235b7-8; 235b31-236a13; 8.8, 263b15-264a6). There are

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first and last instants of being at the position of rest, but no first or last instants of being away from the position of rest. At least, that thought could be used to justify some of the decisions on asymmetry that Aristotle makes. For if space is continuous, rather than consisting of indivisible places, then there will be no first position away from the position of rest. No matter how close a sizeless point you take away from the position of rest, there will always be another sizeless point still closer. This correct thought could justify Aristotle's claims that there is no first instant of *having* changed to being in motion.

However, we learn from Themistius that Aristotle's friend and successor, Theophrastus, raised objections to the asymmetry (192,1-2; 195,8-26; 197,5-8). He did so by appealing to Aristotle's treatise On Sense Perception.<sup>3</sup> In Chapter 6 of that treatise, Aristotle allows that light can supplant darkness over a whole area at an instant without spreading through intervening points first. Light is in this regard unlike a moving body, which has to pass through intervening points before it reaches any point. In that case, Theophrastus objected, there would be a first instant of having changed from light to dark. Why, then, he asked, did Aristotle raise a problem in the very next chapter, Chapter 7, at 449a20-31, about the first instant of an approaching thing having changed to being visible? Aristotle was discussing the approach of an entity whose possibility he rejected. namely of a perceptible thing that lacked parts. He did not notice that his argument would in fact apply to any approaching thing. Aristotle claims that there is an unanswerable question: what is the approaching object's last point of invisibility and what the first point of visibility? It cannot be the same point, nor can the points be separated by a gap. Nor can points in a continuum be adjacent to each other.

Themistius reports that Theophrastus' objection caused difficulty to commentators on Aristotle. But in fact there is no need to appeal, like Theophrastus, to the special cases which Aristotle allows in On Sense *Perception* 6 of discontinuous change, in which light covers a whole area, or ice covers a whole pond, in one go. Even amongst cases of continuous change, we have seen, Aristotle allows, and reasonably so, first or last instants of having reached a position of rest, but not first or last instants of having left them. The justification I suggested was that in a continuum there is no first or last position away from the position of rest. Aristotle's treatment of the visibility of an approaching object was not equally satisfactory. The best approach would be to consider whether there are comparable reasons which would justify an asymmetry in that context too and allow a first instant of visibility on approach, without allowing a last instant of invisibility. This is not hinted at by Theophrastus or Themistius. But Themistius does give us a lively sense of the controversy that Aristotle's discussion of the continuum provoked.

Aristotle's discussion of the continuity of place, motion and time leads up to his theological conclusion in Book 8 of the *Physics* (of which Book 7 is an earlier version) that motion, ultimately the motion of the ensouled heavens, requires a divine unmoved mover. One of the important premisses for this conclusion is that whatever is in motion is moved by something (the subject of *Physics* 8.4). We might have expected from Themistius a critique of this principle for two reasons. First, in the case of the natural movement of the elements, for example of air upwards or of earth downwards, it is not obvious that the element is moved by anything, if that is meant to be anything external. Aristotle regards the element's nature as an inner cause of its being moved and the only external mover upwards of e.g. steam, which is a form of air, is the person who boiled the kettle, or the person who removed the lid, although the latter is only an accidental cause (255b5-256a3). Secondly, at least two people questioned Aristotle on this issue. Galen wrote a treatise querying whether the elements could be said to be moved by anything and was answered by Aristotle's defender Alexander of Aphrodisias in his Refutation of Galen's Treatise on the Theory of Motion. Further, Theophrastus' Metaphysics explored the possibility that the heavens are moved by their souls, without God playing a role. Since Themistius had discussed Galen's criticisms of Aristotle in Book 4 of this commentary (see n. 480 below), already translated by Professor Todd, and in the present books refers to other criticisms by Theophrastus, we might have hoped he would record some of the objections. But this time we are disappointed.

An exceptional feature of this volume is the set of 366 emendations. This gives us the equivalent of a new edition of these books.

## Conventions

 $[\ldots]$  Square brackets enclose words or phrases that have been added to the translation or the lemmata for purposes of clarity.

<...> Angle brackets enclose conjectures relating to the Greek text, i.e. additions to the transmitted text deriving from parallel sources and editorial conjecture, and transposition of words or phrases. Accompanying notes provide further details.

 $(\ldots)$  Round brackets, besides being used for ordinary parentheses, contain transliterated Greek words.

## Introduction

The paraphrase of Aristotle's *Physics* by Themistius (AD c. 317-c. 388)<sup>4</sup> is the earliest systematic treatment of this major Aristotelian treatise to be preserved in its entirety. The present translation of the paraphrase of *Physics* 5-8<sup>5</sup> includes books that by a minority ancient view, and reasonably on general grounds, form a single unit.<sup>6</sup> Books 1-4 offer bold ventures into a series of major issues in physics and metaphysics, but Books 5-8 (sometimes entitled On Change, Peri kinêseôs) are, to use Philoponus' term, more variegated.<sup>7</sup> Thus Book 5 looks back to, and elaborates, the discussion of change in Book 3.1-3, while looking forward (especially in ch. 3) to the discussion of the continuum as a framework for change in Book 6. Book 7 is a miscellany with a problematical status in the *Physics.*<sup>8</sup> but its opening chapter looks ahead to Book 8, an extended proof for the foundational nature of eternal circular motion as the guarantor of change in the universe. But structural issues are not Themistius' concern.<sup>9</sup> His concern is to restate, rationalize, abbreviate and epitomize the texts of these books, as part of his wider goal of providing readers, and presumably students at the schools in which he taught in the 340s, with a review of the major Aristotelian works on which they had completed an initial course of reading and study.<sup>10</sup> Thus while some of Themistius' expositions may reflect his teaching,<sup>11</sup> his paraphrases as a whole are far from 'isagogic' but form an exercise best appreciated by readers already familiar with the Aristotelian text.

The ratio of paraphrase to Aristotelian text for *Physics* 5-8 is the lowest for any of this commentator's Greek paraphrases.<sup>12</sup> Extensive sections, including two chapters (6.7 and 7.1), are omitted, or else radically epitomized, often in a justifiable attempt to avoid repetitiveness, and several formal demonstrations in Books 6 and 8 are omitted or summarized.<sup>13</sup> In one case omission leads to independent input when (at 208,12-30) in the treatment of mechanics in *Physics* 7.5 Themistius offers his own reconstruction. This whole collection of notes is mostly written in the persona,<sup>14</sup> and the style,<sup>15</sup> of Aristotle, a specimen of what Simplicius called exegesis 'part by part' (*kata meros; in Phys.* 1363,25), though without the detail, broader perspectives and textual scholarship of the major commentaries.<sup>16</sup> Historical material is derivative, and there are no explicit cross-references to other Aristotelian treatises<sup>17</sup> and relatively few to books of the *Physics.*<sup>18</sup> Earlier Peripatetics are rarely

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cited,<sup>19</sup> although Alexander of Aphrodisias' magisterial commentary, which is preserved in fragmentary form in the Greek and Arabic traditions, was undoubtedly a crucial source and influence.<sup>20</sup> The Peripatetic tradition was, however, the main catalyst for Themistius' most elaborate and interesting reactions to the Aristotelian text. Thus Alexander's account of change between the elements fuels discussion (at 170,10-19) of whether such change is an exception to Aristotle's definition of change as occurring only between contraries; again, Alexander and Theophrastus set the terms for a treatment of the problem of instantaneous change (at 192,1-22; cf. 197,1-8); and Theophrastus provides a sounding board for considering (at 195,8-26) Aristotle's claim that a change has an end but no beginning. Finally, the suggestive Aristotelian material on projectile motion in *Physics* 8.10 is explicated (at 234,27-235,12) entirely on the basis of Alexander's interpretation.

Themistius' paraphrastic method was avowedly designed to avoid competition with major commentaries,<sup>21</sup> and in the case of the *Physics*, we can see the strengths and weaknesses of his more restrained procedure by comparing and contrasting his material with that of Simplicius.<sup>22</sup> Certainly his consecutive, though sometimes selective, reading of the Aristotelian text is no forum for deploying independent philosophical predilections.<sup>23</sup> Yet if he does not, for example, link the topic of the 'unmoved mover' in *Physics* 8 with Aristotle's theological discussion in *Metaphysics* Book *Lambda*, on which he also wrote a paraphrase (CAG 5.2).<sup>24</sup> he is at pains to show in his paraphrase of *Physics* 6 that instantaneous change, though excluded in principle, is compatible with Aristotle's acceptance of it elsewhere.<sup>25</sup> He also uses the concept of the potential infinite from *Physics* 3.6 to disarm Zeno's paradoxes of motion in Book 6, despite Aristotle's not deploying it for this purpose until Book 8.26 To a modern scholar this could seem intrusive reconstruction in a book that had been written earlier.<sup>27</sup> but Themistius undoubtedly saw the Aristotelian corpus synchronically, as ancient readers generally saw the works of both Plato and Aristotle, and could have agreed with a later commentator. Elias, who claimed that a commentator should 'know all the [works] of Aristotle, so that having shown Aristotle to be consistent with himself, he might expound Aristotle's [works] through Aristotle's works'.<sup>28</sup>

So if Themistius is not highly original in terms of content, he is arguably a pioneer in offering paraphrases of Aristotelian texts in a systematic and consistent form. He extended and transformed a technique that had previously been integrated into more discursive and detached exegetical exercises,<sup>29</sup> though there are no decisive precedents for his method, not, for example, Iamblichus' philosophical scholarship,<sup>30</sup> or the 'synopsis' of the *Physics*, or perhaps parts of it, that Porphyry composed.<sup>31</sup>

Since modern readers of Aristotle will want to consult this commentary primarily on points of detail, I have, as in previous volumes, divided the text into short sections juxtaposed with their Aristotelian sources, though this paraphrase was meant to be read continuously. The identification of a source text does not, of course, imply that the paraphrase systematically covers all of its content, and while the notes will point to many of the supplements, adjustments and omissions involved in Themistius' comments, a detailed collation, or full 'meta-commentary', has to be left to the reader. Commentaries are always at something of a tangent to the texts they address; to define that relationship in too much detail can defeat the purpose of the original exegesis.

#### The translation

This is the first translation of this work into any modern language, its only extant predecessor being a Latin translation by the Venetian humanist Ermalao Barbaro the Younger (1454-93), published in 1481.<sup>32</sup> I have tried to be fairly literal, using square brackets to indicate inserted and understood words (angle brackets are reserved for supplements to the Greek text resulting from emendation). I have also generally used different equivalents for important synonyms,<sup>33</sup> and have dealt with Aristotle's terminology for the processes of change much like my predecessors in this series.<sup>34</sup> Thus I have translated the generic term, metabolê, as 'transformation', and the associated intransitive verb metaballein as 'be transformed'.<sup>35</sup> In the dichotomy implied in Physics 5.1 (see Ross, 616),<sup>36</sup> transformations involve 'coming into being' (genesis) and 'ceasing to be' (phthora),<sup>37</sup> on the one hand, and 'change' (kinêsis), identified by the categories of quantity, quality and place, on the other.<sup>38</sup> Change in quantity (increase and decrease, *auxêsis* and phthisis) and in quality (alteration, alloiôsis) have their own names. 'Change in place' (kinêsis kata topon), however, for which the noun phora has to suffice (cf. Themist. 171,25-172,1) along with the verb pheresthai, covers locomotion. But a challenge arises when the noun kinêsis and both the intransitive and passive forms of the associated verb kineisthai refer not to change in general but specifically to locomotion. Traditionally forms of 'motion' and 'move' were used for all instances of these terms in what Ross once called 'the lesser of two evils'.<sup>39</sup> But if mixing the equivalents 'change' and 'motion' is the greater evil, it will be risked here if only because kinêsis and associated verb forms do not consistently refer to what is naturally meant by 'motion' or 'move' in English, and I have sometimes used the notes to highlight the shifting contexts that require a change in translation.<sup>40</sup>

In the active voice *kinein* means to cause change or cause motion (or in English 'change' or 'move' in a transitive sense), but I have mostly translated it as 'produce change/motion'. Hence the hallowed 'prime mover' (*prôton kinoun*) will be 'the first producer of change', a name perhaps preferable to 'the first changer' and also indicative of the full range of results produced by an initial change in respect of place at the

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celestial level. Also, the middle voice *kineisthai* can mean 'move' or 'change' in an intransitive sense, but also has a passive sense ('be changed', 'be moved') that needs to be used where an agent is identified or implied.

Finally, verbal aspect, particularly where the present and perfect tenses are being contrasted, has sometimes required formulas such as 'to undergo change/transformation' or 'to be in the process of change/transformation' to capture the continuous present tense, while 'to have completed change' *vel. sim.* has sometimes been used to emphasize the perfect tense. I have tried to be sparing with such supplements, though they have antecedents in the Greek.<sup>41</sup>

#### The text

Before the edition by Heinrich Schenkl (1859-1919) at *CAG* 5.2 (1900), Themistius' paraphrase had received an Aldine edition (1534) and one by Leonhard von Spengel (1803-80), published in 1866 on the basis of limited sources.<sup>42</sup> Spengel, who claimed to find Themistius the most helpful of the Greek commentators, was Schenkl's marked superior in textual criticism and his emendations left their mark on the later edition, and, as I gratefully acknowledge, an even greater mark on the text translated here. In fact, the imperfections and hesitations in Schenkl's text have led me to make over 300 changes in content and punctuation.<sup>43</sup>

Schenkl investigated the manuscripts industriously (his *praefatio* must be one of the longest in CAG) and established four independent groups (Praef., p. xv and cf. p. xxviii), but their representatives often had to be supplemented with information from other mansucripts.<sup>44</sup> He also exploited the indirect tradition, represented by the Aristotelian text,<sup>45</sup> Simplicius' commentary on the *Physics* (CAG 10),<sup>46</sup> and to a degree by scholia derived from Philoponus' commentary (CAG 17).47 Themistius' presence in Simplicius is sometimes signalled by his name, but is often latent in closely corresponding texts, many of which may have been independently derived from Alexander's commentary. But while the Themistian text can, and must, be emended from all these sources, it remains inherently imperfect. In the books translated here difficult material was copied by Byzantine scholars doubtless more intent on understanding Aristotle than on preserving the integrity of an ancillary paraphrase.<sup>48</sup> The text relied on for the present translation therefore reflects its early transmission as well as its modern editorial history.

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#### Note on conventions

The abbreviations used for the Greek commentaries and for works in the Aristotelian corpus are those listed at Wildberg, 12-17 and 34-5. The following are also frequently used: Arist. = Aristotle; Themist. = Themistius. For other abbreviations and for authors cited only by name see the Bibliography. Aristotelian loci that Themistius does not paraphrase are marked in bold type in the notes. Cross-references between notes will be to loci indicated at the beginning of the note.

#### Notes to the Preface and Introduction

1. Sorabji (1), 367 and 382-3.

2. See Sorabji (1), ch. 24.

3. See Sorabji (3).

4. For general information on Themistius see Todd (3), 1-7, (7) and (8).

**5.** For a translation of the paraphrase of *Phys.* 4 see Todd (6), and cf. Algra; my translation of the paraphrase of *Phys.* 1-3 is in preparation.

**6.** In antiquity Nicolaus of Damascus (Drossart-Lulofs 130-1), Porphyry (ap. Simpl. *in Phys.* 802,7-13 = 159F Smith), and Philoponus, *in Phys.* 2,17-18, held this view. Other ancients divided the work into two parts: Books 1-5 (*Phusika* vel sim.) and Books 6-8 (On Change, *Peri kinêseôs*); see Ross, 1-3 and Barnes (2), 34-6, 60-1 and 67-9 (= Simpl. *in Phys.* 923,3-925,2).

**7.** Philop. *in Phys.* 2,17-18. 'The discussion *On Change* is complex (*poikilos*), and has many implications'.

**8.** See Simpl. *in Phys.* 1036,8-11 (with Hagen, 11 n. 5). Simpl. *in Phys.* 1036,19-1037,3 suggested that *Phys.* 7 was an early work added to a later edition of the *Physics*.

**9.** At *in DA* 39,6 and 41,29-30 (cf. 50,28) he employs the title 'On the First Principles of the Whole of Nature', which is similar to one that Simplicius, *in Phys.* 801,13-14, uses for *Phys.* 1-5; see Todd (3), 168 n.1. But his reference to a *pragmateia peri kinêseôs* ('a treatment [rather than treatise] concerning change') at *in Phys.* 215,7 seems limited to the immediate context, and not applicable to *Phys.* 5 (or 6) through 8.

**10.** On Themistius' teaching career see Vanderspoel, 42-9. On his conception of his exegetical method see Todd (3), 2-4; see the recent case studies by Achard (1) and (2), Cacciatore and Ciollaro.

**11.** Possible indications of oral instruction are the dialogue at 168,23-35; exhortations to recall material covered earlier (166,8; 210,24; 217,8-9; 222,2); addresses to an audience (e.g. 167,15; 187,29; 197,22; 219,3; 232,6-9); internal dialogue (168,14-169,7; cf. also 210,22-211,6); rhetorical ridicule (185,4-19; cf. *in Phys.* 132,17-133,2, and especially cf.132,26-7 with 185,8); and perhaps the unusual number of rhetorical questions (e.g. 168,33-5; 169,10-11.13.16-18; 179,22-180,1; 183,21-2; 224,27-8; 226,6-7; 229,6-8).

**12.** The ratios of paraphrase to text for the four books *Phys.* 5-8 (as calculated by Dr C.S. Morrissey) are respectively 1.10, 1.12, 0.38 and 0.88; i.e. the paraphrase amounts to 87% of the Aristotelian text, whereas for *Phys.* 1-4 it is just over double its length. See further Todd (6), 4 n. 4.

**13.** At *in An. Post.* 1,22-2,1 Themistius alerts the reader to the abbreviation of irrelevant material; a similar principle of relevance is at work in the books translated here. Formal demonstrations in particular were probably not worth paraphrasing, or reproducing, when Themistius' target audience had access to the Aristotelian text.

14. Aristotle is cited by name eight times, but only when Themistius stands back from paraphrasing to pursue special problems (192,11.13.21; 195,13; 197,9), or to put texts into some general perspective (171,2; 183,2; 184,10). That Themistius merges his identity with that of Aristotle is measurable in the books translated here from the fact that he uses 'he says' to introduce Aristotle's views only three times (195,13.15; 197,12), whereas this is standard in the lemmatized commentaries of Alexander, Simplicius and Philoponus. The merger means that in cross-references it is unclear whether Themistius is referring primarily to his paraphrase or to the Aristotelian text; I have usually cited both.

**15.** In this regard Netz's analysis of the Aristotelian paragraph, particularly 219-23, is instructive, despite being formalistic and neglecting semantics, since it details an argumentative structure that reappears in Themistian paragraphs, where demonstrations or arguments are pursued through successive clauses, generally introduced by the particle *gar*. See the Greek-English index on the uses of this ubiquitous particle and for possibilities for translations that go beyond the traditional and, sometimes almost meaningless, if unfortunately unavoidable, 'for'.

**16.** Simplicius, for example, concludes his commentary on the *Physics* with a masterly overview (*in Phys.* 1363,25-1366,22), and also introduces individual books with synopses; he also mentions variant readings, which are never cited by Themistius.

**17.** In elaborating 225b11-13 at 170,20-9 he may be referring to the *Categories*, a work on which his elementary paraphrase is lost; on it see Simpl. *In Cat.* 1,9-10; Themist. *in Phys.* 4,26 (if 'we' here refers to Themistius and not Aristotle; cf. n. 11 above on merged identities), and Themist. *Or.* 21, 37,3-5 Downey-Norman.

**18.** Some (165,19; 166,8-9; 210,24; 217,9-12) involve the definition of change in *Phys.* 3; others are to relevant texts in *Phys.* 1 (170,1 on 190b30-3; 192,9-10 on 186a15-16), or *Phys.* 4 (190,12 on the void), or to the classification of changes in *Phys.* 5.1 (217,7-11).

**19.** No overt reference is made to Eudemus (second half of the fourth century BC), who commented extensively on *Phys.* 5-8 (Wehrli F92-F123b); see, however, the notes on 182,10; 182,23-7; and 221,10-16. Theophrastus (*c.* 372-*c.* 287 BC) is mentioned three times (192,1; 195,9; 197,5), Alexander (late second/early third century AD) twice (170,10; 197,4).

**20.** Moraux (2), 129-80 reviews the evidence for it in Simplicius; on Greek and Arabic sources; see Giannakis and Rashed (1), (2) and (5) (the last as yet unavailable).

21. Themistius, in An. Post. 1,2-7.

**22.** Though unable to consult Baltussen (3) on Simplicius, I think it fair to say that the Themistian brand of philosophical paraphrasing was quite challenging in its selectivity and compression, whereas expansive text-by-text commentary required less exacting self-discipline even if greater industry.

23. The material translated has no bearing on the issue of Themistius'

Neoplatonic affinities, except for his characteristic use of rare Platonic vocabulary in often unlikely places (see the notes on 166,8; 181,3; 200,21; 207,33; 208,10). On Themistian affiliation and originality see Algra's sober comments in his review of Todd (6). Themistius may have inherited a Neoplatonic tradition from his father, Eugenius, as Ballériaux has argued, but he may also have inherited some of the orthodox exegetical material that we find in his paraphrases; cf. Fazzo (2) 287-95 on the likelihood that Alexander of Aphrodisias also relied on such inherited material. I. Hadot's bald claim (Hadot, 186 n. 12) that Themistius is a Neoplatonist rather than a Peripatetic is, even if in some attenuated sense true, quite compatible with his not being in a systematic way a Neoplatonic Aristotelian commentator. Given the nature of his surviving corpus, that is really all that should matter to anyone not rigidly obsessed with simplistic doctrinal classification.

**24.** This paraphrase (extant in Hebrew and Arabic; see Brague) may have been intended for an audience familiar with *Physics* 8. See Brague, 138-9 and 141 for the references to *Phys.* 8 by Themistius at his *in Metaph. Lambda* chs 6 and 7.

25. See 191,30-192,22 and 197,1-19.

**26.** See Themistius at 187,7-17, 192,17-18; and 200,8-10, and cf. Arist. *Phys.* 8.8, 263a4-263b9 (= Themist. 229,21-30).

**27.** Bostock (1), 180 cites Aristotle's 'lack of suspicion' of the infinite in *Phys.* 6 in contrast with *Phys.* 3, and proposes the 'simple hypothesis' (*sic*) that Book 6 was written before Book 3, which prepares the way for Book 8.

**28.** Elias (sixth-century), *in Cat.* 123,7-9. See Fazzo (1), 9-10 with n. 29 on the general method of interpreting Aristotle 'through Aristotle', a procedure naturally open to qualification and refinement in case studies; see Abbamonte (1), 256-60 on Donini, 5041-4.

**29.** On the admittedly different kind of paraphrasing to be found in major commentaries see the case studies by Abbamonte (1) and (2). Simplicius' contrast (*in Cat.* 30,1-3) between Boethus' detailed text-by-text commentary on the *Categories* and Andronicus' paraphrase is almost certainly a projection onto earlier Aristotelian exegesis of a distinction that was not current until the fourth century AD (a point I owe to Andrea Falcon). In fact, if Silvia Fazzo (who kindly showed me an advance copy of Fazzo [3]) is correct in her forthcoming study of Nicolaus the Peripatetic, who also wrote Aristotelian paraphrases, he was a contemporary of Themistius in the eastern Empire. Even so, exclusively paraphrastic exegesis was rare in antiquity (see D'Acona Costa, 225-6), and in Byzantine Aristotelianism flourished only in a derivative form of generally limited value.

**30.** D'Ancona, 324-5 is rightly sceptical of programmatic claims by Larsen, 117, as she is at D'Ancona Costa, 226 in a survey of Themistius at 224-6.

**31.** For the fragments of this commentary see Smith, 120-59. The relation between the *sunopsis* of Aristotle's views on change by an unnamed critic (plausibly identified as Porphyry) mentioned by Themistius at *in DA* 16,30 and Porphyry's commentary on the *Physics* is unclear. See Moraux (1) and Lautner in Urmson (2), 124 for further discussion.

**32.** On the Syriac and Arabic *fortuna* of this paraphrase see Peters, 30 and 34. On Barbaro's translation see Todd (7), 91-3.

**33.** These include verbs for division (*diairein*, 'divide'; *merizein*, 'divide into parts'; *temnein*, 'cut'); adjectives for indivisible entities (*adiairetos*, 'indivisible'; *amerês*, 'partless'; *atomos*, 'undivided'); nouns for states and processes involved in rest (*êremia*, 'rest'; *monê*, 'stability'; *stasis*, 'stop'), for limits (*peras*, 'limit'; *eskhaton*, 'extremity', with *peras* usually meaning a terminal limit, equivalent

#### Introduction

to *teleutê* or *telos*), and finally for a continuous extension, where *megethos*, 'magnitude' is often used instead of *mêkos* ('length') and *diastêma* (for which the contexts require the use of both 'distance' and 'extension').

**34.** See Urmson at Urmson (1), 9 n. 1, Urmson (2), 5-6 and Urmson (3), 145 n. 9. See also Gill (2), 17 and Waterlow, 162-3.

**35.** The consequence of adopting this passive form is that it cannot be idiomatically rendered as a continuous tense without using an auxiliary verb. Thus, for example, at 191,26 it is said that a thing 'would not be being-transformed' for which 'would not be undergoing transformation' has to be used; cf. also 193,27. See also n. 41 below.

**36.** Themistius does not overtly acknowledge this dichotomy (for example, he omits comment on a statement of it at 229b13-14), perhaps because it conflicts with the interchangeability of *metabolê* and *kinêsis* in *Phys.* 3.1-3; cf. also the exclusive use of *metabolê* at Arist. *Metaph.* 1069b3-14.

**37.** These will be my translations for these nouns, and while the verb associated with 'ceasing to be', *phtheiresthai*, can be readily translated 'cease to be', that associated with coming into being, *ginesthai*, has a wider range of meanings; see the Greek-English index.

**38.** Lautner at Urmson (3), 146, claims that the distinction between *metabolê* and *kinêsis* is 'artificial'. But its principle is taxonomically sound. The fact that the semantics of *kinêsis* and the status of locomotion as the primary change (*Phys.* 8.7) upset this taxonomy is a matter of conceptual inadequacy, which is quite a different issue.

**39.** See the preface to the Hardie/Gaye translation, p. iii. His policy is followed in recent translations of *Physics* 8 by Graham and McKirahan, the latter explicitly proceeding 'in conformity with tradition' (9).

**40.** Waterfield's translation of the *Physics* follows a similar procedure. The subject-matter dictates changes in translation, as, for example, where it clearly refers to the motion of the elements (e.g. *Phys.* 8.4 *passim*) or to that of humans or animals (e.g. 173,2-4; 174,28).

**41.** Verbs of motion can convey processes of change (see 166,1; 177,29-30; 198,4; 210,27; 227,28) as can the periphrastic use of the verb 'to be' with the present participle (166,16; 221,19-20.22-3). The perfect tense can be reinforced by the verb 'to be' with the perfect passive participle (170,18; 196,6; 202,28-9) and by the adverb  $\hat{e}d\hat{e}$  ('already') (193,26; 194,15; 196,14). See the Greek-English index under *kekinêsthai* and *metabeblêkenai* for a list of these perfect tenses. Also, the verbs *anuein* and *dianuein* are used to describe the completion of motion or change; see the references in the index. Analogous issues arise with the use of the ingressive aorist; see the notes on 198,3-12, 203,16-23 and 215,27.

**42.** For this paraphrase he used the Aldine edition, and the annotations by the humanist Piero Vettori (1499-1585) in a copy of that edition at Munich.

**43.** Some changes in punctuation made for purely stylistic purposes, e.g. some parentheses (e.g. 173,17-21 and 32-3), are not recorded. Schenkl (Praef. p. xxxviii) admits that he realized too late that he had not systematically revised Spengel's punctuation, which was not of the same standard as that scholar's textual criticism.

44. The manuscripts cited by sigla are C (Parisinus graecus 1888), M (Modena, Biblioteca Estense  $\alpha$ .M.9.13), L (Parisinus graecus 1891), S (Florence, Biblioteca Medicea 85.18), W (Marcianus graecus 205), respectively nos 43, 36, 46, 31 and 56 at Todd (5), 271-3. Others will be fully identified where cited.

**45.** The Aristotelian editions used by Schenkl are superseded and much of the information in his apparatus from this area is open to correction or adjustment. Also, since the Aristotelian text is not represented by lemmata, Greekless

readers will inevitably find some disjoint between my translation and English translations of the Aristotelian text, with the exception of 168,6-169,7 (on 225a12-20). I have also identified Aristotelian quotations only where they are self-consciously offered; it would undermine the paraphrastic method to try and isolate restated Aristotelian material.

**46.** Of the books translated here, only Simplicius' paraphrase of *Phys.* 8.1-5 is unavailable in the present series; for the others see Urmson (2), Konstan, Hagen and McKirahan.

**47.** The Arabic version of his commentary on *Physics* 5-8 (see Lettinck) contains no references to Themistius.

**48.** The defects in the Greek text of Themistius' paraphrase of the *de Anima* revealed by the Arabic translation (see Todd [3] *passim*) are indirect evidence for the degree of corruption likely to have occurred in the text of the paraphrase of the *Physics*.

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## **Textual Emendations**

The notes in the translation for the loci given here will offer, as needed, an explanation and justification for these changes. In citing Spengel I have not distinguished here, or in the notes to the translation, between emendations that he incorporated into his text and those that he left as proposals in his apparatus criticus. Schenkl is cited for suggestions in his apparatus criticus that were not adopted in his text. All unattributed changes are mine.

These emendations will also be made available in a pdf file using Greek characters on the web site of the *Ancient Commentators on Aristotle* project at http://www.kcl.ac.uk/kis/schools/hums/philosophy/aca/

#### Book 5

5 1

9.1	
165, 6	after topou supply metabainôn
165,8	tauta] read tina
165,9	before <i>thôrax</i> supply <i>ho</i> (Arist. 224a26; MS L)
165, 12	kath' hauto] read kath' hauta (Spengel)
165, 13	after $th\hat{o}rax$ delete the comma and supply $\hat{e}$
166,1-2	remove the brackets on <i>houtô – metaballei</i> ; place a colon before <i>houtô</i>
166,12	place <i>memnêmetha – diaphoras</i> in brackets; delete the preceding colon; replace the stop after it with a comma
166,17	kat' auta] read ouk auta (MS Laur. 85,14; Spengel)
166,19	second <i>oude</i> ] read <i>oute</i>
166,20-3	before <i>kinein de</i> replace the colon with a comma; place <i>hoion</i> – <i>lithon</i> (21) in brackets; delete the preceding comma; place <i>ou gar</i> – <i>anankês</i> (21-2) in brackets, with the colon after <i>metabolê</i> (22) deleted
166,23	kakeinoi ê tina] read kan kinoiê tina (Diels)
167,15-16	ex antikeimenou] read ex antikeimenôn
167,16	before <i>metaxu</i> supply <i>ta</i> (Spengel)
168,7	delete <i>legetai</i>
168,7	mê ex hudatos] read ek mê hudatos
168,9	delete <i>en tôi</i> (MS W <sup>2</sup> )
168,18-19	after <i>kuriôs</i> delete the colon; place <i>holon – melan</i> in brackets
168.23	repunctuate as <i>hoti 'ek tou geros hudatos mê ontos'</i>

12	Textual Emendations
168,31	phaion] read eruthron (cf. 168,28)
168,32-3	repunctuate as <i>elpois an noti der</i>
169,5	often aumhahâhan replace the commo with a ston
169,10	after sum delete the question mark: place it after sum babâken
109,10	instead of a stop
5.2	
170,1	after <i>eidei</i> delete the comma; place <i>touto – sunekhôreito</i> in brackets, followed by a stop rather than a colon
170,6	after <i>metabolêi</i> replace the colon with a question mark
170,7-8	after $p\hat{os}$ supply <i>men</i> ; replace the question mark after $z\hat{o}i\hat{o}n$ with a comma; replace the stop after <i>enantia</i> with a question mark; move the closing bracket after <i>gar</i> (7) to follow <i>enantia</i>
170,13	after <i>hudati</i> supply <i>holôi</i>
170,31	before the second <i>kinein</i> supply to
171,9	before allo supply ei gar kinêsis kineitai
171,10	after <i>kinêsin</i> supply <i>einai</i> (Schenkl), followed by a stop
171,10	before geloion replace to with eti (Spengel; cf. Arist. 226a16)
171,12	after <i>kath' heauta</i> replace the comma with a stop
172,3 172,7	after <i>enantia</i> place a stop
5.3	
172,26	restore the text to <i>duoin gar tinôn to metaxu</i> ; place it in brackets; delete the colon preceding it and replace the one following it with a comma
173,19	before <i>ephexês</i> supply ta (cf. 173,11)
173,30	genêtai] read genoito (Spengel)
5.4	
174,19	before phoran supply pasan (Simpl. in Phys. 882,8)
174,22	delete gar $(1, 1)$ $(1, 2)$ $(1, 2)$
174,22	genei eidei] read gene eide (Arist. 227012)
174,20	horizomethaj read horizoimetha
174,25	after khronon delete heng and the stop following it
175,10-11	nlace heis – dialeinei in brackets
175.15	ophthalmian read ophthalmias (Arist. 228a2)
176,11-13	after <i>genei</i> (11) delete the colon; place <i>dramôn – homoeideis</i> (13) in brackets
176,13-14	after the first $ou$ (13) delete the colon; place $ou \ gar - estin$ (14) in brackets
5.5	
177,18	delete $h\hat{e}$ (MS W)

177,21 *enantiôn*] read *enantiou* 

- 177,28 before *eis* supply *têi* (cf. Arist. 229b12)
- 177,29 before *ontos* supply *tou*

#### 5.6

178,19	eis to katô] read en tôi katô
178,19	eis to anô] read en tôi anô
178,23	all'oute] read all'oude
179, 1-2	delete <i>ar' oun</i> ; read <i>hôi to</i> (Schenkl)
179,3	after <i>pilêthentes</i> replace the stop with a comma
179,5	before <i>alloiousthai</i> supply to
179,10	after <i>ên</i> supply <i>an</i>
179,20	after <i>phusin</i> replace the colon with a comma
179,20	read all' oukh <hê kata="" phusin="" têi=""> tois autois</hê>
180,2	menoi an] read menei (MSW; Spengel)

#### Book 6

#### 6.1

0.1	
181,7-9	delete the question mark after <i>eskhaton</i> (7); place <i>ou gar</i> –
	esencion (9) in brackets
181,10-11	convert <i>kai gar tini – suntithemena</i> into a question by
	accentuating <i>tini</i> as an interrogative pronoun
181,16	suntithentôn] read suntethentôn
181,16	<i>estai</i> ] read <i>eiê</i>
181,16	kat'auto] read kath' hauto
181,19-20	after <i>topôi</i> delete the comma; place <i>kai – grammês</i> (20) in
	brackets
181,21	after megethos supply peritton (cf. 181,14-15)
182,1	stigmê] read stigmên stigmêi (dative) (cf. Arist. 231b6-7; MSW)
182,7	before <i>metaxu</i> supply <i>ti</i>
182,12	before the second $gramm\hat{e}$ delete the colon; place $gramm\hat{e}$ –
	<i>metaxu</i> in brackets
183,18	<i>legomen</i> ] read <i>legômen</i> (MSW; Spengel)
183,24	delete kai peporeusthai
184,2	the first <i>mête</i> ] read <i>mêde</i>
184,4	ep'autou] read ep'auto
184,4	before <i>eph' ho</i> supply <i>tou</i>
184,11	delete the first tês (MS W; Philop. in Phys. 862,30)
184,21	before <i>hou</i> supply <i>eph</i> '
184,21	enestôs] read enestos
184,27	to] read $t \hat{o} i$ (MSS SL)
184,31	megethous] read khronou
6.2	
185 18	delete <i>â diaphthaireusin</i>

- 185,18 delete  $\hat{e}$  diaphtheirousin
- 185,30 diaxei] read  $di\hat{e}xei$  (MSS W, Laur. 85,14)
- 185,31 before  $is\hat{o}i \ khron\hat{o}i \ supply \ en$

14	Textual Emendations
186,8	to $Z\Theta$ ho khronos] read ho $Z\Theta$ khronos
186,9	en tôi ZØ khronôi] read en tôi ZI khronôi
186,11	before <i>braduteron</i> supply to
187,6	after mêkos supply kai khronos (cf. Arist. 233a24)
187,7	to] read tou
187,21	estai] read estô (MSS SL; Arist. 233a34)
188,5	after <i>diexeisin</i> replace the colon with a stop; after <i>adunaton</i>
	replace the stop with a colon
188,13	hupothoimetha] read hupothômetha (Spengel)
189,16	after $khronôi$ delete the comma and $en\ hôi$ (supplied by Schenkl)
6.3	
189,23	between <i>hen</i> and <i>tauto</i> supply <i>kai</i> (cf. 190,2-3)
189,23	delete nun (cf. Simpl. in Phys. 955,13-14)
189,23	delete esti (Simpl. in Phys. 955,13-14)
189,24	after hoion supply te
189,27	after <i>mellon</i> replace the colon with a question mark
189,30	parelêluthotos] read parelêluthos (Spengel)
190,19	after <i>mellon</i> replace the colon with a stop, after <i>atopa</i> the stop
	with a colon
190,20	after <i>nun</i> delete the comma
190,20-1	enclose <i>houtos – to mellon</i> with dashes; after <i>mellon</i> delete the
	comma
191,10	mêde dunaito] read mêd' an dunaito
191,17	mête] read mêden
6.4	
191.27-8	place <i>oute – dunaton</i> in brackets: delete the colon preceding it
192,5	metaballei] read metaballein (Spengel)
192,15	noêsai] read nomisai (Simpl. in Phys. 969,16; Spengel)
192,18	before <i>metaballein</i> supply to
193,1	for the lacuna read <i>tauta diairetê kata</i> (Schenkl)
193,5	delete the colon after sumbebêkos
193,5	after <i>tôi</i> delete <i>gar</i>
193,6	third to] read tôi
193,7	$t \hat{o} i \ p \hat{r} \hat{o} t \hat{o} i]$ read to $p \hat{r} \hat{o} t on$ (MS L), with no comma following it
6.5	
193,11	elthonta] read elêluthota
193,12	êuxêthê] read êuxêtai
193,14	elêluthota] read elthonta
193,14	replace the comma after <i>nun</i> with a colon
193,16	delete de (Arist. 235b9; Spengel)
193,19	hotan] read hote (Arist. 235b14; Spengel)
194,25	after $prôt\hat{e}$ delete the stop; place $h\hat{e} gar - protera$ in brackets, followed by a colon
194.31-	place to te gar – sôma in brackets: delete the colon preceding it:
101,01-	prace to to gain bonna in praceos, acrete the colon proceeding it,

195,1 replace the stop following it with a comma

#### Textual Emendations

195,1	êremêsei]	read é	êremêse	ie (Spenge	el)
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- 195,14 all'ekeino pôs] read all'<ei> ekeino, pôs (Schenkl)
- 195,25 before the first *kai* supply *ei*
- 195,27 katha] read kath' hon

#### 6.6

- 196,2 for the lacuna read *metêllakhen ek tinos eis ti (ei gar en tautôi eiê, ouk an kinoito), to de metêllakhos kekinêtai* (Simpl. *in Phys.* 992,17-18)
- 196,3 *hou*] read *ho* (Spengel)
- 196,5 after *proteron* replace the colon with a comma
- 196,7 *autou*] read *auto*
- 196,8 delete *aei* (coni. Spengel)
- 196,9 before kekinêsthai delete to
- 196,12 after *metaballein* replace the comma with a stop
- 196,14 after proteron supply alla kai to kekinêmenon kineisthai proteron (Arist. 237a18)
- 196,17 after *autôi* delete the comma; delete *ex hou metaballei* (cf. Arist. 237a21-2)
- 196,20 en ekeinôi] read en <tôi hêmisei> ekeinou (Arist. 237a27)
- 196,22 *de*] read *men*
- 196,25 metabalein] read metaballein (MSS SL; Spengel)
- 197,4 delete ouk
- 197,20 after *egineto* supply *hudôr*
- 197,25 after homoiôs supply de (Arist. 237b17)

#### 6.8

- 198,26 *khronon*] read *topon*
- 199,1 after *kineisthai* replace the question mark with a comma
- 199,1 delete *te*; read *tout' auto* (Spengel)

#### 6.9

- 199,10 before *nun* supply to (MS Laur. 85,14; Spengel)
- 199,10 after *sunekhous* delete the comma
- 199,17 after *khronôi* replace the comma with a colon
- 199,17 after *de* delete the comma
- 199,18 delete prôton
- 199,19 after *diastêma* delete the comma; place *ouketi sunekhê* (20) in brackets
- 199,26 *hou*] read *ho*
- 200,10 before gar supply men
- 200,11 after *logon* replace the stop with a comma
- 200,21 oute] read oude
- 201,3 after *dieisi* supply *para* (cf. Arist. 240a11)
- 201,5 for the lacuna supply *isa onta* (Schenkl)
- 201,10 delete kai (Spengel)
- 201,10 before *ex hou* supply *en tôi* (Spengel)

16	Textual Emendations
201,14	after <i>metaballon</i> supply <i>alla metaxu</i> (Spengel; cf. Simpl. <i>in Phys.</i> 1020,17, app. crit.) followed by a stop
201,14	after <i>adunaton</i> replace the stop with a colon
201,19	diorismos ho] read ho diorismos
6.10	
202,4-8	after <i>holou</i> (4) delete the stop; place <i>idoi</i> – <i>kuklon</i> (6) in brackets;
	replace the stop after <i>kuklon</i> with a comma and continue the sent-
909 11	ence to <i>encipor kneun</i> (o), after which replace the coolin with a stop
202,11	remove the lacuna between <i>melaodileth</i> and <i>eremot</i>
202,11	ei de ekeinoj read ei d' <en> ekeinoi</en>
202,12	en toutois] read en toutôi (Arist. 240b24-5)
203,3	after <i>diastêma</i> replace the comma with a stop; after <i>adunaton</i> replace the stop with a colon
203,5	delete <i>alla</i> and the comma preceding it (Spengel)
203,11	after <i>enantia</i> replace the stop with a comma; after <i>metabolês</i> replace the comma with a stop
203,11	after <i>auxêseôs</i> supply <i>kai phthiseôs</i> , followed by a colon, then <i>auxêseôs</i> (Arist. 241a33)
203.16	ap'autou eis autol read aph' hautou eis hauto
203,25-8	after dunaton (25) delete the comma; place $hoion - kin \hat{e}sis$ (27) in brackets
203,28	after <i>hapasôn</i> place a stop, after <i>mian</i> a comma
203,29	ton khronon] read tôi khronôi (Arist. 241b19; Spengel)

### Book 7

7.2	
204,3	huph' heautou] read huph' heautôn
204,5	phoran] read kinêsin
204,9-10	delete autou men ouk epakolouthountos
204,10	sphodroteras] read sphodrotera and reposition it after genêtai
204,12	before <i>ôthounta</i> supply <i>ton</i> (Spengel)
204,14	oude] read ouden (MSS MSL)
204,16	ta aisthêta] read ta alloioumena (Arist. 245a3; Simpl. in Phys. 1058,10)
205,9	apontos] read apiontos (K. Schenkl)
205,9	before tou phthinontos supply tinos (cf. Arist. 245a14)
7.3	
$205,\!24$	<i>eiê</i> ] read ê <i>i</i> [= subjunctive with iota subscript] (Spengel)
205,30	alloiousthai to] read to alloiousthai
206,9	<i>legei</i> ] read <i>legoi</i> (Spengel)
7.4	
206,25	after $hapas \hat{o}n$ delete the colon and place the question $ti gar - phoras$ in brackets

206,31 enclose *phoras – toioutôn* with dashes; place *neuseôs ptêseôs badiseôs* in brackets

7.5

- 207,14 sumbainei] read sumbainei (Spengel)
- 207,15 delete paradoxon and replace it with anison de
- 207,18 autôn] read autôi
- 207,27  $oude p\hat{e}$ ] read  $oudep\hat{o}$  (MSS SL)
- 207,27 delete the second *oude*
- 207,28 tou tripêkhuaiou] read tôi tripêkhuaiôi (Spengel)
- 207,30 proselthon, ho ti] read ho proselthon (Spengel)
- 207,31 delete  $ne\hat{os}$
- 207,33 kai ho sôritês kathaper] read kathaper kai ho sôritês
- 208,1 on *oukoun* change the accent from perispomenon (*sc.* circumflex on the final syllable) to paroxytonic (*sc.* acute accent on the penultimate syllable)
- 208,4 before *hekastou* supply *tou ex*
- 208,5 after *hekastou* replace the comma with a stop
- 208,5 *te*] read *de*
- 208,5 *pleiô*] read *pleiôn* (Spengel)
- 208,17-18 delete  $therm \hat{e}s kai$
- 208,20 before *baros* supply *to* (Spengel)
- 208,20 after *pherein* replace the comma with a question mark
- 208,20-1 transpose  $m\hat{e}$  (20) to precede anankaion (21); after al $\hat{e}$ thes (21) replace the stop with a question mark
- 208,23 sumbainein] read sumbainei (Spengel)
- 208,27 delete the comma after haptomenon
- 208,27 delete gar (MSS SL)

#### Book 8

#### 8.1

- 209,19 sunagêi] read poiêi (cf. Arist. 250b28)
- 209,20 sunekhôs] read sunekhês
- 210,13 after kinêsis delete the comma
- 210,13 after *pragmasi* replace the comma with a colon
- 210,15 *eskhon*] read *eskhen* (Spengel)
- 210,26 for the lacuna supply hexei pantôs (MSS CSL)
- 210,30 after *homoiôs* replace the comma with a colon
- 210,32 before *houtôs* supply *an*
- 210,34 arkhetai] read arkhetô (MSS SL)
- 211,1-2 after *hupothesis* delete the colon; place the question ti ou in brackets, followed by a comma
- 211,5 *êremein*] read *kinein* (MSS L and Par. Gr. 1888 in marginibus)
- 211,32 after *einai* replace the stop with a dash
- 211,35 delete en khronôi
- 212,5 tou nun] read to nun (MS Laur. 85,14; Spengel)
- 213,3 after *aitia* delete the comma

18	Textual Emendations
8.2	
213,12	before <i>proteron</i> supply to (Spengel)
213,14	before <i>apsukha</i> supply <i>ta</i> (cf. 213,17)
213, 14-15	after <i>khronou</i> delete the comma; place <i>hoion – suntheta</i> in
	brackets followed by a comma
213,16	after <i>êremounta</i> replace the comma with a stop
213, 17-18	proteron autou] read autou proteron
213,18	after <i>apodeiknusthai</i> replace the stop with a comma
213,26	after <i>oud</i> 'delete the comma and place it after <i>sunekhês</i>
213,33	mête kinoumena] read mêde proteron kinoumena (proteron mête kinoumena MSS CSL)
214,3	delete on (Spengel)
214,12	after <i>genesthai</i> replace the colon with a question mark (Spengel)
214,12	oude] read oute (Spengel)
214,16	reposition exôthen before endidontôn (Spengel)
$214,\!25$	before <i>tôn</i> supply <i>ek</i>
214,25	after <i>alloiôseôn</i> remove the comma
8.3	
215,17	place the question <i>kai – tautên</i> in brackets
215,18	delete <i>eipein</i> (MS M; om. cett.)
215,18	homoiôs] read homôs (Spengel)
$215,\!22$	oute] read oude
215,23	to] read tôi
$215,\!27$	diistêsi] read diestêsen (MS Laur. 85,14; Simpl. in Phys. 1197,10)
$215,\!27$	after hoi supply men
215,30	after ekoilanen supply an
216,2	delete tôn
216,2	holon] read holôn
216,2	epêlthe] read apêlthe
216,9	after <i>endekhetai</i> replace the comma with a stop
216,14	metaballon] read metabalon
216,16	sklêrous] read sklêroterous (Arist. 253b31; Spengel)
216,19	after <i>êremei</i> replace the colon with a question mark
217,3	toutou] read toutôn
8.4	
217,18-19	after <i>kineitai</i> delete the colon; place <i>en heautôi – kinêseôs</i> in brackets
217,27	remove the brackets on <i>heteron – kinoumenon</i> ; place a stop after <i>kinoumenon</i>
218,1	before <i>legetai</i> supply <i>ouk orthôs oun auto</i> (Schenkl)
218,1	hup'autou] read huph' hautou (Spengel)
218,4	oud'] read outh' (MSS CL)
218,5	oude] read oute (Spengel)
218,8	allôs te] read all'
218,10	after <i>sumbainei</i> delete the stop

- 218,15-17 place *ou gar exôthen* in brackets; delete the colon that precedes it; replace the one that follows it with a comma
- 218,25 after *kinôntai* place a comma
- 219,1 before *metaballein* supply *hoion te*
- 219,6 *ean*] read *ei* (MSS **SL**)
- 219,8 to anô pheresthai] read tou anô pheresthai
- 219,15 metabalein] read metaballein (MSS SL)
- 219,18 delete te (Aldine edition)
- 219,20  $k \hat{o} l u o i$ ] read  $k \hat{o} l u e i$
- 219,26 hup'autôn] read huph'hautôn
- 220,4 before kinêseôs add to
- 220,5 delete to and for dunamin ekhein read ekhein dunamin
- 220,6 after kinêsin replace the question mark with a stop

#### 8.5

220,8	delete <i>gar</i> (Spengel)
220,8-12	after kinoumenou (9) delete the comma; place hoion –
	kinoumenou (9-11) in brackets; replace the stop after
	<i>kinoumenou</i> (11) with a comma, and the stop after <i>arkhên</i> (12) with a colon
220,15-16	place <i>ekeinos</i> – <i>mokhlon</i> in brackets; delete the colon before
	ekeinos and place a comma after mokhlon
220,16	kinêsoi] read kinêseien (MSS SL)
220,21-2	after toiouton delete the colon; place ou gar - proeisin in brackets
221,2-3	kai dedeiktai, hôs] read kai, hôs dedeiktai
221,8	dunasthai] read dunatai (MSS C, Laur. 85,14; Spengel)
222,3-4	place <i>hoion – psukhron</i> in brackets; after <i>psukhron</i> replace the
	colon with a comma
222,5-6	read <i>to gar <thermainon energeiâi="" hôs="" i="" thermon,="" to<=""> Schenkl&gt;</thermainon></i>
	thermainomenon energeiâi psukhron
222,6	delete <i>ekineito heauto</i> ; read <i>ei de tauth' houtôs ekhei <kai> to</kai></i>
	<holon> autokinêton <kinei, holon="" kai="" kineitai="" to=""> (based in part on Philop. in Phys. 834,20-1)</kinei,></holon>
222,7	pros to auto] read kata tauto (cf. 222,9)
222,20	to men hen hoti sôma] read to men sôma hoti hen <kai sunekhes=""></kai>
222,21-3	after <i>eti</i> (21) replace the comma with a stop; start a new
	paragraph with alla touto men (23), and replace the stop after
	<i>logou</i> with a comma
222,26	before kineisthai supply tou
223,1	after <i>duoin</i> delete the colon
223,2	ginesthai (coni. Schenkl)] read einai (Laur. 85,14; cf. Simpl. in
	1 lly8. 1441,44)

#### 8.6

- 223,18 after *bouletai* place a comma
- 223,20 place *hoion amphisbêtoiê* in brackets, followed by a comma in place of a colon
- 223,21 ge pasas] read pasas ge

20	Textual Emendations
223,26 223,28-9 224,1 224,1	transpose <i>tôn</i> to precede <i>arkhôn</i> place the question <i>kai – hêde</i> in brackets followed by a stop delete <i>hotan – hekastên</i> <i>genêtikên</i> ] read <i>genêtikê</i>
224,9-14	after topon (9) delete the colon; place hautê gar – trophês (9-12) in brackets; after trophês (12) replace the stop with a comma; place $leg\hat{o} - topon$ (13) in brackets; after <i>egeirôntai</i> (14) replace the comma with a stop (14)
8.7	
225,14	delete toinun
225,16	delete te
225,16	lekteon] read skepteon (Arist. 260a21)
225,19	ontôs (MSS SL)] read houtôs (MSS MC)
225,21-2	before <i>pos</i> delete the colon; place the question <i>pos</i> – <i>alloiotheises</i> in brackets
226,1	before <i>hôs</i> supply <i>phaneron</i>
226,11	after to supply metabainein
226,11	before gar supply men (cf. 200,10)
226,19	after genêta supply kai phtharta (cf. Simpl. in Phys. 1271,7)
227,8	after ex antikeimenon supply eis antikeimena (Arist. 261a33)
227,13	delete mallon (cf. Simpl. in Phys. 1274,17; Spengel)
227,14 997 94	delete <i>unankei</i> (com. Schenki)
227,29	genomenon (MSS MC)] read ginomenon (MSS SL)
8.8	
228,9	<i>têi</i> ] read <i>tês</i> (Schenkl)
228,9-10	delete the question mark after <i>dunaton</i> (228,9) and move it to follow <i>loipai</i> (228,10), while placing <i>diapherei – loipai</i> in brackets
228,26-8	before <i>ouden</i> delete the colon; place <i>ouden</i> – $duo$ (28) in brackets; after $duo$ replace the stop with a comma
228,33	after <i>meson</i> delete the comma; place <i>toutestin – peras</i> in brackets
229,8	ep'autou] read ap'autou
229,14	before <i>perati</i> supply <i>en</i>
229,15	tou stênai ên] read histainto
229,15	ep'autou] read ep'autôn
229,19	after sêmeiôi supply to eph' hou khrêtai hôs energeiâi sêmeiôi (Spengel)
229,20	before <i>stênai</i> supply <i>proteron</i> (cf. 228,16)
230,5	for holon read holôi
230,15	apo] read hupo (Arist. 264a10)
230,20	after genomenon supply en tôt before and
230,28	before no logos supply hode (Arist. 264b2)
201,2 991.6	nour read en (MD L)
⊿01,0 231.20₋1	read dioner stings on supphies spinonmenous anandussei sta
<u>201,20-1</u>	nun kai ho metaxu khronos tês êremias; place this sentence in

	brackets, deleting the stop after <i>autou</i> (20), and replacing the
931 94	an' autou eis auto an' autoul read anh' hautou eis hauto
201,24	ap' union ets unio up' union read upit riunion ets riuno
231 25	men enil read eni men
231 27	hefore <i>eiê</i> supply <i>an</i>
232 3-4	after anakamptêi delete the stop: place ou gar – dusi (3-4) in
202,0-4	brackets
232.5-7	after <i>ephexês</i> (5) replace the colon with a comma: after <i>pollakis</i>
,	delete the stop (6); place $p\hat{os} - peras$ (6-7) in brackets
232,7	protitheis] read prostithês (MS C; -eis MS Laur. 85,14)
0.0	
8.9	
232,16	after <i>pasa</i> supply <i>gar</i> (MSS SL; Arist. 265a14)
232,18-19	after <i>hautai</i> delete the colon; place <i>sunkeimenê gar ek toutôn</i> in
999 91 9	often gutie delete the stop; place ou gap dijengi in breekete
232,21-2	within which delete sinesthei (Spengel)
<u> </u>	anghamptail road anghamptai (MSS CI)
202,20	man în l road manan
232,20	talautânii road talautânâi (subiunativa)
232,23	before tês de replace the color with a comma
232,29	before <i>les de</i> replace the colon with a comma
8.10	
233,20	kinêsei an] read kinêseien an (Spengel; MS Par. Gr. 1859; Diels
	ad Simpl. in Phys. 1321,10)
233,22	after <i>ontôn</i> place a comma
$233,\!27$	<i>tês autês</i> ] read <i>tautês</i> (Schenkl)
234,2	kinêsis] read dunamis
234,3	tou] read tôi
234,5	after <i>amêkhanon</i> supply <i>einai</i> (Spengel)
234,6	epei] read ekei
234, 10-11	after the fifth $\hat{e}$ (10) read < <i>kata tina tôn allôn tropôn, peri de tôn</i> >
	<i>rhiptountôn</i> by transposing $kata - peri de tôn$ from line 10; delete
004 10 10	ne(11) (Schenki)
234,12-13	after <i>olethenta</i> delete the stop; place <i>pheretal – aphentos</i> in
994 17	brackets followed by a comma
234,17	atto read autou
204,21	tal read to:
204,24	ioj read iou
234,20	delete â hallentee
234,20	after lambanei replace the question mark with a commo
234,20	transpasse to to proceede aidânian
204,29 995 1	anspose to to precede station
200,4 935 8	area quichelises replace the stop with a question mark
200,0 935 16	ex union leau ex numon transpose $hanla = topan to follow antiparistasis (15) (of Simplin$
400,10	Phys. 1351,16-17

22	Textual Emendations
235,19	after antiperistasin place a stop
235,22-3	after $kin\hat{e}sis$ and $homal\hat{e}s$ delete the cola; place $oude - all\hat{e}l\hat{o}n$ and $ou - arkh\hat{e}s$ in brackets
$235,\!29$	kinoun] read kinein (Spengel)
235,30	sumballei] read summetaballei (Arist. 267b2; MS L)
235,31	before <i>kinêsis</i> supply <i>hê</i> (Arist. 267b4)
235,31-2	after <i>monê</i> delete the stop; place <i>ou gar – oudemian</i> in brackets; after <i>oudemian</i> place a stop
235,32	oute] read oude (Arist. 267b5)

## Themistius On Aristotle Physics 5-8

Translation

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### Themistius' Paraphrase of Book Five of Aristotle's Physics<sup>1</sup>

#### [Chapter 1]

**165,2 (224a22-30)** Since some things are transformed *per se*, others incidentally, others in part, they must be distinguished in advance. Now the sorts of things that are transformed incidentally are exemplified by our speaking of an educated person walking, getting cold or getting hot; for this person is walking not *qua* educated, but as one to whom being educated is incidental. Again, a person <who exchanges><sup>2</sup> one place for another is also in his case [transformed] incidentally; for it is what he is in that he is transforming *per se*.<sup>3</sup> And some things<sup>4</sup> are said to change and be transformed in part: the body, for example, becomes healthy because the eye or the<sup>5</sup> chest does. The only things that change *per se* are those transformed neither incidentally nor in part, in the way that a horse runs, a cloak touches [the body],<sup>6</sup> a whole log is heated, and an eye is healed; for it is not the case that everything is capable of undergoing every change *per se*<sup>7</sup>, but some things only change place, like the heavenly [bodies],<sup>8</sup> while others are only altered, like the chest <or>

**165,14 (224a30-4)** But of the things that produce change you could say that some also do so incidentally (as an educated person builds a house), others in part (as a grinder moves a millstone),<sup>10</sup> while others that do so by none of these ways do so *per se*.

**165.17 (224a34-b10)** In which of the following five [properties] that are considered to pertain to the things that change per se is change present: what produces change:<sup>11</sup> what is changed: the time period in which there is change; and that from which, and that into which, something is transformed? We demonstrated earlier<sup>12</sup> that it is not in what produces change and also not in the time period, but not even in that from which transformation comes about, as, for example, when black comes into being from white (for the change gets its name not from [white] but rather from [166] the other thing into which it proceeds and is transformed; for it is said to become black just because it is transformed into black, and not to become white, although [transformed] from white).<sup>13</sup> For ceasing to be also gets its name in this way because it is [a transformation] into not-being, <although from being; and coming into being [a transformation] into being>,<sup>14</sup> although from notbeing. Left for inquiry, then, is whether change is either in what is changed per se, or in the forms and affections into which a transformation comes into being.
166.6 (224b10-16) So while it has been demonstrated adequately earlier too<sup>15</sup> that change is only in what is changed, it would suffice to recall and take as settled<sup>16</sup> the definition of change too (for we did say that change was the actuality of what can be changed),<sup>17</sup> but still it is worth investigating whether in general change is in the forms and affections, or in the places into which everything that changes [place] changes. Regarding places, clearly they are unchanging (for we recall<sup>18</sup> the difference between them and containers).<sup>19</sup> but the affections (e.g. whiteness, blackness, heat, cold) might be thought to be changes.<sup>20</sup> But if this is true in such cases, then change will be<sup>21</sup> a transformation into change, and in this way there will be something that, even when it has been transformed, is still being changed, if it has been transformed into change; or else, when it has come into being in [a process of] change, it is no longer being changed. But clearly change does not exist with respect to the affections themselves<sup>22</sup> but is the [process of] being affected (to paskhein) and of being transformed with respect to the [affections] – not [for example] whiteness but *whitening*.<sup>23</sup> So while from this it is clear that neither<sup>24</sup> is any form or affection changed, nor does it undergo a change.<sup>25</sup> some<sup>26</sup> of the forms are said to produce change (e.g. the soul in an animal; heaviness in a stone), but still they are not also changed per se when transformation into them comes about (for heaviness does not solidify the exhalation that becomes stone:<sup>27</sup> but if it did, it would necessarily produce change in specific things).<sup>28</sup> But what our argument has discovered is that change is certainly in the things that are changed, not in those that produce change. Let this be taken as so defined by us.

166,25 (224b16-26) But still to be added for the benefit of those otherwise fond of learning is that 'incidentally', 'in part' and '*per se*' are also said of the things into which transformation comes about; e.g. what becomes white is transformed incidentally into what is thought (for being thought is incidental to the colour) [167], but into colour in part (for white is a part of colour); and into Europe in part, because into Athens; yet into a white colour or into Athens *per se*.<sup>29</sup> So from what has been stated it is obvious in what way change exists *per se*, incidentally and in part; and [obvious] that change is not in the form but in what is changed.

**167,5 (224b26-8)** Incidental transformation, then, is to be disregarded, for it is not present in things that are within fixed limits,<sup>30</sup> but instead everything can be transformed in this way into everything else (e.g. colour into a magnitude, and educated into black). And it can always be considered as pertaining to each and every thing because of its being multiple and unlimited;<sup>31</sup> for you could always speak of whiteness being transformed both when a body changes place and when it is chilled, moistened and burnt.<sup>32</sup> So for these reasons [incidental transformation] may be dismissed, and we shall go on to discuss transformation *per se*.

167,12 (224b28-30) Now it is present in things that are within fixed

limits; for it is always [transformation] to contraries and from contraries, and is, in general, [transformation] from a contradiction (white, for example, from black or yellow, or, in general, from what is not-white), and you could strengthen this [conclusion] from induction.

167,15 (224b30-5) But it must not disturb you<sup>33</sup> if, having earlier defined transformations as coming about from opposites<sup>34</sup> into opposites, we have now also introduced things<sup>35</sup> that are in between; for the things that are transformed from them use these too as contraries.<sup>36</sup> For since the things in between in a sense<sup>37</sup> exist with respect to the mixing and blending of the contraries, whenever one of the contraries [A] is transformed from what is in between [= M] into the other [contrary state [**B**], the transformation will come about not insofar as [**M**] shares in [**B**] (for [**M**] is not transformed into [**B**]), but insofar as it [shares in] the [original] contrary [A]. Tepidness [M], for example, does not become cold inasmuch as it shares in coldness [B], but inasmuch as hotness [A]is also present in it. That is why what is intermediate relative to the extremes, and the latter relative to it, are also spoken of as in a sense contraries, just as the intermediate note [is spoken of as] low relative to the high note and high relative to the low note, and grey [is spoken of as] white relative to black and black relative to white.

167,25 (224b35-225a12) Now since these distinctions have been drawn, and since every transformation comes about from something to something (as in fact the noun clearly reveals).<sup>38</sup> what is transformed will be transformed in four ways:<sup>39</sup> either (i) from entity (hupokeimenon)<sup>40</sup> to entity, or (ii) from non-entity to non-entity, or (iii) from entity to non-entity, or (iv) from non-entity to entity. By 'entity' I am speaking of what is indicated by affirmation, and by 'affirmation' of what is hot, cold, black, white [for example] - in general, of what exists. But if 'entity' signifies an affirmation for us, clearly [168] 'non-entity' would signify a negation, so that all the transformations described are necessarily three: (*iii*) the one beginning from affirmation and ending in negation, (iv) its converse, and (i) the one from affirmation to affirmation; for the remaining procedure [(ii)] is impossible because it does not exist with respect to an opposition; for it is neither an opposition (for both [entities] are negations), nor [a pair of] contraries (for contraries are indicated by affirmation).

**168,6**  $(225a12-20)^{41}$  *A.* Transformation from non-entity to entity is coming into being with respect to a contradiction, (i) as unqualified without qualification, and (ii) as particular for a particular thing; e.g. (ii-a) the coming into being of this thing from non-white to white in contrast with (i-a) coming to be a substance without qualification from not-being without qualification; and with respect to (i) we speak of coming into being without qualification and not of coming to be something. **B.** Ceasing to be from entity to non-entity is (i) from substance to not-being in an unqualified way, and (ii) a particular [ceasing to be] to the opposite negation, as was also stated for the case of coming into being.

So white is said to come into being from not-white and water from not-water.<sup>42</sup> Now both [come into being] from non-entity to entity and from negation to affirmation, but look at the difference;<sup>43</sup> for I say<sup>44</sup> that white and educated do not come into being without qualification, but that *a person* becomes white and educated, whereas water comes into being without qualification. For I cannot speak of that which becomes water as I could in the case of white and educated (that it is a person, or that it is Callias), unless [speaking] in some respect of the matter as underlying the bodies; for this [matter] we could say becomes water, but it is not a this,<sup>45</sup> as is Callias as one who becomes educated and white.<sup>46</sup>

168,14 So do the two [processes of] coming into being -(i) the [coming into being] of white and (ii) of water - not seem to you to differ from one another in some way? Well, on distinguishing them in precise terms you could not even speak of (i) as 'coming into being without qualification' [225a13-14], but as 'a particular coming into being' [225a14] and one with a specific quality (for it does not produce the substance in its totality), but [could speak of] (ii) as 'coming into being without qualification' and in a strict sense (for it is as a whole that water comes into being itself, as do hot, cold, white or black).<sup>47</sup> So since everything that comes into being does so from not-being, (i) educated too comes into being from not-being, as also does (ii) water, but in (i) it does so from Callias' not being educated), but in (ii) it does so from not-being without qualification.

## <a dialogue with a student>48

**168,23**: Yet you might also say of water '*[It comes into being] from air, which is not-water*'.<sup>49</sup> Now the difference that I described earlier<sup>50</sup> escapes you; for it is not by remaining [the same]<sup>51</sup> that air also becomes water, as Callias while remaining [the same] also becomes white.

So look at both the consequences that follow from the argument, so that you may more effectively learn the difference.

*Callias comes into being as white from not-white*'. But when you say 'from not-white' you mean 'from red, black or yellow', and these are all in opposition to white, but as affirmation to affirmation, as beings to beings, and as properties to properties.

*Water too comes into being from not-water*'. So just as in the first case I showed that not-white existed as black, < red > 52 or yellow, so in this case indicate not-water to us as an affirmation.

'By Zeus', you might say,<sup>53</sup> 'it is air! For water [comes into being] from air! So could you show that air is contrary to water in exactly the same way that white or yellow is opposite to black? And how? For it is one substance in opposition to another.<sup>54</sup>

**168,35** Now since [**169**] we have said earlier<sup>55</sup> that when we speak of something being transformed from entity to entity, we are speaking

either on the basis of negation or on that of affirmation and what is contrary, but since what [comes into being] from not-water does not signify an affirmation and a contrary, it would signify without qualification a negation. So such coming into being is from not-being without qualification (and I say 'not-being without qualification', *not* 'what is completely not-being'<sup>56</sup> but rather what is potential being, in the way that we speak of the state of matter).<sup>57</sup> And the same thing also applies in the same way to ceasing to be, because it too is in just the same way [a transformation] into not-being without qualification.

169,7 (225a20-34) If this is the case, clearly 'not-being' [is spoken of] in several senses; not-white is in fact not-being and not-a-person is not-being. Falsity too is spoken of as not-being, but let it be set aside (for it involves combination or division in a statement),<sup>58</sup> while of the two [cases] just mentioned which kind could be said to have *changed*? I say that it is not-being in the same sense as not-white and not-good, not because not-white itself and not-good itself change (for how, in general, can that which does not exist change?); instead, Callias the not-white and Callias the not-good change. So I do not also speak of such things as changing without qualification but [as changing] incidentally, because they are incidental to the things that are changing.<sup>59</sup> But how could not-water, not-fire, and things that in this way are not, change? Per se? And how, in that they are not thises? Incidentally? Then to which things that are changing are they incidental?<sup>60</sup> Now things that are not-beings in this sense cannot change, but, if they can, then coming into being cannot also be a change. So not-being neither changes nor is it at rest; for it is not even in a place. And not only is coming into being not a change, but neither is ceasing to be; for what is contrary to a change is either a change or a state of rest.<sup>61</sup> but if ceasing to be is a change, then coming into being will be either a change or a state of rest.

169,23 (225a34-225b5) It remains to formulate deductively everything that has been stated: (i) every change is a transformation; (ii) every transformation is *either* from contrary to contrary, *or* with respect to a contradiction; therefore, (*iii*) every change is *either* from contrary to contrary *or* with respect to a contradiction; but (*iv*) not with respect to a contradiction; therefore (*v*) from contrary to contrary. (I am speaking of contraries as things indicated by an affirmation, and this is how things spoken of with respect to a privation – 'naked', 'illiterate' – are also indicated in the case of changes.)

### [Chapter 2]

**169,29 (5.1, 225b5-9;**<sup>62</sup> **5,2, 225b10-11)** So we must investigate the number of categories in which there is contrariety; for only with respect to these is it necessary that change come into being. Now, first, there is no change with respect to [the category] Substance (for nothing is contrary to Substance);<sup>63</sup> [170] for neither is privation [contrary] to

form<sup>64</sup> (this was conceded in a more unqualified way in Book 1),<sup>65</sup> since privation is a sort of 'absence' (*ap-ousia*), and not-being that is not contrary to being.<sup>66</sup> For those who believe that by saying that a living thing comes into being from a seed they are demonstrating that a transformation from one substance to another is a change are again having recourse<sup>67</sup> to coming into being, which we have demonstrated<sup>68</sup> is *not* change. For in such a transformation what is the *thing* that changes?<sup>69</sup> It will not be the animal (for *it* does not yet exist, in that it is coming into being), nor the seed (for *it* does not remain [the same], in that it is ceasing to be – for how is the seed of living things a *contrary*, whereas change is from contraries to contraries?).<sup>70</sup>

**170,8**<sup>71</sup> But someone could perhaps say: 'Whenever water is transformed into fire, a change would come about with respect to Substance; for [the change] is between contraries'.<sup>72</sup> But Alexander [of Aphrodisias] contradicts this by granting that *some* qualities of fire are contrary to *some* qualities of water (e.g. coldness and moistness to dryness and hotness), yet not fire itself *as a whole* to water <as a whole>;<sup>73</sup> in fact, for each of these [elements], [he says], their being is in other qualities.<sup>74</sup> I, on the other hand, think that even his supposition is false; for fire cannot be transformed into water unless it first undergoes transformation into air, and *they* obviously are not also contraries.<sup>75</sup> But what, in general, is the thing that is changed in such transformations? For it is neither the water, which ceases to be, nor the fire, which does not yet exist; but what after the change has been changed is what was earlier undergoing change. So from this [argument] too it is clear that there is *no* change with respect to Substance.

**170,20 (225b11-13)** But neither [is there change] with respect to [the category] Relative,<sup>76</sup> for it is transformed without even any kind of transformation having come about with reference to it.<sup>77</sup> A pillar, for example, comes into being on my right without itself being transformed when I change my position;  $10^{78}$  [becomes] double without having taken on any addition after 5 has been counter-posed to it;<sup>79</sup> and a proposition is true at one time, false at another, when the facts signified by it are transformed; for example, 'It is day' is a statement<sup>80</sup> that, while indeed the same and in the same state, is true if it is day, but false when night falls.<sup>81</sup> But if all change is through *some* transformation and modification<sup>82</sup> of the actual thing that is changing, and if relatives do not accrue and disperse in this way, there will not, of course, be change with respect to [the category] Relative.

170,30 (225b13-16) But neither [is there change] with respect to [the categories] Acting and Being-acted-on. Why so? Because Acting is [classified] under producing change, and Being-acted-on under being changed,<sup>83</sup> and producing change<sup>84</sup> exists [171] neither with respect to producing change nor still more with respect to being changed. To state [that it does] is in fact ridiculous; to think it much more ridiculous still.

171,2 Aristotle introduces still more difficulties for this supposition; for it is an entirely inconceivable thing to admit a transformation of a transformation and a change of a change. *First*<sup>85</sup> [225b33-226a6]. [the process] will go on to infinity, and one [change] will always be prior to another. Second [226a6-10], it will be possible for a change both to be at rest and to change; then [226a10-12] [for it] to be something underlying and a this,<sup>86</sup> as is the body that changes or the soul. Again [226a12-16], that which changes and the change are different; for a person and a change are different, as are a horse and its running. <For if a change changes>.<sup>87</sup> the change that changes will also be different from the change, with the result that change and not-change <exist><sup>88</sup> simultaneously.<sup>89</sup> <*Again*><sup>90</sup> [226a16-18], it is ridiculous for an alteration to move, or for a motion to be altered, or for an increase to undergo one of these [changes]; for they are all in distinct subjects and do not exist *per* se at all.<sup>91</sup> Yet [226a19-23] a transformation can be said to be transformed incidentally and a change to be changed, as, for example, if restoration to health incidentally befell someone as he was running, and we spoke of the running being restored to health with respect to a certain transformation, not because the running itself [recovered] but rather the person, to whom the running was incidental.<sup>92</sup> But we have dismissed incidental changes a while back.93

171.17 (226a23-b1) So obviously there are changes with respect to only three categories, Quality, Quantity and Where;<sup>94</sup> that is because contrarieties are also present in each of them. Now while we give the name 'alteration' to change with respect to what is qualified (and I used 'qualified' not in the way that we speak of differentiation in [the category] Substance - rationality, being footed, being winged, being aqueous $^{95}$  – as qualified, but [as we speak of] what exists only with respect to an affective quality such as coldness, whiteness, heat, and blackness), we cannot call change with respect to quantity by a single name. But increase and decrease do exist with respect to each [extreme of size]:<sup>96</sup> increase into the greater size, decrease away from it. But change with respect to place is without a name, both as common and as specific, [172], but it will be called 'motion' (phora), at least as a common [name]. Yet we are not unaware that we are saying that in a strict sense<sup>97</sup> the only things that move are those that cannot come to a stop<sup>98</sup> by their own power<sup>99</sup> and that, just like non-living things, do not make themselves change with respect to place.

**172,4** (226b1-10)<sup>100</sup> But also to be investigated further at least regarding alteration is how, when a body is transformed from white to more white, or, *vice versa*, from more to less white, it would at that stage come into being from contraries into contraries. Well,<sup>101</sup> both more white and less white exist by a mixture of the contraries; for what shares in less black is more white, and in more [black] less white. So whenever there is a transformation without qualification to white from black, there is a change from what is without qualification contrary into what

is contrary, but when it is from white to more white, it is from what is somehow present as a contrary; for black is somehow present in what is less white. So obviously from what has been said there are only these three changes with respect to only three categories.

**172,13 (226b10-16)** But that which is totally incapable of change is spoken of as 'unchanging', as a sound [is spoken of] as 'unseen' and as that which scarcely changes over a long time period (which one might also speak of as 'resistant to change' and as 'what initiates change slowly', in the way that we speak of people slow to initiate anger as 'imperturbable'). Also spoken of as 'unchanging' is that which is naturally disposed to change and capable of it, yet does not change when, and as so, disposed,<sup>102</sup> and among the unchanging things it is the only one that I call 'at rest'. For a state of rest is a privation of change;<sup>103</sup> that is because a privation belongs to things that are naturally disposed [to change] and as they are so disposed.

### [Chapter 3]

**172,21** (227a7-<10>)<sup>104</sup> Since all transformation, as we have demonstrated, <sup>105</sup> depends on <sup>106</sup> opposites, and since opposites are both contraries and contradictions, and since a contradiction has nothing in the middle, obviously what is in between depends on contraries. And that at which what is being transformed is naturally disposed to arrive before [arriving] at that into which it is transformed last, whenever it is transformed continuously in accordance with nature, is in between.<sup>107</sup>

172,25 (226b26-31) What is in between depends on a minimum of three things (for it is what is in between two specific things),<sup>108</sup> but what is spoken of as undergoing transformation continuously is that which is not interrupted either in the time period, or in the context<sup>109</sup> in which there is change, as, for example, someone singing a lyric might sound the highest note immediately after the lowest without interrupting the time period but [only] the context in which the change is occurring. [173]

173,1 (226b31-4) This is evident to a greater extent in transformations with respect to place;<sup>110</sup> for example, those who leap in a pentathlon do not move continuously, since they cause some interruption in the distance in which they are moving.<sup>111</sup> Now this [conclusion] should not be posited without qualification, should it?<sup>112</sup> For that would mean that we would also be denying that competing horses move continuously!<sup>113</sup> Instead, continuous change must be separately defined by a time period, and by no [part] of it being interrupted, since it is perhaps possible to interrupt the context in which there is change and for things nonetheless to appear to be undergoing transformation continuously. But what is in and of itself continuous must be separately defined with greater precision.<sup>114</sup>

173,9 (226b34-227a6) Now since contiguity is more general than continuity, and succession than contiguity, instruction on succession

must be offered first. Now those things are in succession to one another that have nothing different of the same kind in between them;<sup>115</sup> for while something different from the things that are in succession is not prevented from being intermediate, it cannot be of the same species (for example, houses with no house in between are in succession, as are lines with no line, and humans with no human). Succession is always something secondary, i.e. first after something else; and it is the first either in *position* (as with lines or houses), or in *species* (as with 1 and 2, 2 is in succession to 1, since there is no other number in between), or in *order* (for a proem is prior in order to an exposition, and an exposition in succession to a proem; for there is nothing of the same species in between.) So what is in a strict sense in succession is like this, but it is said that thereby the> things that are in succession<sup>116</sup> are also of the same genus but not in many cases of the same species (the contest, after all, is in succession to the parade, and the Temple of the Nymphs to the Gymnasium).<sup>117</sup>

173,22 (227a6-17)<sup>118</sup> A thing is contiguous that in addition to being in succession to something according to one of the senses stated also has its limit together with that thing's limit. Some [cases of contiguity] are spoken of only as the past is to the future, whereas others also involve contact, as do bodies.<sup>119</sup> And in contact are the things of which the extremities are together, and by 'extremities' I am speaking of limits. So when these limits are two, they are spoken of as contiguous to one another and in succession, but not to the extent of being continuous; but when the two limits (of the thing itself and its successor) become one. they become continuous and the whole thing [becomes] one. And not everything that is contiguous is continuous, but [only] those things naturally disposed to become one (e.g. wood is in contact with stone, but could not become<sup>120</sup> continuous with it). But it should not go unrecognized that the things that become continuous in a strict sense are those for which contact achieves fusion<sup>121</sup> (as in the case of lines, grafted plants, and a time period), and some become continuous even in the case of artisanship (e.g., pieces of wood [fused] by nails or glue), but these [174] are not also continuous in a strict sense.

174,1 (227a17-27) Now, as we have stated earlier, being in succession is obviously prior to being contiguous; for while what is contiguous must be in succession, not all that is in succession is contiguous. That is why what is in succession is also prior in definition, since in most cases it is like a genus; in fact, succession exists among numbers, but they have no contiguity to one another. Being contiguous is in turn prior to being continuous; for if there is to be fusion there must first be contact. So clearly in cases in which there is no contact there is also no fusion; yet not in every case in which there is contact can fusion too have come about *ipso facto*. In fact Homer says that Epeius 'made contact with the mule',<sup>122</sup> but a human being cannot be fused with a mule!

174,10 (227a27-32)<sup>123</sup> Now if what we are saying is true, and if

succession and being in contact are not the same, then a unit will not be the same as a point. For contact is possible at a point, but impossible at a unit; instead, among units there is succession but not contact, and while a line is in between points, nothing [is in between] units, not even [in between] 2 and 1. So clearly there is contact only among things that maintain a position, but succession too among things that do not maintain a position, as also with what is contiguous.

## [Chapter 4]

**174,17 (227b3-14)** A change is spoken of as one in more than one sense because we speak of 'one' in many senses. Now a change is *one in genus* and [exists] by virtue of the same category (all motion, for example, [is one] in relation to <all><sup>124</sup> motion, since it is in [the category] Where; alteration [is one] in relation to alteration since it is in [the category] Quality), but it is *one in species* in the same species of the category whenever it is undivided and primary [in derivation] from the objects of perception,<sup>125</sup> as whitening is in relation to whitening; for *whiteness* is one species and is undivided.<sup>126</sup> But if there are some things that are at the same time both genera and species,<sup>127</sup> then a given change is clearly one [in species] in one sense, but not in another.<sup>128</sup>

**174,23 (227b14-23)** Someone might inquire into whether a change is one in species when the same thing that is changing is transformed into the same thing from the same thing;<sup>129</sup> for were this conceded without qualification and were we to define<sup>130</sup> the same change by *this* species, then circular motion would be identical in species to rectilinear motion, since the same thing can move in the same direction from the same [place], at one time over a straight line, at another over a circular one. Or did we correctly posit [at 174,20-1] that a change that was one in species came into being whenever there was an *undivided* species with respect to which<sup>131</sup> it came into being? But a straight line [**175**] and a circular line differ from one another in species. So while a change does becomes one in genus and species in this way, despite the difference in the context in which they come into being, what must be investigated is how a change will be one in number and in a strict sense one.<sup>132</sup>

**175,5 (227b23-228a1)** Now since we say that three [properties] pertain to the change that we are defining – *what* is changing (e.g. a person or a star); *that with respect to which* it is changing (this is of two kinds: either an affective quality, or a place), and *when* it is changing (namely the time period) – the change that is one in number must possess each of them as one in number: *the species* with respect to which it comes into being (e.g. a colour or a line); *what* is changing (e.g. Coriscus or Callias); and *the time period*<sup>133</sup> (and [a time period] that is continuous and has no interruption is one). But if any of these were not one in number, the change would no longer be maintained as one – if Coriscus, for example, walked and became white at the same time; for

here the subject is one and the time period one and continuous, but there are *two* things with respect to which there is change, colour and place, so that such [a change] is not also one.<sup>134</sup>

175,14 (228a1-6) Again, suppose Callias and Socrates restored to health from the same condition (from inflammation of the eye, for example):<sup>135</sup> still not even this is one change, for the subjects are two.<sup>136</sup> But now suppose that Socrates takes a walk after new moon and again after the seventh [day of the month]; then the time period alone, by not being one or continuous, prohibits this [activity] from becoming one change,<sup>137</sup> since the claim [that it was] would undergo something even more absurd – for if my stroll of yesterday and the one I take today are one, then that which has ceased to be will be the same as that which exists (after all, the earlier change does always cease to be).

175,22 (228a6-24) How, then, will [a change] be one? Well,<sup>138</sup> perhaps so by its continuity, by its being assimilated to itself, and by what ceases to be not being disrupted<sup>139</sup> by what comes into being (and the latter [condition] does not cover things that come into being after an interruption). But if a single change must at all events have its subject as one in number, and if all bodies are manifestly in flux, then no change will have the same subject in an exact sense.<sup>140</sup> And regarding states too one might go through the problem of how there is a single state of health when the healthy person is not one. Or are these [cases] extraneous to the proposed inquiry? For to explain how the same substances remain despite being continuously transformed is not relevant to the account of change.<sup>141</sup> Except let us not pass over the following associated [point]: that there is nothing absurd in making yesterday's and today's state (e.g. health or knowledge) one and the same; for the time period is continuous for every state, whereas the activity cannot be one unless explained as continuous, and from this it follows that for one activity [176] there is at all events one state, whereas for one state there are also multiple activities.<sup>142</sup> But since all change is continuous, if indeed all of it is divisible, then [change] that is one must be without qualification continuous, and continuous [change must be] one; for it could not become continuous with every [change], as neither could one random thing with another (e.g. a line with a sound), but [only] with those things whose extremities can succeed in becoming one.<sup>143</sup>

**176,5 (228a24-b11)** But some things do not have extremities<sup>144</sup> (for example, a unit, which is indivisible, has no extremity), which is why something continuous does not come into being from [extremities], whereas some things do have them, but are dissimilar in species, differentiated, and homonymous, while bearing 'extremity' or 'limit' as a common name. Certainly the extremity of a line and a walk are homonymously related to one another as an extremity, which is why something that is one and continuous does not come into being from them either. Now those things that are not the same in species or in genus could also be contiguous to one another (for someone might catch

a cold immediately after a run; and a torch carried in a relay,<sup>145</sup> for example, undergoes contiguous changes that also resemble one another in species),<sup>146</sup> but not continuous (for [in the second example] the extremity of the stages does not become one, but each of the runners has a limit of his own for the stage).<sup>147</sup> Thus changes can clearly be contiguous to one another, and because of the time period alone, whenever it is continuous, even if they themselves are quite distinct.<sup>148</sup> But they cannot become continuous because of the time period alone, unless they maintain the same species; for in that way the extremities of both [changes] would be unified. And this is why [a change] that is without qualification continuous and one must be the same in species, belong to one thing, and be in one [time period], just as we also defined it above.<sup>149</sup>

**176,20 (228b11-15)** But if in addition to all that has been previously stated, [a change] is also complete (*teleios*),<sup>150</sup> then it is spoken of as one rather than [a change] that maintains the other [conditions] but is incomplete; and a change that acquires its own limit is complete; for we predicate 'one' with application to complete rather than deficient things.

176,23 (228b15-229a1) But also a uniform change is to a greater degree than a non-uniform [change] one, since variations seem to divide the non-uniform [change]. But in all change – in alteration, increase, and ceasing to be - there is uniformity and non-uniformity. Non-uniformity comes about *[either]* when *[a change]* is contra-natural across [the magnitude] it covers,<sup>151</sup> as, for example, with a deflected line (for a uniform change cannot have come into being unless across a uniform magnitude, and a uniform magnitude is one of which any random part [177] fits directly on to<sup>152</sup> any other); or when, contrary to the manner [of the change], it is faster at one time, slower at another. For even if everything else coincides (for example, the magnitude as uniform, the time period as continuous, and the species of the change as the same), but the speed is not the same, then the change is at once non-uniform. That is why fast and slow speeds are not also species of change; for they are present in *all* species of change.<sup>153</sup> In fact, there is fast and slow alteration, increase, and change from one place to another (what is heavier is, for example, faster in its downward motion, what is lighter slower). This is why in relation to their impulsion<sup>154</sup> in the same directions neither heaviness nor lightness differ from one another with respect to their species, since they are not also capable of producing motions that are different with respect to their species.

**177,10 (229a1-6)** And a uniform [change], then, is in a strict sense one, whereas a non-uniform change could also become one by being continuous, but to a lesser degree, as happens with a straight line<sup>155</sup> when it is deflected, and 'to a lesser degree' [means] by a mixture of the contrary [state].<sup>156</sup> So if the change that is continuous and one can also be uniform, but the [change] that is composed of changes differing in species cannot be uniform, then such a single [change] could never become continuous, because [it could] not even [become] uniform; for [at 176,28-177,1] we

did posit uniformity as that of which all the parts could fit directly on to one another. But how is it possible to create such a fit between the parts of [the processes of] becoming-white and of running?<sup>157</sup>

# [Chapter 5]<sup>158</sup>

**177,18 (229a7-9)** A distinction must be drawn<sup>159</sup> also in what pertains to oppositions: both a change<sup>160</sup> is in opposition to a change and a stop to a change, but while [a change] is so as a contrary, [a stop] is so as privation. So what kinds of changes are contrary?

**177,20 (229b2-10)** Now since all change is from something to something – from a contrary to a contrary – [changes] that begin from a contrary<sup>161</sup> and leave off at a contrary will be contrary changes, such as one that begins from health but leaves off at sickness, and one that begins from sickness but stops at health. It is also clear from induction as follows: becoming healthy is contrary to becoming sick, as is going up to going down, walking to the right to walking to the left, and [being] in-front to [being] behind (for the [latter three] are contraries pertaining to place).

**177,27 (229b10-14)**<sup>162</sup> However, for those things that are transformed but have *no* contraries, a transformation from the same thing is contrary <to one><sup>163</sup> into the same thing. After all, coming into being goes into what ceasing to be is transformed from; for ceasing to be is a transformation *from* being,<sup>164</sup> but coming into being goes *into* being,<sup>165</sup> and ceasing to be proceeds into what coming into being is from, [**178**] since [coming into being] is from not-being into being, whereas [ceasing to be] is into not-being from being.<sup>166</sup>

## [Chapter 6]

**178,3 (229b23-7)** So while a change is contrary to a change, a stop [is contrary] to a change as a privation: 'as a privation' I say because it is not a privation in an exact sense.<sup>167</sup> But to be defined is *what sort* of stop [is contrary] to *what sort* of change; for it is not just one random one to another.

178,5 (229b27-230a7) But since change is present in two things [A and B],<sup>168</sup> clearly stability in A is [contrary] to [change] from A into its contrary [B], whereas stability in the contrary [A] is [contrary] to [change] from the contrary [A] into [B]:<sup>169</sup> lower stability, for example, [is contrary] to [motion] upwards from below, while upper stability [is contrary] to [motion] downwards from above. But it is illogical to make a contrary state of rest one present in that into which something is striving to be transformed; for *that* [state] is an end and an extremity, and no end is contrary to the [activity of] striving towards it,<sup>170</sup> but rather has an affinity to it and is named after it.<sup>171</sup> Again, things that change naturally have as the end of their change a state of rest in that

into which they are changing. But how could anything's end be its privation? So the only alternative is that stability in that [end] is contrary to change *from* it.

178.15 (230a18-29)<sup>172</sup> Are change and rest also opposed in the sense that for things that are changing the one is natural, the other contranatural? Now in the case of transformation with respect to place one might discover such a thing all too plainly: for earth's motion is natural when downward but contra-natural when upward, and its lower stability is natural, but its upper [stability] contra-natural.<sup>173</sup> But 'natural' and 'contra-natural' would not seem to extend to applying to alteration and increase (for becoming white is no more natural or contra-natural than becoming black, or becoming healthy than becoming sick, since for animals the body is thought capable of receiving both [states] in the same way). But neither is increase natural and diminution contra-natural, nor vice versa; instead, an increase that is natural is not even $^{174}$ opposite to an increase that is contra-natural. The same reasoning applies in the same way to coming into being and ceasing to be; for it is not the case that coming into being is natural and ceasing to be contranatural (for growing old is natural!), nor do we observe coming into being as natural in one case, contra-natural in another. These, then, are problems one might pursue.

**178,30 (230a29-b6)** But if what is forced is contra-natural, then ceasing to be will, if forced, also be contrary to ceasing to be, as contra-natural [ceasing to be] is to natural [ceasing to be]. So are some cases of coming into being also [**179**] forced and not fated (by 'fated' [230a32] I mean what is natural, to which<sup>175</sup> what is contra-natural is the opposite),<sup>176</sup> and are increases and decreases forced? Grain rapidly matured without also being compressed is [forced] increase,<sup>177</sup> while the same applies to alteration; for some alterations could be forced, others natural, just as health restored on non-critical days is a contra-natural alteration,<sup>178</sup> but when restored on critical days is a natural [alteration].<sup>179</sup>

**179,6 (230b6-10)** Cases of ceasing to be will also be contrary to one another, and ceasing to be will be contrary to coming into being, with nothing to prevent it; for ceasing to be is contrary to coming into being *and* to ceasing to be, not in the same respect, but insofar as it is ceasing to be, it is contrary only to coming into being, but insofar as such ceasing to be is natural, [it is contrary] to contra-natural [ceasing to be]. If in fact it turned out that the former was pleasant, the latter painful, then they would have a contrariety in this respect.<sup>180</sup>

**179,11 (230b10-21)** But what has just been described should not be understood as a different sense of 'opposition'; instead, the [cases of] motion and stability that we have already posited as contrary, and in accordance with the sense that we posited, are designated 'natural' and 'contra-natural', as, for example, we spoke of motion downwards from above as contrary to [motion] upwards from below.<sup>181</sup> The latter [mo-

tion], then, is natural for fire, and, conversely, contra-natural for earth, and likewise their stability; for since [at 178,8-9] we defined upper stability as in opposition to motion [downwards] from above, then of these [properties] too upper stability comes about contra-naturally for earth but motion [downwards] from above naturally,<sup>182</sup> resulting in (*i*) motion being contrary to motion, i.e. natural [motion] to contra-natural [motion]; (*ii*) stability being contrary to motion (the same [body's] natural [stability] to its contra-natural [motion]); but (*iii*) <natural motion [being contrary] to natural motion>,<sup>183</sup> not for the same [bodies] but for different ones separately, as, for example, contrary motions are (*a*) the one downwards from above in relation to (*b*) the one upwards from below, and both are certainly natural, (*b*) for fire, (*a*) for earth.

179,22 (230b28-231a2)<sup>184</sup> 'But if one [part] of what is changing<sup>185</sup> from somewhere to somewhere else [is changing] in the direction of that from which it is changing, the other [in the direction of] that into which it is changing, and if stability at the former [place] is contrary to change from it, surely contraries [180] belong to the same thing at the same time?' In fact, the solution is not difficult; for it is *either* that the contraries do not exist with respect to the same thing but [what is changing] remains<sup>186</sup> in the former [place] in one respect and changes from it in another (for, as will be demonstrated,<sup>187</sup> what changes is not partless); or that change and stability are not even contraries in a strict sense,<sup>188</sup> but change is [contrary] to change rather [than to stability].

**180,5** (231a2-4)<sup>189</sup> An adequate account has been given of the oppositions among changes and states of rest.

# Themistius' Paraphrase of Book Six of Aristotle's Physics

## [Chapter 1]

**181.2** (231a21-b6) If the things of which the extremities are one are continuous, but those of which [the extremities] are together are in contact.<sup>190</sup> then something continuous cannot consist of indivisibles – a line, for example, of points, given that a line is continuous and a point indivisible. That is because points, or, in general, whatever sorts of things one might posit as the indivisibles, must first be able to be in contact with one another if subsequently they are also going to be fused:<sup>191</sup> for this is coming into being for continuous things. But how will the extremities of things that have no extremity be together (for a partless thing has no extremity, given that an extremity and that of which it is an extremity are distinct), and how can a *single* extremity come into being for things of which the extremities cannot be together?<sup>192</sup> In fact, by what<sup>193</sup> part of this 'extremity' do partless things produce a surplus when they are being combined? After all, the contact will use up the whole of their masses; for, of course, partless things are not in contact with one another through parts or limits, but will instead merge<sup>194</sup> together with wholes<sup>195</sup> and will as wholes go through wholes,<sup>196</sup> assuming that partless things that have no part should be called 'wholes'. So their combination will not also produce any surplus magnitude to result in their being divided into one part and then another: for the place of a vast number of partless things that have been combined<sup>197</sup> will also not be<sup>198</sup> larger than that of one thing by itself<sup>199</sup> (for what is added will not also supply an extension to the recipient!). yet for every continuous magnitude the place of the whole is larger than [the place] of each of its parts. Again, if the parts of continuous things are separated from one another by their place (and one necessarily here, another there, as in the case of a line),<sup>200</sup> but the combination of partless things produces no <surplus><sup>201</sup> magnitude, how will it produce parts separated by their place?<sup>202</sup>

181,22 (231b6-18) Because of the difficulties that we have stated it is absurd to posit partless things being in contact, or becoming continuous, with one another and in this way also producing a continuous magnitude, but perhaps, to avoid admitting the problems arising from extremities,<sup>203</sup> there is nothing to prevent indivisibles coming to exist *in* succession to one another [182] (e.g. a point being in succession <to a point>,<sup>204</sup> and the now to the now) with the result that both a magnitude

and a time period are composed of partless things, but ones that are neither in contact nor in continuity with one another. But, first, such a claim does *not* produce a continuous magnitude, but [produces] everything from things with separate boundaries, as it does with number;<sup>205</sup> and, secondly, this actual [successiveness] cannot even be posited.

182,6 Look at it in this way: either there will be absolutely nothing in between the points placed in succession, or there will be <something $>^{206}$ in between: now if absolutely nothing, then partless things would in turn be in contact with one another (for nothing that has been inserted will impede them); but if there is going to be something in between, let us investigate what this would be. For since our earlier arguments have eliminated the void,<sup>207</sup> then if there is going to be something in between points that are in succession to one another, clearly this will be either a body, or a surface, or a line.<sup>208</sup> And clearly it is a line (for there is always a line between points);<sup>209</sup> but since this is possible, or more importantly since it is necessary to identify<sup>210</sup> a point on the *totality* of the line, you would also identify along the [line] in between the points another point that itself comes into being between them. How, then, are those [points] that have another point in between them in succession?<sup>211</sup> Thus by exclusion partless things are either in contact with one another, or not also in succession. But if they cannot be in contact, they cannot also be in succession.<sup>212</sup> So by this procedure too a magnitude cannot also be composed of partless things. So from what has been said it is also clear that every continuous magnitude is divisible into things that are always divisible.

**182,20** In fact, one could draw this conclusion from a deduction: (*i*) every continuous magnitude is *either* divisible *or* indivisible; but (*ii*) it is not indivisible (for how could it still be a magnitude and continuous?); therefore (*iii*) it is divisible. Now (*iv*) everything is divisible into things that are always divisible, *or* into indivisibles; but (*v*) not into indivisibles<sup>213</sup> (for then it would also be composed of indivisible things, which has been demonstrated<sup>214</sup> to be impossible); therefore (*vi*) into things that are always divisible.

182,24 Again, if a magnitude consists of partless things, then it is possible for one line to have become greater than another by a [single] point. But if so, the point will be divided into two; for if every line is divisible into two, then so too are the [lines] that are greater and less by a [single] point. So when the greater line is cut into two, the point will also be cut into two.<sup>215</sup> And in general, when [a line] is composed of surplus points.<sup>216</sup> So how will this [greater circle] be divided into two? The halving of the circle by the diameter is also done away with; rather, no diameter at all will even exist, for, as a partless subject, the centre will not admit the straight line drawn through it to become [divided] into two [semi-circles]. So there will not even be a semi-circle, but instead the centre, by always being assigned to one of the two parts of the circle

[183], will make that [part] greater by virtue of the division.<sup>217</sup> Anyone with an ambition to elaborate Aristotle's [arguments] could pile on many others.

**183,2 (231b18-20)**<sup>218</sup> Again, if a magnitude can be composed of indivisible and partless things, then motion over<sup>219</sup> this [magnitude] must also be composed of partless motions; for, as has also been demonstrated earlier,<sup>220</sup> motion follows the magnitude over which it comes into being, and in the same way that a magnitude's being continuous entails its [motion] being so too, so a magnitude's consisting of things that have separate boundaries and are partless entails its [motion] being like this too.

183,7 (231b20-8) To make the necessity of this implication even clearer, suppose a magnitude composed of three partless things, ABC, and [object] X moving over this magnitude in a motion consisting of the points **DEF**. The motion **DEF** will therefore also itself be composed of three partless motions; for each part of it will be partless in the same way as the [magnitude] over which it comes into being; for if someone forces the motion over A to be divisible, he will also make A divisible; for the extension is always divided together with the motion. Therefore one half of the motion will also be over one half of A – but A is posited as *indivisible*. So it has been demonstrated that for someone who constructs a magnitude from indivisibles it necessarily follows that he is also producing a motion from indivisible motions. But let us state<sup>221</sup> in turn that no motion can consist of indivisible motions. Obviously, then, moving comes into being by the presence of motion, and whatever state motion is in so too is moving; so if the motion that comes into being over A is indivisible, then moving over A will also be indivisible; but this is impossible: so neither is motion indivisible.

**183,21 (231b28-232a6)** So how is it impossible for moving over *A* to be indivisible? [It is because] a thing moving from somewhere to somewhere must not simultaneously be moving and have moved to where<sup>222</sup> it is moving: i.e. <not> simultaneously be travelling to Thebes and be in Thebes;<sup>223</sup> not simultaneously be walking to the Piraeus and have walked to the Piraeus. Instead, travelling to Thebes must be prior to being in Thebes, and walking to the Piraeus to having reached the Piraeus. So how will this [distinction] apply to the same partless thing, when X is moving over it in the presence of motion **D** (the latter posited as indivisible)?<sup>224</sup> For in the case of a partless thing its moving cannot be earlier than its having moved, and its travelling than its having travelled; for that would make the motion *divisible*. [184] But how, in general, will moving exist? <For> not being at rest is also not<sup>225</sup> [equivalent to having moved and is to be neither in that from which nor in that to which [there is motion]; for if in the former, something would be at rest, if in the latter, it would no longer be moving towards it.<sup>226</sup> It is therefore in what is in between what [it is moving] from and what [it is movingl towards.<sup>227</sup> Therefore both motion and magnitude are divisible,

so that by exclusion it is necessary *either* to make indivisibles divisible again, *or*, by maintaining this posit [of indivisibility], to fall back into the earlier impossibility that someone who *is walking* to the Piraeus *has walked* to the Piraeus during the actual walking, and someone who *is going away* to Megara *has gone away* to Megara during the actual going away.

184.9 (232a6-11)<sup>228</sup> But the 'quite brilliant' Epicurus<sup>229</sup> is not ashamed to employ a drug harsher than the sickness,<sup>230</sup> although Aristotle had previously demonstrated here too the faultiness of the argument. For, says [Epicurus], while something that is moving does move over the whole<sup>231</sup> [line] ABC, it is not the case that it is moving but that it has moved over each of the partless things from which [ABC] is composed. Next, he is unaware of falling into innumerable absurdities: (i) because he constructs the motion over the whole of ABC not from motions but from the *limits* of motion and from the [fact of something] having moved;<sup>232</sup> for the whole motion DEF will not have the parts Dand E and F as its motion;<sup>233</sup> for it is assumed that at  $(kata)^{234}$  each of these [parts] it is not moving but has moved; (ii) because he says that 'having moved' is true for the [extension] over which 'is moving' has never been true; and that 'having traversed' holds of the [extension] of which 'is traversing' did not hold earlier; and that 'having walked' holds of the [extension] of which 'is walking' did not hold earlier: and that, in general, the past<sup>235</sup> is true for that [extension] over which<sup>236</sup> the present was never true.

184,21 (232a12-17) Again, if, when so disposed, everything that is naturally disposed to move is necessarily either moving or at rest, then  $\langle if \rangle X$  is not moving at A, clearly it is at rest in A, and in the same way in both B and C. But it is also posited as moving over the [line] composed of ABC, so that while being at rest at every part of the [line] ABC, it will nonetheless traverse the whole [line]. In general, if motion over each of the partless [parts of a line] is going to hold of X,<sup>237</sup> surely it will move when it undergoes motion? But if it is rest rather than motion that is going to hold of it, then its motion will be composed of rest!

184,28 (232a18-22) Again, if a magnitude consists of partless things, then a time period must also be composed of indivisibles; for if someone posited a partless magnitude and not a partless time period too, but instead [posited] everything as capable of being divided, then he is in turn going to be proposing the partlessness of a time period too.<sup>238</sup> For it is agreed that everything with a constant speed moves over less distance in less time; so if *this* [shorter] time period too, in which something moves over<sup>239</sup> a [magnitude] that is partless and smallest, were to be divisible, [185] clearly in a 'part' of this time period it would traverse a 'part' of what is smallest! So someone who constructs a magnitude from partless things must also posit partless time periods.

## [Chapter 2]

185,4 (232a23-b23)<sup>240</sup> Someone who posits partless time periods does away with what is faster and slower – facts that stare us in the face and are familiar to all. I mean, who is there who does not know that a horse is faster than a tortoise,<sup>241</sup> and an ox-cart slower than a chariot? And were you to inquire of one of the masses why indeed a chariot is faster than a wagon, he would reply, with no need of Epicurus' brilliance,<sup>242</sup> that a chariot would traverse 30 stades in one hour, whereas a wagon would complete the same number of stades in three or four hours; for in the time period in which the horses canter through the 30 stades the oxen would travel barely seven.<sup>243</sup> For what sort of brilliance is involved in knowing that a faster thing will traverse an equal distance in a shorter time period, while a slower one [will traverse] a shorter length in an equal time period? It is just as my children and I did not complete an identical journey from Nicea to my homeland [of Paphlagonia] in equal time periods, when I had a public mule-wagon and they an ox-cart, but I did so in two full days, they in four.<sup>244</sup> So it is these [facts], which are self-evident and stare every human being in the face, that those who posit time periods that are partless and smallest destroy.<sup>245</sup>

185,19 But consider this: if in fact there is any time period that is smallest and partless, is it possible or impossible to move in it? For if it is impossible, then it is also impossible in the [time period] composed from it: for how will it be possible to move in the whole of a thing in no part of which it is possible to move? But if it is possible to move in a partless time period, then, of course, it is possible for there to be both slower and faster motion in it, and I am certainly not speaking of the same thing moving but of one thing [moving] after another.<sup>246</sup> So if in jest with us the argument supposes a tortoise moving in the heavens, or something slow-moving other than a tortoise, then, of course, this thing will also itself move in a partless and smallest time period, but in moving it will at all events complete a distance of some specific quantity. So, then, will this very swift Sun too ('driving its winged chariot'),<sup>247</sup> traverse<sup>248</sup> this distance, be it short, small, whatever you like, in a partless time period, or in one less than a partless one? Now if it does so in a partless one, then they are making the tortoise equal in speed to the Sun (for what completes an equal distance  $\langle in \rangle^{249}$  an equivalent time period has a constant speed); but if in a [period] less than the partless one, then they are no longer maintaining a smallest time period.

185,33 (232b23-233a5) Now for such a supposition just the preceding [criticism] was enough, but let us give a more extensive explication to the argument, for in this way it might become more obvious that neither a time period nor a magnitude is composed of partless things.

185,35 Since the [aforementioned]<sup>250</sup> horse necessarily completes an identical distance in a shorter time than a tortoise: (*i*) suppose a faster and a slower thing, A the faster, [186] B the slower, and let the slower

(**B**, that is) move over the line **CD** in time period **fg**. Clearly the faster, namely **A**, will move over the same length, namely the straight line **CD**, in a time period less than **fg**. Now (*ii*), suppose [**B**] to have moved in [time period] **fh**. When in turn the faster [**A**] has traversed the whole [line] in **fh**, let the slower [**B**] fully traverse in the same time period a line less than **CD**, namely **CJ**. Now (*iii*), since the slower traversed **CJ** in time period **fh**, the faster will fully traverse **CJ** in a shorter time period [than **fh**], so that again the time period **fh**<sup>251</sup> will be divided; for **A** travels over **CJ** in time period **fi**.<sup>252</sup> So in **this** same time period **B** [will] no longer [travel over] **CJ**, but over less than **CJ** – just **C**.<sup>253</sup>

186,10 (233a5-12) We shall therefore think, as we continually intersubstitute<sup>254</sup> the faster and the<sup>255</sup> slower and use the procedure for inter-substitution demonstrated here, that the faster will always divide the time period and the slower will always divide the magnitude; for the faster will always traverse the same straight line in a shorter time period, while the slower will traverse a shorter straight line in the same time period. Since inter-substitution is always possible (for it is always possible to think of a faster and a slower thing), we shall also always be able to divide both the time period and the magnitude along with the time period; for these imply one another – meaning the division of the magnitude and of the time period<sup>256</sup> – and if the time period is divisible a specific number of times, the magnitude is also divisible an equivalent number of times.<sup>257</sup>

186,20 (233a13-21) And this becomes particularly evident from things that are moving at a constant speed;<sup>258</sup> for they will always traverse half the magnitude in half the time period, and a third in a third of the time period, and a smaller fraction in a smaller fraction [of the time], so that if [they traverse] the time period to infinity, then [they will traverse] the magnitude [to infinity] too. For the time period of the motion is coextensive with the distance over which the thing that is moving continuously is changing its place, and for this reason in whatever way the time period maintains infinity, the distance will also do so in just the same way: [viz.] if [the time period] is non-traversable and non-terminable, and has no extremity, then the length too is non-traversable; but if [it is traversable] by being divided and cut up, then the length in turn is similarly so; and if [traversable] in both respects [sc. extremity and divisibility], then the magnitude is also [traversable] in both respects.

186,30<sup>259</sup> (233a21-6)<sup>260</sup> Of this Zeno [of Elea]<sup>261</sup> is, or pretends to be, unaware when he thinks that he is deriving the elimination of motion from the impossibility of saying that something that is moving has traversed infinitely many [parts] in a time period that is finite, and that [moving object] A has made contact with infinitely many [parts] and individually – if [for example] a one-foot length is divisible into infinitely many [parts] and to infinity, but [187] the time of the motion over it is finite. For, says [Zeno], the chariot wheels that revolve across a stade do

not, of course, omit, the division of the stade, but since [the division] is itself infinite, as are the parts generated in the [division], how do the [chariot wheels] run through infinitely many [parts] in a finite time? For this was the impossibility that followed for [Zeno] from his not grasping, or not wanting to, that both length <and time>,<sup>262</sup> and, in general, everything continuous is spoken of as infinite in two ways: either by its being divided to infinity, or by not having any extremity or any limit to its magnitude.<sup>263</sup>

187,7 (233a26-34) Now I would say that neither could contact be achieved with all of such a quantitatively infinite length.<sup>264</sup> nor could all of it be traversed in a finite time; but it would be possible to make contact with and traverse in a finite time all of [a length] limited in quantity, but infinite (and *potentially*, not actually, infinite)<sup>265</sup> with respect to being cut up and divided. In fact, this time period itself is limited in quantity, but infinite with respect to division, and infinite in the same way that a length is. For *both* are in potentiality, so that a [moving] thing will traverse an infinite [length] in infinite time (the potentially [infinite length] in potentially [infinite time]), and make contact with the parts that are infinitely numerous in conception by means of the parts of the time period that are infinitely numerous in conception, since with respect to each of the two significations for the infinite we are also in agreement, but specifically we shall also demonstrate that it is not possible to traverse either (i) an infinite magnitude in a finite time period, or (*ii*) a finite [magnitude] in an infinite time period, but instead, if the time period is infinite, so too is the magnitude. and if the magnitude [is infinite], so too is the time period.<sup>266</sup>

187,21 (233a34-b14) [demonstration of (ii)]: Let there be<sup>267</sup> a finite magnitude AB and an infinite time period c, and let some [part] of the time period be identified as finite, say cd. In [cd], then, something that moves<sup>268</sup> will traverse some [finite part] of the magnitude, and assume it to have traversed the [line] BE. So this part of the length, I mean BE, will measure out the whole length AB, or will exceed the part that is at the end;<sup>269</sup> for it makes no difference whether [the thing that moves] is always going to be traversing in an equal time the [distance] that is equal to the part BE, and whether this [part] measures out the whole magnitude and exceeds the part that is at the end. That is because the whole time period in which [the thing that moves] has traversed the whole [magnitude] will be finite; for it will be divided into as many equal parts as those into which the magnitude [will be divided].

187,29 But if it troubles you that BE is not in all cases [188] at equality in accordance with what measures out the [line] AB, you can make BE of such a size that it measures out BA. For if [the thing that moves] is also going to perform its traversal in accordance with the whole [line AB] in infinite time, it will at all events traverse BE at least in a finite [time period], so that, if BE measures out BA, so too does the time period in which one could say that it will also traverse the part BE

in infinite time. But this is impossible;<sup>270</sup> for if the time period is bounded at each limit, and if something that moves begins its motion from point **B** at a specific time, then it must traverse the line **BE** in a finite time. For since it will traverse the part in a time less than the whole, then this lesser [time] also has to be limited – it will have the same starting-point as the whole, but will add on its limit from being less [than the whole].

**188,10 (233b14-15)** [demonstration of (i)] It is also the same demonstration if we supposed the length infinite, but the time period finite; for again the length too will be finite when we use the identical procedure, and our demonstration is the same, even if we do not suppose<sup>271</sup> the motion as being at a constant speed.

188,13<sup>272</sup> To explain: even if according to this supposition there is motion not over an equal distance in an equal time period, but over an equal one in more or less [time], clearly if the finite distance is divided into equal parts, the time period too will be divided along with it into an equivalent number of parts, but not ones equal to one another. Yet to demonstrate [that the time period is divided] into what is finite it is enough to demonstrate that it is composed of parts limited in number, even if these parts happen to be unequal, and *vice-versa*, given that the time period was assumed to be finite, but the distance infinite. So the only way in which it is possible to move over a finite distance in an infinite time period is if there is motion over the same [distance] again and again, as we in fact observe with the divine bodies.<sup>273</sup> But if a finite body does not traverse an infinite distance in a finite time period [cf. (i)]. then it is obvious that (*iii*) an infinite body (if we supposed it moving) would also not traverse a finite distance in a finite time period; for whenever an infinite body traverses a finite line, clearly at that time a finite line too will traverse an infinite body. But this has been demonstrated as impossible.<sup>274</sup> Yet even if we supposed (iv) that the distance was infinite as well as the moving body, and if only the time period were finite, the remaining [items] too must emerge as finite. [189]

**189,1** (233b15-32)<sup>275</sup> So because of Zeno's problem our discussion took on these [demonstrations] as extraneous to the proposed [topic], but let us go back to what we digressed from:<sup>276</sup> that neither a line, nor a plane, nor any continuous thing at all can be either indivisible or composed of undivided things, not only because of what was said earlier,<sup>277</sup> but because an undivided thing will as a necessary consequence also be divided; for since in every time period there are faster and slower things, with the faster traversing a greater length in an equal time period, this greater [length] could be double, triple or even  $1\frac{1}{2}$  times larger.

189,8 Now in an equal time period let the faster have moved over a distance  $1\frac{1}{2}$  times that of the slower, and let the magnitude be divided into three partless [parts], over the whole of which the faster one travels, while the slower does so not totally but in an equal time period over two partless [parts] (for in that way one length would be  $1\frac{1}{2}$  times

the other). But if the length over which the faster moves is composed of three undivided [parts], then the time period in which it moves will also be composed of three partless [parts], if, as has been shown,<sup>278</sup> the time period necessarily follows the distance. But since the slower one passes by *two* partless [parts] in a time equal [to that of the faster],<sup>279</sup> then when it completes the second of the two partless [parts], it will at that time, of course, use up *half* a time period (and this [time period] was [*ex hypothesi*] composed of three *partless* [units]!). Thus, one of the *undivided* [parts] of the time period will be *divided* into two,<sup>280</sup> given that the whole [time period is now divided] into two [partless parts] from three.<sup>281</sup>

## [Chapter 3]

**189,21 (233b35-234a3)** Earlier we also adequately demonstrated regarding the now as it is spoken of primarily and truly that it is partless and indivisible<sup>282</sup> and in every time period one <and><sup>283</sup> the same (the limit of the past, the beginning of the future),<sup>284</sup> but it is not in any way possible<sup>285</sup> to investigate now too whether the now is like this. So I think that all would agree that the now is the extremity of the past, and that prior to the now nothing at all of the future exists; for how could there be something future prior to the end of the past (for it would no longer be anything future but something past through being enclosed by the limit of the past)?<sup>286</sup> Again, then, by the same token it is also evident to all that the now is the beginning of future time, and its first beginning, after which there is nothing past:<sup>287</sup> for how could there be something past after the beginning of the future?

189.31 (234a3-24) Are the [190] extremity of the past and the beginning of the future two things, then, separated in a precise sense from one another, or are they one and the same, simultaneously both the limit of the past and the beginning of the future? Now I say that they are one and the same; for, if they are separated from one another, they could not be in contact with one another, for both are partless and have no extremity but are themselves extremities.<sup>288</sup> But our earlier arguments too do not permit a time period to be composed of the nows when in succession or in contact; for nothing continuous consists of partless things.<sup>289</sup> But if when separated two [nows] are not in contact with one another, there must be something in between them: but what is this if not a time period? For while both [nows] are the limits of a time period, and the extremity of the past and the beginning of the future, between the limits of a line there is nothing other than a line, just as between the limits of a body there is nothing other than a body (for the void does a fine job of serving as an impediment!)<sup>290</sup> So if there is a time period in between the limit of the past and the beginning of the future, clearly it is a time period that is *neither past nor future*. What is [this]? [I ask] because it encloses the now itself, but is neither the [time] that has

passed after the now, nor the [time] that will exist before the now; but if it is neither past nor future, it is totally a now. Also, since every time period is divisible, this now too can be divided, but every division of a time period makes [the now] into *both the past and the future*.<sup>291</sup>

**190,19** And look at the absurdities that follow:<sup>292</sup> for the time period in between – [*viz.*] this elongated now<sup>293</sup> that we have divided into the past and the future – is, to the extent that it exists after the extremity of the past, totally future (so there will be something past belonging to the future!), while to the extent that it is earlier than the beginning of the future, it will be entirely past. There will therefore be something future belonging to the past (to dismiss what is most obvious), because one [part] of the now is past, the other future, and because with the division coming about in one place and then another, the nows in the now are multiple and non-simultaneous! So if this is impossible, the same thing must be a now as *both* a limit *and* a beginning, and in a precise sense indivisible.

**190,28 (234a24-31)** So what follows from this [argument]? A fact paradoxical but entirely true: *that nothing changes in the now*; for if something can change in the now, then it could do so more quickly and more slowly. So let a slower thing change in the now over a distance of, say, 24 digits.<sup>294</sup> By the preceding arguments<sup>295</sup> a faster one will complete the same distance not in the now but in less than the now; therefore the now that we have demonstrated to be indivisible will be divided. Therefore nothing can change in the now.

**190,34** (**234a31-4**) But still neither can anything be at rest; [**191**] for we say<sup>296</sup> that that which is naturally disposed to change and, when so disposed, is not changing, is at rest. But if nothing is naturally disposed to change in the now, clearly neither is it [disposed] to be at rest.

191,2 (234a34-b5) So since it has been adequately demonstrated that because the now is the same in both time periods (and I mean the past and the future), as the limit of the one and beginning of the other, then if we thought of something [X] changing in a past time period, but at rest in a future time period, clearly it will be simultaneously changing and at rest in the now; for insofar as [the now] is the limit of the past, X will be changing, but insofar as [the now] is the beginning of the future, X will be at rest, so that if it is naturally disposed to be at rest and to change in the now, it will be changing and be at rest in the same [now]! For while as things are<sup>297</sup> this is not even a necessary consequence because [X] could not even change<sup>298</sup> in the now, in the case [envisaged] absurdity would necessarily follow; for what is naturally disposed to change in the now and is changing in the whole past time period would also be changing in the now that is the limit of the past, just as what is naturally disposed to be at rest in the now and is at rest in the whole of the future time period would also be at rest in the now that is the beginning of the future. And so X would consequently both be at rest and be changing in the same [now].

191,16 (234b5-9) That nothing changes in the now might perhaps seem quite plausible, but that nothing<sup>299</sup> is at rest not similarly logical. But one could without difficulty admit the latter [claim] too by reflecting that we speak of a body being at rest just when it is in the same state both now and earlier, whereas in the now there is no 'earlier', thus no rest either. So what is changing and what is at rest must be changing and at rest in a time period.

# [Chapter 4]

**191,22 (234b10-20)** What must be investigated is therefore whether everything that is transformed is divisible, or whether it can also be partless (in the way that the mathematicians say that the point moves and by its motion produces the line).<sup>300</sup> Now if what is being transformed must be neither in (*i*) that into which it is being transformed (for then it would have been transformed), nor in (*ii*) that from which it is being transformed (for in that way it would not even be undergoing transformation), clearly all that remains is that one [part] of it is in (*i*), the other in (*ii*) (for it could not be in both, nor can it be in neither),<sup>301</sup> so that it will necessarily be divisible. But while this is also inherently clear from induction in the case of transformation with respect to place, it is more familiar in the cases of alteration or increase.<sup>302</sup>

#### <excursus: instantaneous change>

**191,30** <1. the problem> But in cases in which it sometimes turns out that transformation is instantaneous (*athroos*), in what way is it necessary that, [**192**] [for example], one [part] be in white, the other in black?<sup>303</sup> Theophrastus explicitly raises this problem in his On Motion, Book 1 and has provided confusion for the commentators.<sup>304</sup>

**192,2** <2. *instantaneous change part by part*> Now to say that nothing has an instantaneous transformation in the same way with respect to the totality of its parts but [only] in all those in which instantaneous transformation is thought to come about<sup>305</sup> is [the same as] transforming<sup>306</sup> one part earlier, another later (as in the cases of milk being frozen and a body being darkened from a sun-ray);<sup>307</sup> for [what is transformed] first is either the most easily affected<sup>308</sup> part or the one closer to what is imparting the change.

**192,8** <3. *instantaneous change observable*> Yet it is not really true to say this; for *sense perception* shows us that *some* transformations and alterations of bodies come about instantaneously,<sup>309</sup> and this is how at the outset we have opposed Melissus' view.<sup>310</sup> But it is also not [true] that Aristotle has formulated his demonstration<sup>311</sup> only for the case of transformations with respect to place, since he is obviously speaking about *everything* that is transformed.<sup>312</sup>

192,12 <sup>313</sup> <4. instantaneous change, indivisibles and parts> Now the

following struck us as helping the argument. We think that Aristotle does not even believe<sup>314</sup> that he needs an argument about the things that, because they are divisible and are magnitudes, are transformed instantaneously. For if we say that those things, *all the parts* of which are also either altered or increased with respect to one time period, are transformed instantaneously, clearly such transformation applies to things that possess *some parts*. As for those that possess *no part*, how could they be simultaneously altered with respect to *the totality of the parts*? Now either it is not the case that being transformed<sup>315</sup> instantaneously is [identical with] being transformed] *is* instantaneous, then inquiring into whether such [partless] things are divisible is ridiculous. That is certainly why Aristotle did not even formulate an argument that applies to these [partless] things at all, but [only] those things that are transformed by the other ways [of being changed].<sup>316</sup>

**192,23** (234b21-3)<sup>317</sup> Change is divisible in two senses: in one sense by time, in another with respect to the changes in the parts of what is changing. (235a10-13) Change comes to be divisible by time because more of it is in more time, less in less. [193] (235a13-18)<sup>318</sup> But after <this, it is divisible with respect to><sup>319</sup> the unique changes in the parts of what is changing; for the whole change is in the whole [of what is changing], whereas the parts are in the parts of what is changing.<sup>320</sup> Divisible too are the things with respect to which change comes about (e.g. place, mass, colours), but not in the same way; instead, quantities [change] *per se*, but what is qualified [changes] incidentally<sup>321</sup> by<sup>322</sup> the body, in which, [for example], there is white or black, being divided. (235b1-5) The most important consequence of both change and the things with respect to which there is change being divisible is that what is changing is first divisible.<sup>323</sup>

#### [Chapter 5]

**193,9 (235b6-13)** Since everything that is transformed is transformed from something into something, when a thing that has been transformed has *first* been transformed,<sup>324</sup> it must be in that into which it has been transformed; for example, when a person who has come<sup>325</sup> to Athens has *first* come, he has [come]<sup>326</sup> to Athens;<sup>327</sup> and when a person who had grown to a height of 48 digits had *first* grown<sup>328</sup> to a height of 48 digits, he was 48 digits [tall]; and when a person who had recovered his health had *first* recovered his health, he was in good health. I say *'when ... first'*, for it follows that a person who came to Athens *a year ago* has not [come] to Athens *now*;<sup>329</sup> however, when he has *first* come, necessarily he has [now come] to Athens. It is also clear from [Aristotle's] statement [at 235b8-9];<sup>330</sup> 'for what is transformed is displaced from, and abandons, what it is transformed from';<sup>331</sup> for 'to be transformed from something' is just the same as 'to abandon' that thing.

**193,18 (235b13-19)** Now because this is the case, let us look at one of the transformations – that with respect to a contradiction. So when<sup>332</sup> something has been transformed from not-being into being, clearly it has abandoned not-being; it will therefore be in being, given that there is nothing in between being and not-being. One could also observe this in the case of the remaining transformations; for where will what has been transformed be if not in that into which it has been transformed? For it is posited as having abandoned that from which [it has been transformed].

**193,23 (235b19-30)**<sup>333</sup> Yet someone might say: 'It could be in something else, as in what is in between; for no changes exist with respect to a contradiction'.<sup>334</sup> But if it is in what is in between, we are representing it as *being transformed*, not, as we posited, as *having been transformed*. But if it has *already* been transformed, how could it be in what is in between? For how could what has been transformed, when it has been transformed, *still* be undergoing transformation into that into which it has been transformed? So it is obvious that *when* what has come into being has *first* come into being, it also *immediately*<sup>335</sup> exists, and *when* what has ceased to be has *first* ceased to be, it does not exist.

193,28 (235b30-236a5)<sup>336</sup> And this first thing, in which [194] it is said to have been transformed first,<sup>337</sup> and to have come into being or ceased to be.<sup>338</sup> or to have been altered, must be partless and just one thing; for what is spoken of as first is that to which nothing else is prior, and something that is not also itself of a given kind through something else being of that kind. For example, we speak of seeing as belonging to a human being but not to [a human being] as first, since [it belongs] to the eves as first; and of having two right angles [as belonging] to an isosceles triangle, but not to this [triangle] as first (for prior to that [it belongs] to the triangle [in general]). For in the case of the things for which what is said to belong [to them] belongs first to their part or genus,<sup>339</sup> these are not the things to which it belongs first, and [by the same token] if that in which something has first been transformed is divisible, it has not been transformed in this as first but in the part, so that either [the part] is prior to what is first, or what is first is undivided and partless.

**194,10 (236a5-7)** Now obviously what has come into being and what has ceased to be have both come into being and ceased to be at an undivided [time], and we shall not be lost for a reply to the sophists<sup>340</sup> as to when a person who has died has died, and at what kind of time.<sup>341</sup> For if [he has died] in the [time] in which he is living, then he comes to be alive and dead at the same time; but if [he has died] at the [time] at which he has died, then he comes to be dead a second time – when he had already died! But if [he has died] at no time, then he will *never* be dead! But this [conclusion] is not true, for he has died not *in a time period* but, as has been demonstrated, *at the limit of a time period*. So the limit of the change both exists and becomes evident, since the

transformation can be terminated, and [the limit] is the end of the transformation, as has also been demonstrated, because it exists as indivisible because of the limit being also undivided.

**194,20** (236a7-35)<sup>342</sup> But can the beginning of a change also be identified in just the same way as the limit? I speak of a beginning as the [beginning] with respect to a time at which what is being transformed first begins to be transformed. Now this [time] is either (i) a time period, or (ii) the beginning of a time period and like the now.<sup>343</sup> So if (i) it is a time period, and if all time is divisible, it is impossible to cease cutting up time itself so as to settle on<sup>344</sup> a beginning, and there is no longer a first [change] at all (for [change] in the part [reached by division] is prior);<sup>345</sup> but if (ii) the now is the beginning of the transformed is transformed immediately, something would be transformed in the now, which is impossible;<sup>346</sup> and next, if something can be transformed from a state of rest, clearly the now will be the limit of that state of rest.

**194.29** So is *this limit* (i) the same as the beginning of the transformation or (*ii*) different? But if (*ii*) different, the nows will be contiguous to one another (for the limit of the state of rest will be a now and indivisible and the beginning of the transformation will be similarly so; that is because a time period cannot be produced in between [these nows]: [195] for [if it could], the [changing] body could neither change nor could it come to rest<sup>347</sup> in it);<sup>348</sup> but if (*i*) a limit and a beginning are, as has been demonstrated,<sup>349</sup> the same, the limit of a state of rest will consequently be the beginning of a change. So at the same time there will and will not be change; for what is at the limit of a state of rest is not yet changing, but what is at the beginning of a transformation is already changing. But not only is it impossible to identify for a time period that [time] at which what is being transformed first initiated the transformation, but it is also possible to identify the *first part*, which is the first to have been transformed, of that which is itself being transformed; for all body, just like time too, is divisible.<sup>350</sup>

## <Theophrastus on the beginning of change>

**195,8** 'Now it is remarkable', as Theophrastus says,<sup>351</sup> 'and way beyond our conceptions, if there is not a beginning of change but [only] a limit, and, in general, if both are not demarcated<sup>352</sup> but walking has an end but no beginning, and sailing an end but no beginning, and if it is possible to say when a horse has stopped running but not when it began'. Or is Aristotle saying not that a beginning of the change does not exist, but [only] that it is impossible to *identify* it? But <if><sup>353</sup> so, how does he demonstrate that the limit of change is indivisible, and say that it can thereby be identified, whereas the beginning of change is neither indivisible nor identifiable? Yet beginnings are similar to limits; for if a limit of a line is a point and a beginning is a point, then it also seems to be an

axiom that the beginning and that of which it is the beginning are not the same, so that the beginning of a change is not also a change. But if it is not a change, then it is neither divisible nor in a time period, but it is in the now, just like the limit. So perhaps [Aristotle] will grant that the *beginning of a change* can be identified,<sup>354</sup> just like the limit, but that the *first change* cannot be identified – and that is true; for [the first change] is in a time period and a time period can be divided to infinity. He himself, as he proceeds,<sup>355</sup> makes this evident to anyone paying close attention. And clearly by the same reasoning the *last change* too will not be identifiable,<sup>356</sup> even <if><sup>357</sup> the *limit* [of change] is both identifiable and indivisible.

## <addendum: Simplicius on Theophrastus on the beginning of change><sup>358</sup>

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**In Physica 986,3-987,8:** At this juncture<sup>359</sup> it is considered problematical as to how a limit yet not a beginning is said to exist for a change, i.e. for the time period with respect to which that which is being transformed is said to have been transformed. In fact, Theophrastus in Book 1 of his On Motion says: 'What is evidently remarkable with respect to the actual nature of the change<sup>360</sup> is, for example, if it has no beginning but [only] an end. But how did Aristotle identify the limit as indivisible but the beginning as infinitely divisible?'<sup>361</sup>

**986,8** It is because it is possible for someone using the same arguments [as Aristotle] to identify both the limit of what is continuous as infinitely divisible and the beginning as indivisible. Thus both the limit and the beginning of the change, of the time period and of every continuous thing seem to be twofold: as (1-a) the first *part* or (1-b) the last *part* of what is continuous, and as (2-a) the beginning and (2-b) the limit (things that are no longer parts nor like the whole). In such cases it has also been adjudged that the beginning and that of which it is the beginning are not the same, nor are the limit and that of which it is the limit,<sup>362</sup> just as the point is both the beginning and limit of a line while not itself a line, and in the same way the now is also [the beginning and limit] of a time period, and a completed-change (*kinêma*) is [the beginning and limit] of change<sup>363</sup> (for that is the sense in which they call it 'the limit of a change'<sup>364</sup>).

**986,17** And [Aristotle] initially [236a7-13] said that what had been transformed was in the kind of limit that followed the whole transformation (= 2-b), but now [236a13-27] he identifies the beginning of a time period *and* of a change as what is so *as a part* (= 1-a), as is clear from his saying that this is the beginning 'in which something first began to be transformed' [236a9-10], i.e. to be changed. And everything that is changed is changed in a time period and not in the limit of a time period, and such a beginning, by being a part of what is continuous and [itself]

continuous, is divisible into things that are always divisible. Such a [part] does not have a beginning, because whatever [part] you identify is also divisible, since the indivisible beginning (= 2a) as the [beginning] opposite to the limit in which it is said to have been transformed (= 2b) is such that nothing is transformed in it, as also not in the limit, but exists before transformation and has no other beginning before it. [Aristotle] himself, by identifying, on the one hand, a beginning of change  $(= 2 \cdot a)$  and a first change as the one existing with respect to being transformed as a part of change and in a time period (=  $1 \cdot a$ ), and, on the other, a limit as that in which what is being transformed has been transformed (= 2-b), says that [2-b] exists and is identifiable ('for a transformation can be brought to completion' [236a11-12]), but that [2-a] does not exist nor it is possible to identify it,<sup>365</sup> because there is another beginning for every beginning in it, in the same way as in the case of the limit considered as a part [= 1-b] another limit can be identified for every limit.

**986,33** And it is clear [**987**] that when a whole that is finite is identified *as continuous*, it is possible to identify *both* the partless limits [2-*a*, 2-*b*] *and* the ones that as parts are terminal [1-*a*, 1-*b*], but when it is identified *as infinitely divisible*, *neither* the partless [limits] *nor* the limits that are divisible into parts can be firmly identified;<sup>366</sup> for prior to everything that has been identified as divisible into parts there is another [part], and after every [part] another one. And if some first or last part has been identified, then since it is divisible into parts, then in any [part] whatsoever of it there has to have been a transformation. Thus there will again be some [part] prior [to a first or last part], and of that which has been identified as always divisible into parts what exists as a beginning or limit in the sense of being undivided will be prior.

**195,26 (236a35-b10; b17-18)**<sup>367</sup> Indeed, that which is first cannot be identified either in a time period or in a magnitude, but not in a place either, nor in the mass with respect to which<sup>368</sup> change comes into being. In fact, these are continuous and infinitely divisible too, unless someone were to dispute this just for the case of alteration; for it is possible to identify for a colour the first thing into which the transformation of hot and cold comes about, since [temperature and colour] are affections and indivisible, since they are divided incidentally by being properties of things that are divided.<sup>369</sup>

#### [Chapter 6]

195,32 (236b32-237a2)<sup>370</sup> So since the definitions and demonstrations that all time and all magnitude are always divisible have been given in this way, obviously everything that is changing [196] must have

changed earlier, not in the sense of having ceased from change but in the sense that what is traversing [a magnitude] has in some respect already traversed it.<sup>371</sup> For since what is changing has, whenever it is changing, <br/>been transferred from something into something (for if it were in the same [place], it would not be changing), and since what has been transferred has changed>,<sup>372</sup> then clearly what is changing has changed.

**196,3 (237a2-11)**<sup>373</sup> So once a magnitude over which<sup>374</sup> there has been change has been identified, then since it is infinitely divided into parts, what is changing will consequently have changed earlier<sup>375</sup> over the same infinite place, and what has changed will also have been changing in just the same way; for when a magnitude is always being cut, then it has been changed in all the cuts. Again, were we to speak of there having been change by identifying the actual extremity of the change,<sup>376</sup> namely the now, and if the now can be identified in every time period,<sup>377</sup> then [we could] also [speak of] there having been change in every time period in just the same way.<sup>378</sup>

196,9 (237a11-28) Again, what is being continuously transformed without having ceased to be, and without having ceased from transformation, must be undergoing transformation or have been transformed in whatever belongs to a time period,<sup>379</sup> but it cannot be undergoing transformation in the now.<sup>380</sup> Therefore it must have been transformed at (kata) each [now], so that if the nows are infinitely numerous, everything that is being transformed will have been transformed an infinite number of times. But not only must what is changing have already been changing earlier < but also what has changed [must] have been changing earlier>;<sup>381</sup> for to have completed change (to kekinêsthai) is like a limit on, or cessation of, change, since everything that has been transformed from something into something has been undergoing transformation in a time period, and a time period is divisible. For if [it is being transformed] in the now, then if it is in *the same* [now] in which it is, it has not been transformed from [the now] from which it is being transformed;<sup>382</sup> but if it is in *another* [now], there will be a time period in between, since the nows are not contiguous, just as <a point> is not [contiguous] to a point. But since all time is divisible, then in half [the time period] it has undergone a different transformation,<sup>383</sup> and similarly in <half> of that [half] again;<sup>384</sup> in fact, always in such a way that it would be undergoing transformation earlier; for having been transformed is always the limit of being transformed.

**196,22 (237a28-b3)** While<sup>385</sup> in the case of change with respect to place this is more evident because of the magnitude and distance also being continuous and being cut in the same way as the time period, in the case of the other transformations a distinction must be drawn.<sup>386</sup> For if *all* transformation is in a time period, the claim made [at 237a34-5] is true, and what has been transformed must have entered earlier into [the state of] having been transformed through [the process of] being

transformed;<sup>387</sup> [197] but if *some* transformations also come about *in*stantaneously, this [claim] should perhaps no longer be condoned, and I am using 'instantaneously' here not in the sense of just the parts in their entirety but in the sense of [a transformation coming about] not in a time period<sup>388</sup> over which [the process of] being transformed is earlier than [the state of] having been transformed.<sup>389</sup> Now while Alexander thinks that all change exists in a time period,<sup>390</sup> Theophrastus<sup>391</sup> seems to be pursuing a problem<sup>392</sup> and perhaps had reservations about transformations from darkness to illumination, as when, [for example], a lamp is conveyed into a room and the whole dwelling is filled instantaneously with a flash (*augê*), i.e. with light (*phôs*) without a time period. But this [case] must be examined later.<sup>393</sup>

197,8 (237b9-11) Certainly Aristotle prevails, (i) because what has been transformed must have been undergoing transformation, and what is undergoing transformation must have been transformed, and (ii) [because] having been transformed is earlier than being transformed, and being transformed earlier than having been transformed; and (iii) because what is first [in transformation] will never be identified; the reason for this, he says, is the infinite division both of magnitudes and of the time period, and the fact that one partless thing is not contiguous to another. But just as division in the case of lines would never cease adding to one part and subtracting from another, so too is the situation with all continuous things.<sup>394</sup> So obviously both what has come into being must also have been coming into being earlier. and what is coming into being must have come into being [earlier]. And I am not speaking of everything but [only] of those things that are divisible and are magnitudes, since you might also speak of contacts between bodies as having come into being, but not through [a process of] coming into being; instead, they come into being instantaneously and not in a time period.395

**197,19 (237b11-13)** But confirmation must also be derived from induction; for example, this thing has become water, and so at some time it was also coming to be <water>;<sup>396</sup> this thing has become a house, and so at some time it was also coming to be a house (in fact, it was coming to be a house when the foundations were being laid). And were you to quibble that at that stage it is not a house that is coming into being but only the foundations, you will at least concede that the foundations are something belonging to a house. That suffices for us to claim that a house's coming into being was prior to its having come into being, either the house itself or just something belonging to it.

**197,25 (237b13-22)** But<sup>397</sup> the same also applies to ceasing to be and having ceased to be; for having ceased to be will always be prior to ceasing to be [**198**] and ceasing to be to having ceased to be, from which it must be all the more affirmed that it is impossible to identify what is first in *any* transformation.

## [Chapter 8]

**198,3 (238b23-30)** Coming to a stop (*histasthai*) is very different from reaching a stop (*stênai*); for reaching a stop is to have ceased from change, but coming to a stop is to proceed to this cessation; and while coming to a stop is the same as coming to rest (*êremizesthai*), reaching a stop [is the same] as reaching a state of rest (*êremêsai*).<sup>398</sup> Now what is coming to a stop and what is coming to rest are changing (for everything is either changing or at rest), but if what is coming to a stop must be in a time period, since we say that we are coming to a stop both more quickly and more slowly, and [speak of] this as in a time period.<sup>399</sup>

**198,9 (238b31-239a10)**<sup>400</sup> Now since coming to a stop and changing have been shown to be the same,<sup>401</sup> everything incidental to changing is also incidental to coming to a stop – namely both (*i*) coming to a stop in any part whatsoever of that time period in which something first comes to a stop; and (*ii*) the impossibility of identifying when what is coming to a stop first does so.

**198,13 (239a10-14)** Nor is it possible to identify when what is at rest was first at rest; for it was not at rest in what is partless; for when naturally disposed to change, it is also naturally disposed to be at rest; and it is naturally disposed to change in a time period, and thus also to be at rest in a time period.

**198,15 (239a14-22)** Again, we also speak of being at rest when the same state is maintained now and earlier, determining this not by one but by at least two [nows];<sup>402</sup> thus that in which there is rest will not be partless but a time period, but it is not a time period that is first, any more than [it is] a [first] magnitude or a continuous thing at all, so that it will also be impossible to identify what is first in a state of rest.

198,19 (239a23-b4) Since everything that changes changes in a time period, in the time in which it first changes it cannot exist at some [part] (kata ti) of the extension (by 'at some [part]' I mean that both what itself is changing as well as each of its parts are *in* the same [place], and *in* an equivalent extension);<sup>403</sup> for then it would turn out to be at rest and changing at the same time – for what else is being at rest than that the whole of what itself is changing and its parts are in the same [place] for a time period?<sup>404</sup> So if what is changing is not in any time period at some [part] of the extension over which it is changing, and does not occupy a place<sup>405</sup> equal to itself, how does it complete the whole extension in this time period and fully traverse it? Well, it is because it is in the now (and this is the limit of the time period) at some [part] of the extension, and only in the now does it occupy a place equal to itself, in which it is naturally disposed neither to be at rest nor [199] to change,<sup>406</sup> and it is just this<sup>407</sup> [now] that exists in potentiality and by our conceiving of it. since it is certainly not in any way actual; otherwise [what is changing] would in turn come to a stop,<sup>408</sup> the time period would undergo division into infinitely many [parts], and infinitely many [parts] would come to exist in actuality.  $^{\rm 409}$ 

## [Chapter 9]<sup>410</sup>

**199,4 (239b5-9)**<sup>411</sup> Zeno [of Elea] reasons fallaciously as follows by saying: if (*i*) everything is at rest whenever it is at an extension equal to itself, and (*ii*) it is always the case that what is moving is at an extension equal to itself; then (*iii*) a moving arrow must be unmoving.<sup>412</sup> But this is a falsity; for it is *not*-(*ii*) always the case that what is moving is at an extension equal [to itself], but instead it is not in a time period at all but only in the now, as has been stated earlier;<sup>413</sup> and a time period is not composed of the nows, nor do the nows exist in actuality, nor is >41enow a part of a time period at all, as neither is anything else a partless and indivisible part of what is continuous.<sup>415</sup>

**199,12 (239b9-14)**<sup>416</sup> Zeno has *four arguments* that eliminate motion and discomfort those who try to solve them, and the *first* goes like this. (*i*) If motion exists, then it is necessary that something that is moving first fully traverse half the distance; but (*ii*) there are infinitely many halves (for it is always possible to identify points that are halves of a [distance] that has already been identified); but (*iii*) it is impossible fully to traverse infinitely many [halves] in a finite time period; thus<sup>417</sup> (*iv*) it is impossible to move in this way. But it must be stated<sup>418</sup> (*i*) that in continuous things division is to infinity not in actuality but in potentiality;<sup>419</sup> and (*ii*) that what is moving will not traverse the distance by making divisions (for then it would no longer move over one continuous [distance] nor in a continuous motion);<sup>420</sup> and (*iii*) that the infinite is, as stated earlier,<sup>421</sup> similarly present in both time and magnitude; thus (*iv*) the infinite is not present in what is finite but in what is similarly infinite.

199,23 (239b14-29)<sup>422</sup> The second argument is the so-called 'Achilles', as dramatized just by his epithet;<sup>423</sup> for, as [Zeno] says, 'swiftest-footed Achilles'424 will not overtake Hector,425 but also not the slowest tortoise! For if the pursuer must first come to the limit of the distance that<sup>426</sup> the pursued has come to earlier, then the one cannot be overtaken by the other; for in the [time period] in which the pursuer traverses this distance, the pursued will clearly add on some other [distance]; for even if it is always less because he is assumed to be slower, he certainly adds on at least something. [200] Let Achilles, then, be 'more swift-footed' than the tortoise by a speed 10 times as great, but let the tortoise first cover a half-stade of a total distance of one stade.<sup>427</sup> In the [time period] in which Achilles runs through a half-stade, the tortoise would travel through 1/10th of the remaining half-stade. And in that [time] in which Achilles again [runs through] this 1/10th the tortoise would add on 1/10th of the very 1/10th of the distance from which [Achilles] had not yet moved away. Since the magnitude added by the tortoise always comprises 1/10th, the tortoise would also always be adding on some [distance] and each of them will never fully traverse the stade.

200,8 Here too<sup>428</sup> the explanation lies in infinite division, since [Zeno's] argument makes it actual rather than potential: for <while>429 this [argument] differs from the preceding one to the extent that it fashions infinite division not into halves but, of course, into an equal proportion, yet if it were otherwise conceded that what is moving can, as we have shown,<sup>430</sup> fully traverse a finite [line], then the slower one will at all events be overtaken by the faster. For example, if the one is 12 times faster than the other, then the [distance] that the slower one has moved in a day is what the faster will move in the hour that is the last of the 12 [daytime hours], and it will overtake [the slower] at the limit of the hour. But, as it is, [the faster] is first compelled to move over some limited part of the distance, then in this way over the whole [distance]; and this [assumption] is the source of the fallacy derived from infinite division. But we say that it moves first over a part of the whole, but that it impossible to put limits on [that part]; for then both the magnitude and the motion would *already* be divided and would no longer be maintained as continuous, nor<sup>431</sup> would the motion be one.<sup>432</sup>

**200,21** Zeno is youthfully brash<sup>433</sup> in this argument, for he says that the one in the lead cannot be overtaken. So when he *is* in the lead, we too say that he cannot (for he would both be *and* not be in the lead!), but we shall concede that he is not *always* in the lead so as always to be adding on a defined part of the [total] distance, but that at some time he will come to the limit, with the result that the faster one also does so in the same way. So when the time period for the faster one's motion is such that it is not less than whatever the amount is by which the slower one is the more sluggish, the [slower one] must be overtaken by the faster.

**200,29 (239b29-33)** The *third argument* is the one concerning the moving arrow, which we have already solved ahead of ourselves;<sup>434</sup> for it is always the case that in the now each of the things that moves occupies a distance equal to itself; but time is not composed of the nows, nor is it divided into the nows, and without this being conceded the deduction will not go forward. [**201**]

**201,1 (239b33-240a18)**<sup>435</sup> The *fourth argument* is the one concerning the <volumes> that move in a stadium.<sup>436</sup> For having made three volumes equal in length, [Zeno] makes one move [forward], the other stand still, while he moves the third in reverse. When the one moving [forward] passes by<sup>437</sup> the volume moving in reverse more quickly than it does the one that is stationary, he thinks that from this [construction] he is weaving a sophism.<sup>438</sup> 'For', he says, '<by being equal>'<sup>439</sup> (for both the stable volume and the moving one are equal [in length]) 'they will not traverse an equal distance in opposite directions in an equal time period'. And quite so, you astonishing man,<sup>440</sup> for one of them is at a standstill, while the other is moving in reverse! But if they both remained [stationary], *then* it would it be paradoxical.

201,8 (240a19-29) Still another argument beyond the four stated is posed as a query about transformation with respect to a contradiction.<sup>441</sup> They say that since what changes from something<sup>442</sup> into something is posited as being at neither [contrary] while it is being transformed (neither <in the one $>^{443}$  from which [it is changing], nor in the one into which [it is changing]), then whenever a transformation comes about with respect to a contradiction (e.g. from white to not-white, or from being to not-being), clearly that which is being transformed is *neither* white nor not-white, neither being nor non-being, <br/>but in between>.444 But that is impossible; for in a contradiction there is *nothing* in between.<sup>445</sup> But we say that what is being transformed is instead both [contraries], not that it is neither, and is [for example] white and not-white, educated and not-educated, but not as a whole,<sup>446</sup> but white in respect of one thing, not-white in respect of something else. In this way what is ceasing to be both will and will not be each [contrary] in at least some respect, without being in each as a whole, until it ceases to be.

**201,19 (240a29-b7)** There was also in the case of a contradiction [involving change] the following distinction<sup>447</sup> [drawn] not in respect of one thing and then another: 'How, [it is asked], are the sphere that moves around an axis that is stable and the circle that similarly [moves] around a centre at rest?'<sup>448</sup> They think, that is, that this [question] also creates a fallacy: 'for the [sphere and circle] remain stable,' they say, 'in the same place [as well as move]'.<sup>449</sup> But, first, the *parts* of the things that move in this way do not also remain in the same place at all, but each of them comes to exist in one place and then another continuously. Secondly, neither does the whole [remain in the same place]; for the same circumference is not identified from one starting-point and then another, except incidentally<sup>450</sup> because of pertaining to the same subject, but there is instead one starting-point when you begin from A, a different one from B, and yet a different one from another point, so that the whole is never [contained] in the same circumference.

## [Chapter 10]

**201,29** (240b8-30)<sup>451</sup> With this demonstration completed, we say that what is partless cannot change except incidentally, when, for example, a body, or the magnitude<sup>452</sup> in which it inheres, changes, like a point [moving in a line],<sup>453</sup> and as something that moves in a boat [202] [is moved] by the boat's motion. Parts also change incidentally by inhering in the whole, except not in the same way; for *parts* still also change *per se*, given that changes in them also differ from the [change] of the whole (and one could see the difference best in the case of the [celestial] sphere; for while the motion of the whole is at a constant speed, the speed of each of its parts, both those at the poles and at its greatest circle, is not identical),<sup>454</sup> but *partless things* cannot also change *per se* in any way except incidentally and through inhering in [something else].<sup>455</sup> For if
[such change] is going to be possible (grant the supposition that something partless does change), then it is either from a magnitude into a magnitude, or from a quality into a quality, or by its being transformed from being into not-being. But at the time when a thing first<sup>456</sup> begins to be transformed, it will be at rest, but if it is <in> that into which it is being transformed, it will have been transformed without undergoing transformation.<sup>457</sup> Therefore the only alternative is that one ['part'] is at the [beginning],<sup>458</sup> the other at [the end]!<sup>459</sup>

**202,13 (240b30-241a6)** But in this way it is divided into parts. For the only way that there could be change for partless things is if time were composed of the nows. For since each [partless] thing that has been changed has been changed at the now, then, if time is composed of the nows, it could be said that what is partless has been changed at *each* now, and thus also at the whole time period, and so it would follow (*i*) that change was composed of completed-changes (*kinêmata*), i.e. of the limits of change;<sup>460</sup> (*ii*) that the time period [was composed] of the nows and the extension [composed] of partless things; and (*iii*) that no longer would having been changed be earlier than being changed.

**202,20 (241a6-14)** Again, if everything that changes with respect to place is going to move over an extension greater than itself, it will necessarily do so first over an extension less than, or even equal to, itself. (If, for example, the thing that is moving were 24 digits long, it would not traverse 72 digits unless it first moved for 12 digits of the extension, or 24,<sup>461</sup> and this is less than, or equal to, [itself]; for it cannot be *in* a smaller place *while moving*, but it can move and go forward in respect of a smaller one.) So given that this is so, if what is partless<sup>462</sup> were to change with respect to place, it would not do so over an extension less than itself; for in that way it would certainly be divided into parts. But if it is *always* going to move at [an extension] equal to itself, then whenever it fully traverses a line, it will have measured out this [line];<sup>463</sup> and if so, the line will be composed of partless things.

**202,29 (241a15-26)** Again, if everything changes in a time period, and if the point too moves over an extension equal [**203**] to itself, then, of course, it too moves in a time period. But it is possible to identify a time period smaller than every other; and so we could identify one even smaller than that [time period] at which a point has made a transition over an extension equal to itself. But that is impossible;<sup>464</sup> for a smaller thing has to move in the smaller [time period], so that an indivisible thing will be divisible;<sup>465</sup> for what is partless and<sup>466</sup> indivisible could move only if someone believed change possible in the now.

**203,7 (241a26-241b2)** There is no infinite transformation, since the limits of each [transformation] have fixed boundaries. And this is directly obvious with regard to the other [transformations], such as coming to be and ceasing to be, alteration, increase and decrease; for the limits of coming to be and ceasing to be are the parts of the contradiction being and not-being, whereas for alteration they are the contraries, and

these are the extremities of transformation.<sup>467</sup> Similarly for increase <and decrease>, the limit <for increase><sup>468</sup> is on a size complete with respect to its own nature, whereas for decrease it is a removal from this [size].<sup>469</sup>

**203,13 (241b2-3)** But regarding motion this is not how a demonstration can be given; for not all [motion] is, as in the case of the [rectilinear] motion of animals and the circular motion of the universe, between contraries or [based] in a contradiction; for the [motion] of animals is entirely without boundaries and not from one contrary to another,<sup>470</sup> whereas circular motion is from itself to itself.<sup>471</sup>

**203,16 (241b3-12)** But the demonstration must be given in another way.<sup>472</sup> For (*i*) since the impossibility of achieving [a state of] being cut is also the impossibility of undergoing [a process of] being cut (by 'impossible' I mean what is so called [just] by virtue of its not being possible),<sup>473</sup> as in general the impossibility of achieving [a state of] coming to be is also the impossibility of undergoing [a process of] coming into being (for the diameter cannot have achieved commensurateness with the side; hence it also cannot be undergoing [a process] of coming to be so) – and if (*i*) is true, then (*ii*) since infinite motion cannot be achieved, neither can [a process of infinite] moving; but as for the motion that can exist, *this* can be achieved in just the way that there is motion; therefore (*iii*) the motion that both animals and the divine bodies all undergo is finite.

**203,23 (241b12-20)** There can therefore be [only] one change that comes into being again and again<sup>474</sup> as identical in species, and as both continuous and infinite in time. For *different* changes can perhaps [come into being] from one another (if, for example, alteration followed motion, and increase and again coming into being followed alteration; for in that way there will always be change),<sup>475</sup> but not *one* change, because a single [change] does not [come into being] from all of them.<sup>476</sup> Thus [a change] that is infinite in time<sup>477</sup> cannot also become one, with one exception, and that is motion in a circle.<sup>478</sup>

# Themistius' Paraphrase of Book Seven of Aristotle's Physics<sup>479</sup>

# [Chapter 2]<sup>480</sup>

**204,2** (243a32-5; 243a11-15)<sup>481</sup> Since everything that changes is changed by itself or by another thing, clearly all the things that are changed by their own means<sup>482</sup> have in themselves that which produces change together [with that which is changed] (for the power to produce change inheres in them),<sup>483</sup> but as for all the things that are changed in respect of place<sup>484</sup> by means of another thing, what must be investigated is whether there is nothing in between what produces [such] change directly and what is in locomotion.

**204,6 (243a15-b2; 244a4-6; 244a14-b2)** Now the aforementioned things are moved by another thing in four ways: for it either pulls, pushes, carries, or causes rotation;<sup>485</sup> for all changes with respect to place are referred back to these procedures.<sup>486</sup> Even throwing comes under pushing, since throwing is an intense pushing by means of pressure,<sup>487</sup> when this becomes <stronger> than the natural motion of the projectile.<sup>488</sup> If these are the four procedures for motion by another thing, and if it is impossible for the person who pushes,<sup>489</sup> pulls, causes rotation or carries not to be in contact [with what is moved], then clearly there *is* nothing in between what is moved and what produces alteration.

**204,15** (244b2-12)<sup>490</sup> For both the last thing that produces alteration and the first thing that is altered turn out to be together,<sup>491</sup> and things that are altered<sup>492</sup> are also altered by objects of perception, and objects of perception are those things by which [205] one body differs from another (heaviness and lightness, hotness and coldness, and the coordinated lists [of contraries]),<sup>493</sup> and what heats, cools, whitens, and produces change in the organ of perception is in contact [with what is altered]. In fact, actualized perceptions *are* alterations.

**205,4 (245a5-16)** Air, after all, is continuous with fire,<sup>494</sup> body with air, colour with light, and light with the organ of sight, and so too in the case of the organ of hearing and the other sense organs; for flavour is together with the organ of taste, and the organ of smell with the object of smell, and nothing exists in between.<sup>495</sup> By the same token there is nothing in between what is increased and what produces an increase; for increase occurs when something is added and unified, and, conversely, decrease when <something><sup>496</sup> belonging to what is decreasing continually departs.<sup>497</sup>

**205,9** (244b12-15)<sup>498</sup> What is living is also altered in all the same respects as what is non-living, yet not conversely; for actualized perceptions are alterations unique to living things.

# [Chapter 3]499

205,12 (245b3-246a4) The following might clearly teach us that what is altered is altered [only] by the objects of perception<sup>500</sup> and that alteration does not occur in other things. For it might be believed that among the remaining things alterations above all occur among figures. shapes and states, and their removals and transformations, but that is untrue; for we no longer call something that has had a shape imposed on it by the name of its underlying substance, as, for example, a statue 'bronze', or a bed 'wood', but [call] the one 'brazen', the other 'wooden' by paronymy, but we do still call something that has been altered by the same [name]; for [we still call] a piece of bronze hot and cold and a piece of wood damp or hard, in that here what has admitted the affection that came to be in it through alteration does in a precise sense remain both earlier and now, whereas with imposed shapes the underlying substance no longer remains entirely in the same state. That is because such transformations are close to [the process of] coming into being,<sup>501</sup> since they also in some way include the underlying nature, whatever it may be.<sup>502</sup>

**205,24 (246a4-9)** So just as it is illogical to say that a human being, or a house, or a ship that has come into being has been altered (for whatever is altered in a precise sense must remain the same), so also is it in the case of the imposition of shapes. Now perhaps in cases of coming into being too each thing must have come into being when *something* was being altered (e.g. matter being condensed or cooled), yet the *things* that come into being are certainly not altered, nor is their coming into being an alteration; for in cases of coming into being there is also a special condition, that the underlying matter is 'altered' beforehand<sup>503</sup> rather than remaining attached to the same nature that it had at first. Clay and mud, for example, are not earth and water, but [**206**] migrated into a different nature, yet are not something that has come into being, like a brick or an amphora,<sup>504</sup> for prior to these [artefacts] a brick or an amphora did not even exist.

**206,3 (246a10-b3)** Yet neither would you speak of the states of the body or those of the soul (e.g. states of sickness and health, and vices and excellences) as alterations, or as being altered with respect to these bodies and souls of animals; for excellences are completions, which is why each thing is preeminently in its natural state when it has adopted its own excellence, whereas vices are corruptions. So just as something that is being brought to completion is not also being altered (for it is absurd for someone to speak<sup>505</sup> of a house that is being roofed as being altered rather than being roofed), this [principle] also applies in the same way to the excellences, both those of the body and those of the soul.

**206,10** (246b3-247a19)<sup>506</sup> Again, all excellence and vice is present in what is proportional and disproportional, and these belong to what is relative, but there is no alteration with respect to what is relative.

**206,13 (247b1-13)** Yet neither are the states of the part [of the soul] that can think [alterations] nor are the apprehensions belonging to the states,<sup>507</sup> and not only not alterations but not even cases of coming into being at all. That is because bodies of knowledge are collected from the universals, whereas the universals [are collected] from individuals,<sup>508</sup> and there is no coming into being or alteration for the activity of the intellect; for neither is it in a time period at all, nor is its<sup>509</sup> being brought to fulfilment by means of a time period, even if it is above all because time exists that we think and contemplate, just as being in contact also comes about because time exists, but it is not in a time period.<sup>510</sup> And this is clear from the fact that the things that are in contact are in contact identically in every part of a time period, since they need no [part] of the time period to generate contact, and things that do not need a time period to be transformed from potentiality to actuality come into being atemporally.<sup>511</sup>

## [Chapter 4]

**206,24 (248a10-18)** Not every change is comparable with every change, nor is there a common measure for all [changes]<sup>512</sup> (for what similarity is there between an affection and a motion?),<sup>513</sup> (**248a18-b6**) but also not between motion that is circular and rectilinear; for the distances – both the circular and straight lines – are also not comparable, since the one is neither greater nor less than the other. (**248b6-12**) So neither does faster or slower apply to all [changes] in relation to all [changes], but it is the same as our saying that a pen is sharper than wine, and a sword than the highest note.<sup>514</sup>

**206,30** (249a8-29)<sup>515</sup> But perhaps someone will say that a time period is the common measure of *all* [changes]<sup>516</sup> – motion (swimming, flight, walking);<sup>517</sup> increase; cooling and the like – for in an equal time period the one succeeds in moving, while the others are affected and increased. But it is not for this reason [207] that a given change should be spoken of as generic, but only synonyms are comparable, and it must be realized that among homonyms some have something in common, others do not, and some are close [to one another], others remote.<sup>518</sup>

# [Chapter 5]<sup>519</sup>

**207,4 (249b27-250a19)** Since what produces motion does so by means of a specific power, over a specific distance, and in a given quantity of time, is it the case that, just as a multiplied power moves a multiplied weight, so does a fraction [of a power move] a fraction [of a weight]? For example:<sup>520</sup> if (*a*) 50 people [move] a pillar, can one person on his own

move 1/50th of the pillar? And if (b) 50 move a whole pillar one stade in one day, will 50 move half the pillar 2 stades in the [same] day, while 25 [move it] just one stade? And if (c), just as the 50 [move it] one stade [in one day], will one human being move this pillar 1/50th of the stade in a time period equal to that in which the 50 [move] the whole thing? Some of these [cases] appear to maintain the proportion, whereas others cannot, as in fact (c), for example, the last of those described above; for in that way something very weak would turn out<sup>521</sup> to move the same thing as something very strong, not over an equal space,<sup>522</sup> nor in the same way, but <over an unequal [space]>,523 in any way whatsoever and anything whatsoever, so that even the one person will move a boat and a ten-talent weight!<sup>524</sup> For it is evident that a mover moves according to a given excess of power, and one [power] is far removed from what is moveable and is as if incomparable with it,<sup>525</sup> another is as it were diminished, another as it were already its equal,<sup>526</sup> and finally one actually overpowers it; for it is because of this [series of proportions] that one person is far from moving a ship, but 10 are less so, while 30 neither overpower nor are overpowered, but with one added person they exceed what is moveable, and it is not one person who acts but the power of them *all together*, as also with equally balanced scales,<sup>527</sup> for one additional coin moves the whole weight [in the other scale], but a greater amount is always closer to producing motion than a lesser one.

**207,25** Similarly with magnitudes,<sup>528</sup> the [total] needing a *palaistês* (4 digits) is closer to being three *pêkheis* (72 digits) than the one that needs one *pêkhus* (24 digits), and still more the one that needs 2, and still more the one that needs 1, but the same [total; *sc.* 72]<sup>529</sup> only exists when the digit-length [magnitude] is added. But the reason [for its being 72] is not the last [digit] added to the 72-digit-length [magnitude]<sup>530</sup> but the magnitude derived from *all* of them. But in these cases the quantity is fixed and it is easy to discover both by perception and by reason the magnitude that on being added<sup>531</sup> first produced a magnitude of 72 digits; but in the cases of beaching a ship<sup>532</sup> and of the balance-beam it is difficult to give an account of when a large enough quantity has been generated to produce motion for the first time. That is because the [principle of] 'within a little' (*to para mikron*)<sup>533</sup> crops up<sup>534</sup> in this case, just as<sup>535</sup> the sorites [argument]<sup>536</sup> does for the cases of wealth and [**208**] baldness.<sup>537</sup>

**208,1** So it should not<sup>538</sup> be surprising why this person did not manage to make [something] move when he happened to be alone, but [did so] together with perhaps thirty people, just as I think a person would not become fully audible when just shouting alone, but would be so in a theatre along with many others; for what is derived from all [the members of a group] is distinct from <what is derived from ><sup>539</sup> each, except that what is derived from all and what is derived from each are in a sense manifest.<sup>540</sup> But<sup>541</sup> collective power is always greater<sup>542</sup> than

divided [power], since food too of a given amount is in itself healthy, but many such amounts together are duly sickening and harmful.

**208,7** (**250a19-25**)<sup>543</sup> So it is not also the case, as Zeno believes, that because a *medimnos*<sup>544</sup> of millet seeds makes a sound so too will a single grain, nor is it in any way necessary that a single drop of water erode a rock because multiple drops do.<sup>545</sup> For powers are not sliced up along with<sup>546</sup> magnitudes, but in some cases they abandon in advance masses that can still be cut up. But enough said on these [matters].

**208,12 (250a25-8)**<sup>547</sup> But it is above all the following kinds of [cases] that have in and of themselves a special way of being considered and inquired into: [*viz.*] whether the totality will move a weight proportioned to that derived from individuals. I mean, for example, if each individual [moves] a one-talent weight, does the totality [move] a 100-talent weight, or one that is greater or less? While it is illogical for it to be less, it is more [logical] for it to be greater; for something that is in a collectivity and is ambitious is also at the same time capable of mutual stimulation, just as with horses yoked together to achieve speed when a greater power supervenes<sup>548</sup> because of the intensity of [animals] who are heated and engaged in competition.

**208,19**<sup>549</sup> But surely the opposite [procedure, *sc.* dividing down] is not without proportion, so that it *is* possible to carry the weight<sup>550</sup> or mass in its entirety when it is divided among individuals?<sup>551</sup> But if that is indeed true, is it perhaps even necessary? For something divided into parts subtracts from the [collective] power what collectivization had added or augmented. It would seem to be the same as happens<sup>552</sup> in the case of geometrical constructions to things covering an extensive space;<sup>553</sup> for there the double [power] is quadruple,<sup>554</sup> as here the collectively is multiplied.

**208,24**<sup>555</sup> But there is also a difference in things that are moveable being such by virtue of their shape, as also when moved by their own means.<sup>556</sup> What is spherical, for example, is easily moved; for in its case that which is stationary to the least extent and least in contact [with the ground]<sup>557</sup> prepares the way, as it were, for motion.<sup>558</sup> This is also why in general [a spherical thing] is one that is more easily moved than one that is immobile, and likewise too with all the other things that resemble those [moveable by virtue of their sphericity]; for they all have a distinct way of being considered.<sup>559</sup>

# Themistius' Paraphrase of Book Eight of Aristotle's Physics

# [Chapter 1]

**209,2 (250b11-18)** Next in line for investigation is whether change that did not exist earlier has at some time come into being, and whether it in turn ceases to be in such a way that there is no change; *or* whether it neither came into being nor ceases to be, but always was and always will be, and whether this among the things that exist is immortal and unceasing, like a life belonging to everything constructed by nature. In fact, all who treat of nature and discourse on coming into being and ceasing to be agree that change *exists*, though not all go as far as [agreeing] that it is *eternal*.

**209,8 (250b18-251a8)** But (*i*) those who say that there are infinitely numerous worlds, and that there are always some coming into being and others ceasing to be, are saying that change always existed, since for them it follows that coming into being and ceasing to be are accompanied by change; and just like them are (ii) those who, by supposing a world both one and eternal, agree that change is also eternal. But for (*iii*) those who [suppose a world] one but non-eternal it follows that they use their suppositions about the universe with reference to change too. But the procedures for those who make the world non-eternal are two, with no other apart from them: for *either* (*iii-a*), as Anaxagoras<sup>560</sup> says, when everything had been mixed together for infinite time. Mind at some time began the world and change; or, it is (*iii-b*) as Empedocles<sup>561</sup> [savs]: for he makes change 'in alternation' for the universe as well as rest<sup>562</sup> – change when Love <makes><sup>563</sup> the universe into one thing from many or when in turn Strife [makes it] into many things from one, but rest in the time periods in between.<sup>564</sup> Thus for Anaxagoras change once begun is continuous,<sup>565</sup> as also is the world, while for Empedocles it exists 'in alternation', at one time but not at another, just like the world too. To be investigated is how these [procedures] are maintained; for [doing so] could perhaps become advantageous not only for the study of Nature, but also [210] for the method of inquiry regarding the 'primary source' [251a7-8] and first cause<sup>566</sup> of the totality of things.

**210,2** (251a8-16)<sup>567</sup> Let our basic starting-point be what we have defined and already posited. We say that *change is the actuality of what can be changed, insofar as it can be changed.*<sup>568</sup> Therefore if change that does not exist is at some time going to exist, the objects<sup>569</sup> capable of being changed with respect to each change must *pre*-exist. In fact, this

is clear aside from the definition of change; for if there is going to be alteration, then what can be altered must pre-exist: if locomotion, then what can be in locomotion must at all events exist earlier;<sup>570</sup> and indeed what can be burnt [must] exist before being burnt, and what can burn [exist] before causing burning.

210,9 (251a16-b20) So given that it is absolutely necessary that the objects pre-exist change though suitably disposed towards it, what those who supposed that change came into being without ever having existed and who proposed as a beginning for it one with respect to time must be asked about the objects, since change exists not per se but<sup>571</sup> in objects, is.<sup>572</sup> did these objects pre-exist for infinite time and were they eternal, or did they themselves too have<sup>573</sup> a beginning for their coming into being? Now if they came into being at some time when they were not in existence, had they at an earlier time undergone the change on account of which they entered into being from not-being (and I am not now saying that coming into being *is* a change,<sup>574</sup> but that at all events it exists through change), so that once they identify a first change, then by their reasoning another earlier [change] manifests itself. For in order for change to come into being, the things that are going to change must have come into being earlier, but in order for the things that are going to change to come into being, another change must have come into being earlier. Thus by this procedure the beginning of change cannot be identified; for there is always some change earlier than the one first identified.

210,22 'Yes', [the opponent] says, 'I am speaking of that earlier change as the one through which the things that were going to change came into being'. But if you remember the definition of change and grant that what can be changed *always* exists prior to the change,<sup>575</sup> and that when the objects come into being through change, they must at all events share in change in [the process of] coming into being, <then they will at all events be><sup>576</sup> suitably<sup>577</sup> related *earlier* to that change with respect to which they enter into coming into being. For since nothing is derived from total not-being, but from that which exists in one respect but not in another, then what subsists this first transformation and change must be in some way pre-existent. So again we shall ask in the same way:<sup>578</sup> is that which is pre-existent eternal or brought into being? For if we again say that it is brought into being, we shall go on to raise the same problems; for the only way that a beginning for change with respect to time could be<sup>579</sup> identified is if coming into being could be produced from total not-being.

**210,34** (251a20-8)<sup>580</sup> But let the objects pre-exist for all time as eternal, and let them initiate<sup>581</sup> change at some specific time. While to those who have attended to it the supposition appears even self-evidently irrational [211] (for *why* do the [objects] begin to change now but not earlier?),<sup>582</sup> yet by the same token more absurd consequences follow for those who also advance the argument to the next stage. For if some

things can be changed and others produce change, but both nevertheless maintain a state of rest earlier but now begin to be changed and to produce change<sup>583</sup> respectively, then an *earlier cause* must exist to explain their being inactive with respect to their potentiality earlier, but their having undertaken activity now. (251b1-10) For it is not by being similarly related to one another in separation from a cause both now and earlier that they are active now but not earlier, but either they were more distant from one another earlier but now have drawn close, or there was at all events some intervening impediment that has now been eliminated.<sup>584</sup> Whichever one of these you posit, you have to posit a change different from the one posited earlier; for if the objects were always in existence, but it was not always the case that some changed, while others produced change, but they began to do so now, clearly they did not have the same relation to one another earlier that, through their having it now, one is changed, while the other produces change. Instead, one or both of them underwent transformation, either just the one capable of producing change or the one that can be changed. So if they need an earlier change to initiate the first change, then this argument [of ours] is sustained. But even if someone speaks of the first change as that in respect of which what is capable of producing change has been transformed into producing change now, and in respect of which it has adopted this relation towards what can be changed, not even this [argument] will gain him any advantage; for we shall again inquire into the cause of *this* transformation: for unless he has again laid claim to another earlier change, he will be unable to describe it.

**211,20 (251b10-14)** But why these [arguments], when the [opponents] can be shown up as refuting themselves? For those who say that change does not exist earlier are saying that there is a time when there was *no* change (for 'earlier' signifies this for them). Yet, as has been demonstrated earlier,<sup>585</sup> time cannot exist apart from change. So what follows for those who say that at some time there was a time when change did not exist is the claim that at some time there was change when change did not exist!<sup>586</sup>

**211,26 (251b14-28)** For if concerning time too someone contended with us that it has come into being at some time without having existed earlier, as indeed Plato is held to do in the *Timaeus* (for he generates it along with the heavens),<sup>587</sup> it is enough to display to this person the opinion and consensus of all the natural philosophers concerning the eternity of time. Democritus,<sup>588</sup> for example, says that because time cannot be brought into being, this very [eternity] is the major evidence that everything cannot be brought into being<sup>589</sup> – but lest we seem to be shaming them just by the quantity of witnesses, let us test on its own terms the actual claim as to whether time that did not exist can have come into being at some time. But this supposition too is in conflict with itself; for 'existing at some time *and not earlier*' and 'having come into being now'<sup>590</sup> are all predications of time, and, [**212**] to pass over the

other [problems], who does not know that neither does the now exist without a time period, nor a time period without the now? For the now is the mean of a time period, simultaneously maintaining both the beginning and the end of any time period – the beginning of the future, the termination of the past – and it can be identified only as belonging to a time period.<sup>591</sup> So if in the case of all coming into being and of all that comes into being it is necessary to think of the now<sup>592</sup> along with them, then it is necessary to think of a time period on both sides of [the now] along with [the now], so that if a time period began now, then there was also a time period earlier, of which the nows are a limit. But if this is impossible, time is surely eternal; but if time is eternal, change is too, given that it has been demonstrated that it is impossible to think of time without change.<sup>593</sup>

**212,10 (251b28-252a5)** We shall use the same arguments also for the case of change's not being able to cease to be; for just as in the case of change's coming into being it followed that there was a change earlier than the one identified first, so here [it follows that there is a change] *later* than the one [identified] last; for when change has ceased to be, the objects too either cease to be or they remain. So if they cease to be, then since nothing disappears into total not-being, clearly they are transformed into something else; but all transformation is though change; therefore there will be change *after* change ceases to be. But if they remain forever, we shall again ask the same questions as in the case of change's coming into being: *why* are some things that can be changed and others that can produce change at rest for infinite time, and why did they produce change and undergo change earlier, but now no longer do so?

212,19 (252a5-32) For in the case of Nature the absence of a ratio or cause must be particularly avoided, as almost everyone fails to see, since even Empedocles in producing change and rest in alternation (change through Love and Strife, rest in the time periods in between), does not add the cause by which he gives an account of this [change] as being in alternation.<sup>594</sup> But neither does Anaxagoras add a statement of the cause for the very slow-moving<sup>595</sup> Mind's beginning to produce change at some time in this mixture that had been at rest for infinite time. (For why not [produce it] sooner - and why not always sooner than 'sooner'?)<sup>596</sup> In fact, among the things that come into being from Nature *nothing* lacks a ratio or an order, but Nature is the cause of all order and so of coming into being in accordance with a ratio. And as for things being at rest for infinite time but beginning to change now, either through future change or, conversely, through future rest for infinite [time],<sup>597</sup> what ratio does [such change] maintain and what [temporal] ordering, when there is no distinction stated to account for why [change exists] now rather than earlier? For natural [bodies] must either exist in an unqualified state, and not this way at one time and that way at another (as, for example, fire naturally moves upwards and earth downwards); or else the natural philosopher must supply a rationale for things not always being in the same state.

**212,33 (252a32-252b6)** Yet those things that always exist, or that come into being in this way,<sup>598</sup> are not also without a ratio and first principle;<sup>599</sup> [**213**] a triangle, for example, always has its angles equal to two right [angles], but nevertheless there is another cause for its always being like this. But the causes of eternal things are just the ones that are first causes and first principles.<sup>600</sup> So it appears that for someone who draws conclusions in such a fundamental way<sup>601</sup> there cannot be a time period when there was not or will not be change.

# [Chapter 2]

**213,6 (252b7-12)** Also to be solved in turn are the [arguments] that someone might believe stand in opposition to this thesis; for someone might say, *first*, that if no change is eternal, neither is there eternal change at all, but instead all transformation is within fixed limits (for it is all from something to something), and we recognize the limits of each [transformation] as the contraries – both the one from which it begins and the one at which it ceases – for nothing unlimited undergoes change.<sup>602</sup>

**213,10 (252b12-17)** Secondly, if we see plainly that what is completely unchanging earlier can be changed, and that <what $>^{603}$  did not even possess any change within itself earlier is now initiating change, either totally or partially, obviously change that had not existed could have come into being. For non-living things<sup>604</sup> too (e.g. earth, fire, water, air and their compounds),<sup>605</sup> undergo change after having started [to change] at a specific time, in that they have no prior transformation but are at rest.<sup>606</sup>

**213,16 (252b17-28)** *In addition*, living things also change from complete rest, yet for non-living things one might object that they are changed by another thing that itself undergoes change earlier,<sup>607</sup> so that on these [grounds] it is not decisively demonstrated that change is brought into being,<sup>608</sup> whereas for living things and animals it is not easy to find any objection; for they frequently change from a state of complete inactivity by their own means. But if a change in an animal could have come about when it was neither in [the animal] itself nor derived from outside, what prevents the same thing happening in the universe too? For if it is possible in the microcosm, then it is also possible in the macrocosm.<sup>609</sup>

**213,24 (252b28-253a2)** The *first [problem]* must be investigated first. So it is correct to say that if all change comes about from contraries to contraries, it is bounded and limited by contraries and is not continuous, not even if it turns back again and again;<sup>610</sup> for such [repetitive change] also cannot be one and the same, just as when a string is struck again and again a sound is also not one in number and the same, and,

as we proceed, we shall demonstrate this in more precise terms.<sup>611</sup> But, as I said, if all change is like this, it is correct to say that no change is either eternal or continuous; if, on the other hand, there is some [change] that is also one continuous [change] and not from contraries to contraries, clearly this argument should no longer be given attention.

213,32 (253a2-7) Yet regarding non-living things changing without also changing earlier.<sup>612</sup> it is easy to say that there is nothing surprising in their being changed by other things when that which produces change is present, but not changed when it is not; for change is not shown to be without gualification non-eternal by depending on [non-living] things initiating change and in turn ceasing [from it]. [214] For what prevents the things by which they undergo change from outside from becoming the causes of their successive change by changing continuously and perpetually? In fact, inquiring into just<sup>613</sup> why non-living things are not always changing when what produces change in them is always changing, is not for those disputing whether change is eternal or not, but is entirely for those engaged with the additional problem of why some of the things that exist change at one time, but are at rest at another.<sup>614</sup> So *that* is the starting-point for the whole current inquiry into why many of the things that exist are like this; for clearly animals do change at one time but are completely at rest at another, and when changing have within themselves the cause of the change.

214,10 (253a7-20) Surely<sup>615</sup> solving [*the third problem*]<sup>616</sup> involving animals is not difficult, even if this argument in particular seems to establish more plausibly that change that did not exist can have come into being?<sup>617</sup> For neither<sup>618</sup> are [animals] ever entirely at rest<sup>619</sup> but they are always undergoing some innate changes, nor do they possess in themselves the cause and source of *all* change, but only that with respect to place. And they are also changed in many ways from outside by the environment, in that they are heated and chilled, become pale and dark,<sup>620</sup> and see and hear the things that impart these changes to an animal from outside.<sup>621</sup> So nothing prevents this, but rather it is surely also<sup>622</sup> necessary that while many changes come about in the body through the environment, some of these produce change in thought or desire, and the latter<sup>623</sup> produce change in the whole animal; for while heating produces a change in the appetite for drink, the appetite [moves] the animal to water.<sup>624</sup> But sleep in particular makes this clear; for then animals, though not undergoing a change derived from themselves, nevertheless undergo numerous changes as their food is being digested, with thought forming images when certain things are altered in them by the environment through being heated or chilled.<sup>625</sup> That at least is how they also wake up again when a specific cause for their being awakened has been generated < from $>^{626}$  such alterations.

**214,26 (253a20-1)** But it might become clear how the truth stands regarding change in animals and in non-living things, and, in a word, in the whole proposed inquiry, if we learnt, as I also said earlier,<sup>627</sup> why

some of the things that exist are naturally disposed to be changed at one time and to be at rest at another.

## [Chapter 3]

**214,30** (253a22-32)<sup>628</sup> So resuming from above,<sup>629</sup> distinctions must be drawn. It is necessary either (*i*) that all things are at rest [215] or (*ii*) that [all things] are changing, or (*iii*) that some things are changing, while others are at rest. And if (*iii*) some things are changing, while others are at rest, this in turn will also have a threefold implication: either (*iii-a*) that the things that are changing are always changing, while those at rest are always at rest; or (*iii-b*) that all things are similarly naturally disposed to undergo change and to be at rest; with then still the third [possibility] too, (*iii-c*) that some of the things that exist are unchanging, while others are always changing, but that others share in both [states], and *this* is what must be demonstrated by us; for this holds the solution to all the problems that have been raised and is for us the goal of the treatise on change.<sup>630</sup>

**215,7 (253a32-b6)**<sup>631</sup> Now it is ridiculous to dismiss sense perception and search for a specific argument for it not being the case that (*i*) all things are at rest (for it is an infirmity in reasoning not to discriminate between what needs argument and what does not, since in some cases we are better off doing without an argument), and at the same time disputing [this claim] is irrelevant to the natural philosopher, as also stated at the outset.<sup>632</sup>

**215,11 (253b6-13)** But that it is also not the case that (*ii*) all things are changing is also always similarly self-evident, and needs no additional argument, but it may be appropriate to explore this [case] in more detail; for an argument that removes rest and stability from existing things is not as peripheral to our procedure as one [that eliminates] change. Some do indeed claim that all things are always changing but that this eludes our sense perception, but it is nevertheless<sup>633</sup> not difficult to confront them, despite their not defining whether they are speaking of one change that everything is continuously undergoing (and [not defining] just what kind this is),<sup>634</sup> or of all changes without qualification.<sup>635</sup>

**215,18 (253b13-23)** Nothing, for example, is naturally disposed either to increase continuously, or in turn be diminished continuously, or to conjoin increase with diminution, but there is a stop and state of rest at a mid-point,<sup>636</sup> since, if change from increase to diminution were continuous, then something undergoing an increase would be transformed into the process of diminution. Nor<sup>637</sup> if in 20 years an increase has reached 48 digits;<sup>638</sup> has it in a single hour increased over any part of the 48 digits; for that [would be] the same as saying<sup>639</sup> that since 5,000 rain-drops eroded a given amount of a rock, then at all events each of the drops also eroded some part [of that amount];<sup>640</sup> and that if a fig-tree

displaced stones by an outgrowth of up to 12 digits,<sup>641</sup> then on first flowering from the seed it also displaced<sup>642</sup> some part of the 12 digits. But just as 100 men<sup>643</sup> together launch a ship,<sup>644</sup> though added singly each individual would not even make it wobble,<sup>645</sup> so a given number of drops removed a given amount of a rock, though one of them per se [would] not even [remove] any part whatsoever; for it is not the case that, if the magnitude [of the rock] is divisible, each [rain-drop] [216] would necessarily have eroded<sup>646</sup> some part of the magnitude, but instead a given amount departed<sup>647</sup> by the action of a given *total* of [drops].<sup>648</sup> For again, just as in the case of the beaching of a ship<sup>649</sup> by 50 men, a ship hitherto unmoved was destabilized when one man was added [to the total], and just as in the case of the scale<sup>650</sup> 10 talents did not produce an imbalance, but a single additional drachma drew it down, so a given number of drops fell short of having the power to erode the rock but could do so when one was added. So it is obvious that in the case of things that are diminishing something does not also always have to depart from [the total], since what is diminishing is divided into infinitely many things, but it can also sometimes depart in its totality.<sup>651</sup>

**216,9** (253b23-6 + 28-30) The same also applies to any kind of alteration whatsoever; for if what is being altered is infinitely divisible into parts, then the alteration is not for this reason also [divisible]; instead, as with freezing, [alteration] often comes about instantaneously over the whole magnitude.<sup>652</sup> For, in general, no alteration is continuous and *ad infinitum*; for all [alterations] are from one contrary [state] to another.

**216,12 (253b26-8)** Also, while being transformed to health a sick person is being continuously altered as long as he is being transformed, but once transformed<sup>653</sup> to health he is at rest with respect to that actual alteration. **(253b30-2)** And,<sup>654</sup> by the gods, we do not see stones becoming either softer over a long time-period, or harder,<sup>655</sup> or changing with respect to place (for it would be remarkable had these [changes] eluded us in happening to pillars). **(253b32-254a1)** And surely the earth remains in the lower [position] from necessity, and surely each one of the other natural bodies is at rest when it has reached its own place?<sup>656</sup> For what sort of change are we to say that it undergoes at that time? Not natural [change] (for it is already in the appropriate area),<sup>657</sup> nor contra-natural [change] (for it remains in its own place).

**216,22 (254a1-15)** Similarly it is impossible for some things to be always changing, while others are always at rest; for in many cases we observe the transformations mentioned, such as increases and diminutions, and natural changes. So neither does what is changing always change (for things that are increasing come to a stop when they adopt their [proper] size),<sup>658</sup> nor are things that are at rest always at rest (for things that are moving are moving naturally from their proper places, in which they were formerly at rest). But neither does what is coming into being always [continue] coming into being, but it ceases from this

transformation when it comes into being; nor does what is ceasing to be [continue] ceasing to be, but there is a limit to its ceasing to be. So be it. It has, then, been clearly demonstrated that neither do all things <always change, nor are all things><sup>659</sup> always at rest, nor do some things always change while others are at rest.

**216,31 (254a15-18; b4-6)**<sup>660</sup> It remains for us to scrutinize the [remaining] two procedures:<sup>661</sup> whether all things are such that (*iii*) they change at one time, but rest at another; or [**217**] whether, instead of this being true, it must be said that (*iii-c*) some of the things that exist are such that they change and rest in turn, whereas others are always at rest (specifically, always unchanging), while others are always changing. For once we have begun again from another starting-point we must show that only one of these<sup>662</sup> [possibilities] will also be concordant with the truth; for in that way we could confirm in more exact terms that change too is eternal.

### [Chapter 4]

**217,7 (254b7-12)** Some of the things that produce change and that are changed are changed incidentally, others in part, others *per se*. But we know, if we have remembered what was stated earlier,<sup>663</sup> which are the ones that are changed incidentally and which the ones [changed] in part. While the latter [two] must be dismissed (for they are infinitely numerous and cannot enter into a fixed dichotomy),<sup>664</sup> some of the things that are changed *per se* are changed naturally, others by force and contranaturally.

217,12 (254b12-33) Naturally [changed] are the things that have in them the source of change,<sup>665</sup> such as animals and all those non-living things that move as they are naturally disposed (things that are heavy and earthen downwards; light things upwards). Contra-naturally [changed] are the things [changed] by force and not as naturally disposed [to be changed], as, for example, if someone applied force in throwing a stone upwards or fire downwards. The bodies of animals also often change contrary to their own nature; for example, when animals leap or prance they move upwards despite being heavy and earthen. That is because an *animal* never changes contra-naturally (for it also has the source of such change in itself),<sup>666</sup> but its body [changes] contranaturally (for it is not *qua* body nor *qua* heavy that [an animal] changes). As for those things that are changed contra-naturally, it is immediately obvious that they are changed by something, namely by another thing that applies force to their nature, since they would not be changed contra-naturally except by another thing. But as for those things [that are changed] naturally it is a matter of dispute in their case whether they are changed by something; for things [changed] naturally are thought to be changed because of [being changed] by themselves rather than by another thing.

**217,25** Now in the case of *living things* obviously they are changed by something; for even if not by another thing and not from outside, still there is in them what produces change and what is changed.<sup>667</sup> And there is no dispute as to whether they are changed by something (for they are changed by the soul), but the inquiry is into how what produces change and what is changed should be identified within them; for it seems that in animals, just as in boats<sup>668</sup> and [all] non-natural constructs, what produces change and what is changed are divided and that that is how the totality makes itself change. [**218**] <So> it is <correctly><sup>669</sup> said <not> that an animal is <itself> changed by itself,<sup>670</sup> but that it has within itself what produces change *and* what is changed.

218,2 (254b33-255a11 + a18-20)<sup>671</sup> But in the case of non-living things, when they are changed naturally, it is difficult to explain by what; for they are changed neither by another thing and from outside, as are things [changed] contra-naturally, nor<sup>672</sup> by an internal source and cause within themselves, as we see in living things; for neither<sup>673</sup> do they have within themselves what produces change and what is changed, nor are they divided into what acts and what is acted on, as animals are into soul and body, since they are not divided at all but are continuous and united. But<sup>674</sup> if they had the cause of change, such as a soul, within themselves, they would consequently<sup>675</sup> not only make themselves change but also, as in the case of animals, be able to make themselves come to a stop, and would be changed not in one way but in multiple [ways], just like animals; for they walk, run, leap, dance, and move up and down, whereas these [non-living things] undergo a unidirectional and single change that is as if necessitated. Surely, then, they too are changed by something? To be investigated is how.

218,14 (255a20-33) Some of the things that produce change are also capable of producing change in accordance with the nature that is their own, others contra-naturally: contra-naturally in the way that a lever moves a stone (for it is not *qua* iron nor *qua* heavy that it elevates a rock, nor does it have this source within itself but from outside),<sup>676</sup> whereas naturally capable of producing change are the things that have the source of change within themselves. Indeed, every actual cause can naturally produce change for the kind of thing that is potential – what is actually hot, for example, for what is potentially hot; for when something hot heats something that can be heated, it heats in accordance with the source and cause within itself. For just as something that is actually hot is naturally capable of producing change in something potentially hot, so something potentially hot can be naturally changed by what is actually hot; for just as the latter has the source of acting, so the former [has] within itself [the source] of being acted on. Fire, indeed, and each of the uncompounded bodies are, whenever they are moved.<sup>677</sup> moved at all events by other things, but by force when [moved] contranaturally (i.e. in a direction in which they are not naturally disposed [to move]), but [they move] naturally when [moving] into their own places (i.e. into [places] into which they are naturally disposed to move). Motion to a natural place is just the actuality and completion of the potentiality that each thing possessed prior to moving, and it adopts this actuality through the agency of that which made it such that it could no longer remain in a place from which it was moving once it had reached it. [219] So what made <it possible><sup>678</sup> for air to be transformed into fire was itself also the cause of activating it as fire and as a light thing, and its activity is the upward motion itself; for everything that comes into being or changes, as you are aware, is such by means of something, and on having adopted the state that earlier it possessed in potentiality is also immediately active in accordance with it, unless something prevents it.

**219,5** (**255a33-b5**)<sup>679</sup> For a learner, when he is in the process of learning, is immediately engaged in active study,<sup>680</sup> unless something else,<sup>681</sup> such as a preference or a distraction, impedes him. So just as the one who makes it possible to study actively is the cause for the learner of his active study, so the one who makes a thing light from being heavy is the cause of<sup>682</sup> upward motion from below for the thing that is light. And wood is in one sense potentially a light thing because it can be transformed into fire, but in another sense potentially fire, because it can thereby engage in upward motion. And someone who can learn a body of knowledge is potentially an educated man in a different sense from someone who already has [knowledge] but is not using it, and the latter is in the border-land<sup>683</sup> between unqualified potentiality and unqualified actuality, just like the person possessing the state of being educated is in between being a person who has not yet been taught and one who is using [his knowledge].<sup>684</sup>

219.14 (255b5-21) Now being transformed<sup>685</sup> from that first potentiality is certainly by means of another thing and from outside; for fire does not come into being by its own means but by means of another thing, but when it is transformed and takes on the state that it possessed in potentiality by means of that which possesses it in actuality. it is also potentially a light thing as long as it is inactive. But this potentiality is more complete<sup>686</sup>, and if nothing from outside prevents it,<sup>687</sup> it also immediately has the activity that follows. For example, as long as air is spoken of as potentially a light thing in the sense that it can be transformed into fire, it is not yet moving upwards; but when spoken of as potentially a light thing in the sense that it has already been transformed into fire, it immediately moves upwards, if nothing restrains it by force. So the cause of the first potentiality being transformed into the second is at once the cause of the actuality at the second stage. So the sense in which we speak of these [bodies] too as being moved by another thing – fire upwards, earth downwards – is that they became fire and earth by means of another thing: for it was not by their own means.<sup>688</sup> What followed for them as soon as they came into being was that they were going to be active in accordance with the nature by which they came into being, unless something prevented it.

**219,27 (255b24-31)**<sup>689</sup> And the person who has moved a thing that is resisting and impeding [motion] produces motion just by himself in one sense, but not so in another; e.g. the person who has withdrawn a [supporting] pillar or removed a stone from wineskins [immersed] in water moves in a primary sense the pillar and the stone [**220**], but [only] incidentally the wall and the wineskin.<sup>690</sup>

**220,1 (255b31-256a3)** So if everything is changed either by force or naturally, and in that case by something, then everything that is changed will be changed by something. So how do we speak of some things as having a source of change within themselves, like the whole set of natural bodies? In what sense, then, <sup>691</sup> do we say that some things possess within themselves a source of change? [Answer]: to possess<sup>692</sup> a source of change is to possess a source of being changed – [*viz*] a potentiality<sup>693</sup> and suitability for being transformed into just that through being transformed into which [the aforementioned things] *will* be changed by something in this case.<sup>694</sup> So it has been adequately demonstrated through the foregoing that everything that is changed is changed by something.

# [Chapter 5]<sup>695</sup>

220.8 (256a4-b13) Everything is changed in one of two ways: by what produces change either<sup>696</sup> having the source of change within itself, or by itself being changed from outside, as, for example, a stone (for [it is moved] either by a person, a lever, or by something else that does not make itself move but is moved by a different source), but [change] will not proceed to infinity but comes to a stop at the source that produces change through itself; for while a stone is moved by a lever, a lever by a hand, and a hand by a person, a person [is moved] by himself, without going on<sup>697</sup> [to be moved] by another thing.<sup>698</sup> We indeed say that both the lever and the person produce motion, but the [person] to a greater extent (for he also moves the actual lever),<sup>699</sup> and while a lever could not produce motion<sup>700</sup> without a craftsman, a craftsman could move a stone without a lever. So clearly when what produces change on itself does so through an intermediary rather than directly, that is how it also possesses the source of change. Thus everything that is changed will be changed by something that produces change on itself; for what is changed is either changed immediately by such a thing, or at some time reaches such a thing (for it will not proceed to infinity).<sup>701</sup> Thus that which can produce change is always a different cause from what does produce change; for [otherwise], *first*,<sup>702</sup> a source for change will no longer be identifiable, and, with there being nothing from which to derive the source of change, there will in the end not even be change: *next*, infinite change will also consequently come about in a finite time period for an infinite magnitude. For if the things that produce change and that are changed are *both* infinite, then clearly one infinite magnitude must have been generated from them,<sup>703</sup> and I say 'one' not because it is continuous but because it consists of things that are in contact; for everything that produces change does so by being itself changed when in contact with respect to place.

220.29 (257a27-33)<sup>704</sup> So what conclusion has the argument [at 256b13-257a25] reached for us? If being changed by something necessarily belongs to the things that are being changed, whereas [being changed] by something that is itself changed from outside does not necessarily do so, an exclusive disjunction is left: that as we advance we stop *either* at what is unchanging (the first producer of change), or at what is self-changed. [221] For since what produces change is necessarily either changed or not changed, then if not changed, it is unchanging; but if changed, then [it is changed] either by itself or by another thing; and as has been demonstrated,<sup>705</sup> not necessarily by another thing. The only alternative is [that it is changed] by itself. In fact, it is anyway reasonable that what is self-changed is the cause of change rather than what is changed by another thing; for what itself exists *per se* is always prior to, and the cause of, what exists on account of another thing. So to be investigated as we adopt a new starting-point is just how what is self-changed produces change and in what sense.

221,7 (257b2-258a8)<sup>706</sup> But to be distinguished first of all are the number of senses in which what is self-changed can<sup>707</sup> be said to be self-changed; for since it is assumed that what is changed is a magnitude and continuous, [what is self-changed] could be spoken of either<sup>708</sup> (i) as a whole simultaneously making itself change and being changed by itself; or (ii) as a part of itself making both itself and the whole change; or (*iii*) as a whole [making] a part [change]; or again (*iv*) as some part of a whole [making] another part of a whole [change]. And if (iv), then [it is spoken of *either*] in the sense that  $(iv \cdot a)$  each [part] is reciprocally changed by each [part], or (iv-b) that only one [part] produces change, while the other is changed, and it is in only this [latter] sense that something will be shown to be capable of being self-changed; for all the others terminate in (i) – that a whole makes itself change – and that, as we shall demonstrate,<sup>709</sup> is inherently absurd and impossible. But, first, it must be noted that all the other senses apart from the last [sc. (*iv-b*)] terminate in (*i*). In fact, if (*ii*) a *whole* were changed by a *part*, this part, if it makes the whole change, will also make the part *per se* change, so that if the remaining part is removed, this part will be making itself change as a whole. And if (iii) the part is changed by the whole, the argument is the same.<sup>710</sup> But again, even if (iv) the parts themselves were to make one another change, the absurdity is the same; for if each of the [parts] by which [a part] is changed reciprocates the change, then each of them will itself be making itself change through an intermediary.

**221,23** From what has been said it is obvious that all the senses [of being self-changed] terminate in (i), but we might learn from numerous [arguments] that for any whole to be changed by the whole of itself is

absurd; for does it undergo the same change that the self-changed thing produces, or a different one? If a different one, then it would no longer be self-changed in a precise sense, or rather not at all, but one [part] of it would be what produces change, the other what is changed, given that the changes are also different from one another. But if it is the same, one could not even guess how [a whole] could simultaneously produce and engage in the same motion or be altered and produce alteration, so that it could [for example] teach and learn simultaneously, [**222**] and heal and be healed with respect to the same state of health.<sup>711</sup>

**222.1** The preceding [consequence] is guite absurd and directly so, whereas what will appear more absurd is if we recall<sup>712</sup> that while everything that is being changed into something exists in potentiality insofar as it is being changed (e.g. that what is being heated is potentially hot, and what is being chilled is potentially cold),<sup>713</sup> everything that produces change already exists in actuality insofar as it produces change; for <that which produces heat is actually hot, as that> which is being heated is actually cold.<sup>714</sup> If this is the case, <and if> the <whole> self-changed thing produces change, then the whole is also changed>.<sup>715</sup> [A whole] is therefore changed by a whole, and will be simultaneously potential and actual with respect to the same thing<sup>716</sup> (potential insofar as it is being changed, actual insofar as it produces change), and simultaneously incomplete and complete with respect to the same thing (incomplete insofar as it is potential, but already complete in actuality). Thus it would simultaneously be both already hot and not yet hot, and already cold and not yet cold. So the only alternative<sup>717</sup> is that one part of what is self-changed produces change, while the other [part] is changed, and of these the one that produces change is at all events unchanging, while the one that is changed sometimes becomes the cause of change for other things too, at other times not, but it itself alone is changed.

**222,14** [*Appendix*]<sup>718</sup> It is just as we observe with animals;<sup>719</sup> for they are self-changed<sup>720</sup> according to the sense that we have distinguished, and in them there is an unchanging producer of change (the soul), and what is changed by the soul but does not necessarily go on to produce change, but does so at one time but not at another (the body). For example, when [an animal] pulls a stone, it also produces change by means of the body and is changed, but when asleep, it does not produce any change by means of the body but is changed as it is feeds, increases, pulsates or breathes. So it is clear that in the self-changed [animal] the body is one <and continuous><sup>721</sup> (for it was shown that everything that is changed is continuous), but still unclear whether it is also what produces change.<sup>722</sup>

**222,21 (256b13-27)**<sup>723</sup> But while this [problem] will surely receive a discussion just by itself,<sup>724</sup> it would also seem otherwise reasonable that there is something that, while being the producer of change, is unchanging; for if some things share both in producing change and in being

changed, others in only the one (being changed), it is reasonable, not to say necessary, that some things also share only in what remains, and I mean in producing change, but not in being changed.<sup>725</sup> [**223**] For in all cases of things being combined from two [constituents] it could be learnt that<sup>726</sup> if one of the things in the mixture can exist<sup>727</sup> per se, then the other can exist per se too; for since honeyed-wine comes from wine and honey, the honey exists even apart from the wine, and the wine exists apart from the honey. And so if there are some things that both produce change and are changed, and some that are only changed, then there must be some that only produce change.

**223,6 (258b4-9)** So it is obvious from what has been said that the first producer of change is unchanging; for since, as we also said earlier,<sup>728</sup> the things that are changed are changed by something (for in that way they would proceed to infinity and a source for change be eliminated), an exclusive disjunction is left: that they are changed *either* directly by what is unchanging, *or* by what is at all events self-changed<sup>729</sup> – but also when [they are changed] by what is self-changed, [they are changed] even then by what prior to this is unchanging. So Anaxagoras<sup>730</sup> is right to make Mind unchanging, since he posits it as the source of change. That the first producer of change is necessarily unchanging has, then, been adequately demonstrated.

#### [Chapter 6]

223,14 (258b10-259a6) That [the first producer of change] is also eternal is clear from the following [argument]. Since change must be eternal, the cause of this change must also be eternal and, as the first producer of change, must therefore totally exclude the kind of transformation involved in coming into being and ceasing to be. Now whether everything eternal also produces change without being changed is not relevant to the current discussion. For grant, if anyone wants to,<sup>731</sup> that many of the sources capable of producing change but unchanging can exist at one time but not at another (as, for example, if someone argued that the souls of terrestrial animals are like this),<sup>732</sup> but certainly not all<sup>733</sup> of them can. For these animals themselves have another cause, necessarily not existing at one time but not at another, for continuously coming into being from one another, as do their sources for existing at one time but not at another and for such a succession never letting up; for it will not also be the cause of this eternal transformation but [will be] in existence as 'eternal and of necessity'.<sup>734</sup> For it cannot also be said that because these sources<sup>735</sup> cease to be there is one that is always anticipating its successor: for it is the *first* cause into which we are inquiring, and what is truly the source, whereas the [sources] derived from one another are infinitely numerous and not together (in fact why is this one [a source] rather than that one?).736 But, in general, an uninterrupted source must be posited for cases of uninterrupted coming

into being from one another, but the sources subject to ceasing to be, of course, cease to be along with the animals, given that among animals some sources are subject to ceasing to be. So another cause [224] exists beyond each of these [interrupted sources], one capable of bringing into being *any* of the ones succeeding it.<sup>737</sup>

**224,2** (**259a13-20**)<sup>738</sup> But in general, if it has been adequately demonstrated from the foregoing that change must be eternal and continuous (for what is in succession is neither continuous nor eternal), then the cause of this change must be eternal and one; for if there is one [cause] now and then again another, change is no longer continuous but successive.

224,5 (259a20-2 + 259b6-20)<sup>739</sup> From these [arguments] one could confirm that there is something first, eternal and unchanging, and, having looked again at the remaining sources for changes<sup>740</sup> in animals, [confirm] that these too are not sources in a strict sense. For while<sup>741</sup> predominantly not all the changes that animals undergo are also derived from them but only the one with respect to place (for it alone is based on an impulse, whereas most are external and natural, [e.g.],<sup>742</sup> increase, decrease, breathing, which each animal undergoes not through the source within it but through the environment of its incoming food), still for the only change that they are believed to undergo by their own means (and I refer to change with respect to place), its endowment is *also* external, as when they wake up after their food has been distributed.<sup>743</sup> Hence *this* change too cannot be continuous: for sleep is unavoidable because of food, 744 and when asleep animals are at rest and do not change by means of themselves; instead, another cause exists for their being at rest at one time and changing at another, one that by always changing but not always being in the same state in relation to them also does not dispose them in identical ways.

**224,19** (259b24-8)<sup>745</sup> Now just from what has been said it is clear that there must be something unchanging that first produces change, if there is going to be, as we have said, some 'unceasing and immortal' change,<sup>746</sup> and if, [contained] within itself, the universe itself is going to continue changing and remain stable; for when the primary source produces change, yet remains unchanging, the result is that what is changed also partakes of both [properties], so that it is both changed with respect to its parts *and* unchanging with respect to its whole place.<sup>747</sup>

**224,25 (259b32-260a11)** Yet if what produces change is eternal but unchanging, then what is first changed by it must also be eternal; for if there is one [thing producing change] and then another, once again no change is continuous.<sup>748</sup> So why have I spoken of what is *first changed* and not unqualifiedly of what *is changed*? Because the things that are involved in coming into being and ceasing to be are also changed by the unchanging source, but not as first [source] but through an intermediary; for coming into being and ceasing to be would not exist without there being some body in between, changed by what is first and un-

changing, yet making the other things change by also becoming for them the cause of their transformation into one another. That is because the unchanging source will always produce change in the same way and [only] one change inasmuch as it itself is not in any way transformed in relation to [**225**] what is being changed, whereas [the combination of]<sup>749</sup> what is changed by it (*viz.* the heavens) and what is in turn changed by the heavens (*viz.* the Sun) is, on account of its being in one state then another in relation to the objects, not the cause of the same change but of a given [change] on its approach, and of a different one in turn on its withdrawal, and will produce rest at one time, change at another.

**225,5 (260a11-19)** It has also become obvious from this [argument] just why it is not the case that everything either changes or is at rest, or that some things only change while others are only at rest, but why some things [change] at one time but not at another;<sup>750</sup> for since some things are changed by what is unchanging and eternal, others by what is eternal but itself changed and transformed, clearly some things will always be changed in the same way, others not in the same way. In fact, the source that produces change is in the same state for some things, but not in the same state for others.

### [Chapter 7]

**225,11 (260a20-6)** So while it sufficed to demonstrate in just the preceding way that what is first changed by the unchanging source is eternal, it will be clearer from the following; for if an eternal change has to be continuous as circular motion,<sup>751</sup> then<sup>752</sup> the first producer of change also produces this [motion] on a body to which circular motion is natural. How, then, can none of the other changes be either eternal or continuous? This is what we must investigate in our discussion<sup>753</sup> now that we have adopted a different starting-point.

225,16 (260a26-b29) Now since there are three changes (those with respect to quality, size and place),<sup>754</sup> I say that motion is the first - in nature, in time, and by belonging to more complete things. In this way<sup>755</sup> none of the other changes can exist by nature apart from motion, but it can exist in separation from them; for while increase will not exist without alteration (for how could an increase come about without the food having first been altered?),<sup>756</sup> how can bread, grass or water be altered unless they have moved towards, or, in general, become adjacent to, an animal or a plant? So either what receives or what provides food, or both, must of necessity first change with respect to place. So without motion increase and decrease will not otherwise exist. But indeed neither would alteration, since condensation and rarefaction are the source of all qualitative affections. In fact, heavy and light, soft and hard, and hot and cold are considered states of density and rarity, and condensation and rarefaction come about by aggregation and segregation and things that are aggregated and segregated are necessarily

transformed with respect to place. That said, it is <clear><sup>757</sup> that coming into being and [**226**] ceasing to be are subsequent to motion, because coming into being is either, as Democritus believes,<sup>758</sup> self-evidently aggregation and ceasing to be segregation, or, while coming into being exists with respect to alteration, aggregation and segregation have primacy and in this sense motion will exist as prior. So while none of the other changes are in this sense without motion, obviously [motion] is also separate from the others; for that which is moving has no necessity either to increase or be altered, or to come into being or cease to be.<sup>759</sup>

**226,6 (260b29-33)** So in this sense [motion] is primary in nature, but in time how so? It is because it is only this change that eternal things can undergo; for, as we shall show, it alone is continuous and eternal. But if eternal things exist as prior in time to those that are brought into being, then change for them is also prior in time to [change] for the latter. So what remains is that <change of place><sup>760</sup> also belongs to more complete things, and clearly so; for when animals have come to completion, <sup>761</sup> they exchange one place for another, but when they are coming into being and increasing, they are still entirely incomplete.

**226,13 (261a1-7)** But this [conclusion] might seem quite contrary to what was stated earlier;<sup>762</sup> for coming into being is [now] being found to be prior to motion, at least if something has to come into being first, then in this way undergo change. But this is true in the case of any single thing whatsoever of the things that come into being, but not true without qualification; for something different – what can bring into being what comes into being – has to change earlier with respect to motion, since it already exists, does not come into being at the time [of generation] and was previously different from [what comes into being].

**226,18 (261a7-12)**<sup>763</sup> Again, coming into being cannot be first; for then everything that changes would be capable of being brought into being <and of ceasing to be>,<sup>764</sup> if the things that are going to change with respect to any change whatsoever first have to have come into being. Therefore coming into being is not prior to motion; and if coming to being is not, obviously increase or alteration will be secondary and subsequent to it.

**226,22 (261a13-23)** Again, the incomplete among living things, such as zoophytes<sup>765</sup> and plants, have no share in this change. And the things that change only with respect to motion are least removed from their substance; for they are not transformed with respect to any [part] of themselves, as when they are being altered in quality and increased in quantity.

**226,25 (261a23-7)** Again, that which is self-changed is the source both for the things that change and those that produce change, and that which is self-changed changes as self-changed only with respect to motion. Therefore motion is in this way prior [**227**]. Again, we say that only what changes with respect to place changes in a strict sense, but

when at rest with respect to place, but increasing or decreasing, or happening to be undergoing alteration, it changes in some respect, but we do not say that it changes without qualification.

**227,4 (261a27-b7)** Now from what has been stated it is obvious that among the changes motion is primary, but to be demonstrated now is what the primary motion is; for the earlier supposition,<sup>766</sup> that there can be continuous and eternal change, will also at the same time be clarified by the same procedure. For none of the remaining [changes] can be eternal, since they are all changes and transformations from opposites <into opposites>:<sup>767</sup> coming into being and ceasing to be into being and not-being; alterations into contrary affections; increase and decrease into greater and lesser size. So since opposite [changes] cannot have become one [change], but continuous [change] is at all events one, none of the other changes will be continuous.

**227,12 (261b7-22)** That opposite [changes] cannot have become one [change] or be undergoing opposite changes as one [change], is clear;<sup>768</sup> for were they one,<sup>769</sup> then what is becoming white would also be simultaneously turning black;<sup>770</sup> someone who is being restored to health would also be simultaneously getting sick; what is increasing would be simultaneously undergoing diminution; what is coming into being would also be simultaneously ceasing to be! So if what is becoming white is not also simultaneously becoming black (for becoming black would be the end of becoming white), clearly it is undergoing a change different from the earlier one [*sc.* of becoming white] when it is becoming black. But if it is undergoing the latter [change] now but not earlier, and if it existed both then and now, clearly it has been transformed into it [*sc.* becoming white] from one [change]; for unless it had been at rest in between, it would be undergoing contrary [changes] as one [change].

**227,21 (261b22-4)** And the same will hold both in the cases of coming to be and of ceasing to be. In fact, even if these are not contrary but opposite [changes], still relative to what are truly changes<sup>771</sup> the difference is that for them too there is at all events something in between, but certainly not a state of rest but a time period;<sup>772</sup> for when a thing that is ceasing to be is transformed into not-being, it could be not said to be at rest in not-being, but some time period [could be said] always to come about in between ceasing to be into not-being and coming back into being from not-being. For it would seem entirely absurd if immediately on having come into being something had to cease to be without having remained for some time in the form into which it was proceeding as it was coming into being.<sup>773</sup>

#### [Chapter 8]

**227,30 (261b27-31)** So let the preceding suffice [to show] that none of the other [changes] is continuous, and let us now argue that only motion, and within motion the circular kind, is: for everything that

moves changes with either a circular, rectilinear, or mixed [motion]; thus if one of them cannot [228] be continuous, neither can the [motion] composed of both; for its continuity is blocked by there being no continuity in their composition.

# <rectilinear motion: 228,2-231,9>

**228,2 (261b31-6)**<sup>774</sup> So what must be demonstrated is that what moves on a straight and finite [line] does not move continuously; for it turns back, and what turns back on a straight line undergoes contrary motions. For with respect to place [motion] is contrary to [motion] – upward to downward, forward to reverse, leftward to rightward, these being the contrarieties of place.<sup>775</sup> So if what is moving upwards does not come to a stop before turning back, then it would also move up and down at the same time, and similarly with the remaining [contrary motions].

**228,8 (261b36-262a6)** But how, in general, can contrary motions become one (for upward [motion] differs from<sup>776</sup> downward in species, as do the remaining [contrary motions])?<sup>777</sup> They must [become one] not with respect to the one motion also being continuous; instead, in the same way as the thing that is moving is one and the time period is one so [must] the species of the motion also exist as one.<sup>778</sup>

**228,12 (262a6-12)** And a sign of this [being true] is that contrary motions are the [motion] from here to there [as contrary] to the one from there to here (for if [in this case] the moving things move at the same time they cause one another to stop and cease because contraries destroy and impede one another), but [motion] sideways is not [contrary] to [motion] upwards.

**228,15** (262a12-263a1)<sup>779</sup> Confirmation that everything that turns back, whether it moves over a circle<sup>780</sup> or over a straight line, necessarily first comes to a stop involves not only sense perception but also reasoning. That is because everything that moves also has a necessity to come to a stop in what it has a necessity to reach and leave, and to which [it has a necessity] to come and from which [it has a necessity] to depart by using [the point of arrival and departure] as the beginning and limit of its motion. For in the same now it cannot both reach something *and* leave it, and come to it *and* depart from it; for then it would both be and not be in the same thing at the same time,<sup>781</sup> with the result that it was in successively different nows. If this is so, and if there is a time period between all the nows, [the moving thing] will be at rest for this intervening time period in which it is posited as having reached and then having left it.

**228,24** So in the case of the intermediate points on a finite straight line there is no necessity for a moving thing to reach any [point] and to leave (for none of [the points] exists in actuality nor does a point exist in actuality at all; for an actual point also has to be an actual middle, beginning and limit, and in substrate one but in definition two), but this is not so in the case of a continuous [line], where it is continuous.<sup>782</sup>

Instead, [a point] becomes an actual middle and actual point precisely at the time when the moving thing comes to a stop at it and, having halted, begins to move again; for in this way it becomes a middle, beginning and end – the beginning of the later change, the end of the prior one. So at the same time it is both a stop for the moving thing and at once the actual middle, that is, both the beginning [**229**] and limit,<sup>783</sup> and at the same time it is in actuality a middle and stop at [the middle]; for if a stop had not occurred at it, there would not have been a beginning, limit and actual point. But when [what is moving] moves *continuously*, it cannot either have reached or have left with respect to a point but can only be in the now, and not in any time period, unless someone were to say that it was in a time period in the sense that the now is something belonging to a time period, for [the now] is a division of the whole [time period].<sup>784</sup>

**229,6** So is it also the same in the case of the limits of the whole straight line, and does what is moving have no necessity first to have reached the limit, then in that way to have turned back from<sup>785</sup> it and left? And yet if, because the intermediate points on the whole line existed in potentiality, it moved continuously over them, it is because they exist in actuality (for they are already a limit and a beginning in relation to each of the two [limits]) that it will come to a stop at them; for if it moved continuously in the [process of] turning back, the point would be neither a limit nor a beginning, nor an actual point at all, but a potential one, just like the intermediate [points]. But, in general, even if what moves over the intermediate points came to a stop at them<sup>786</sup> by actually having reached a limit and a beginning, clearly it will all the more come to a stop and be at rest at a limit and at a beginning that is *already* actual.

**229,17 (263a1-2)**<sup>787</sup> Now on the basis of this [argument] apply to the [main] argument the necessity derived from the [following] deduction: if that which is moving does not use as an actual point anything on that over which it continuously moves, its motion <over what it uses as an actual point>,<sup>788</sup> or rather over what it is necessary for it to use [as such], would not be continuous; therefore what turns back on a straight line must <first><sup>789</sup> come to a stop.

**229,21 (263a4-b9)** The existence in potentiality of intermediate points on a straight line must also be used against Zeno's problem that states that motion cannot be achieved over a finite [line] because the halves are infinitely many in a continuous [line].<sup>790</sup> For while the halves in a continuous [line] are not only not infinitely many in actuality, but not even two (for [the line] is at one and the same time being cut in actuality *and* has ceased to be continuous),<sup>791</sup> there is nothing absurd about the halves of a continuous [line] being infinitely many *in potentiality*. And it is not impossible to traverse things that are infinitely many in potentiality, so that someone who divides and counts the halves destroys the supposition of the problem; for while *we* are inquiring into

whether the halves are infinitely many in a *continuous* [line], *he* turns out to be maintaining neither the straight line nor the motion as continuous, since he is also dividing the motion along with the division of the straight line.

**229,30 (263b9-264a6)**<sup>792</sup> And in a time period too the now is like a point; for it is identical as a limit and a beginning (a limit of the past, and a beginning of the future),<sup>793</sup> but as for the reality<sup>794</sup> with respect to which [**230**] the transformation has come about, it must be assigned more to the future. I mean, for example, that since for the time period in which Socrates was dying there is a limit at which he has first died, this [limit] belongs to the past with respect to the time period (for it is the latter's limit), while with respect to the reality (I mean his having died) it belongs more to the future, in which he is spoken of as being dead in its entirety.<sup>795</sup>

**230,5** [*Dilemma*]<sup>796</sup> But (*i*) if someone is going to say that Socrates is still dying at the limit of the past since he is also in the past in its entirety, whereas at the beginning of future he has died, since he is also in the future in its entirety, then, had the now been maintained (as indeed the truth stands, in that [the now] is at once both a limit and a beginning), this person would be saying that Socrates is both dying and has died *at the same time* – and this is no different from Socrates both being alive and being dead at the same time! But if (*ii*) someone makes the nows two, he will be making nows successive to one another. But that is absurd, for a time period is not composed of partless things.<sup>797</sup>

**230,12 (264a7-b1)**<sup>798</sup> But while these [matters] perhaps belong more to the general definitions of change, one might also demonstrate more formally as follows that what moves necessarily comes to a stop on a finite straight line before turning back: (*i*) if everything that moves continuously is not deflected by<sup>799</sup> something, then at an earlier time it was also moving to what it came to in respect of its motion; (*ii*) if it came to **B**, then it was also moving to **B**, and not only when it was near **B** but as soon as it began to move, assuming that it was moving continuously to the same thing, but had its impulse directed to what it was moving towards continuously; since (*ii*) is true, then (*iii*) if a thing that is moving upwards from below is not inactive and at rest when it reaches > upper [position],<sup>800</sup> but is moving to the lower [position] continuously with the same impulse as when it began to move from below, it would therefore be moving to the lower [position]!

**230,23** This is ridiculous even in itself, but more so in the following [argument]: (*i*) if everything moving downwards moves downwards from the upper [position], clearly (*ii*) if what is moving from below is in continuous motion to the lower [position], it was *already* removing itself from the upper [position], which it had not yet reached!; but (*iii*) that [consequence] is impossible; therefore (*iv*) [a thing that is moving] must first come to a stop in the upper [position]; therefore (*v*) the motion is not one (for a [motion] interrupted by a stop is not one).<sup>801</sup>

230,28 (264b1-9) And the following<sup>802</sup> argument is more relevant than those that have been stated.<sup>803</sup> (i) Everything that is being transformed into white from black or from non-black has at the same time discarded the non-white colour (e.g. yellow, grey or whatever), and has become white; for at the limit of the transformation into white [231] the prior colour has ceased to be and has become the one that a thing now takes on. But (*ii*) if it is being transformed back from white at the same limit, namely at<sup>804</sup> the same now, and not at another [now], then three things will come to exist in the same [now]: the ceasing to be of yellow, the coming into being of white, and the transformation back from white. Therefore (*iii*) the transformation to white is *not* continuous with that from it, just as <we also said earlier>;<sup>805</sup> for it is the whole time period that is continuous. But these changes are successive, since how could a limit for becoming white and becoming black <[be] one and the same>?<sup>806</sup> For neither is getting blackened a limit on becoming white, nor is getting whitened [a limit] on becoming black.

#### <circular motion: 231,10-232,9>

231,10 (264b9-18) Now while these are the number of impossibilities that follow from the other changes, if they are supposed to be continuous, it is only [motion] in a circle and over a circular line that entails nothing 'out of place'.<sup>807</sup> For what moves from A will also simultaneously move to A in accordance with the same purpose and impulse; for it will not come to another point earlier (for there is not even an actual point on a circle), nor will it turn back from anywhere to A, but it simultaneously moves both to A and to B, and not with simultaneously contrary or opposite [motions]. For not all [motion] from A is contrary to that to A, but rectilinear [motion] is; for in its case the limits and beginnings are actual and the thing that is moving uses the same thing twice – as limit and as beginning - and it has to have reached and also left it (that is why <when something> does not <move> continuously, the time period of rest that is in between will also double <the> now);<sup>808</sup> whereas in the case of circular [motion] what is to prevent it moving continuously and not interrupting the time period?<sup>809</sup> For what is its actual limit or beginning? And, in general, what other point already existing in actuality is there that [circular motion] must have reached earlier?

**231,23 (264b18-24)** Only circular motion, then, is from itself and to itself,<sup>810</sup> whereas rectilinear [motion] is from itself to another thing. In the case of a circle<sup>811</sup> [motion is] never over the same distance; for in the case of a circle no distance is fixed in actuality, nor can the limits of a circle be<sup>812</sup> in any way identified as belonging to a specific circumference, but in fact there is one [circumference] and then another, or rather *always* another.<sup>813</sup> But in the case of a straight line there is repeated motion from here to there and from there to here *over the same distance*. That is because the limits are fixed and already identified and so there

has to be a stop on it; for the reason [motion] is repeated over the same distance is because there is a stop at the limits and a turning back. If there were no stop, [232], there would be perpetual and continuous motion, as in the case of a circumference.

**232,1 (264b24-8)** But not only is there no continuous motion over a straight line, but also not over a circular one whenever something does not move in a circle but turns back<sup>814</sup> (for *it* does not conjoin the limit with the beginning, nor does it used them as one but as two).<sup>815</sup> And so<sup>816</sup> at that time [it moves] repeatedly over the same line (for it does so not continuously, nor as with a single [motion], but successively); but when (*i*) [it moves] in a circle, it does so with a single [motion] (for it does so in accordance with a single impulse), not repeatedly (for how will you count [its motion] repeatedly, since you have no beginning or limit?); but when (*ii*) you identify a stop applicable to [a beginning and limit], you are thereby making an imposition<sup>817</sup> on that which has *not* come to a stop, and so in this way *you* also repeatedly *think* that you are identifying for yourself this given point<sup>818</sup> as a beginning and in turn as a limit.<sup>819</sup>

**232,9 (265a2-10)** So from this [argument] it is clear that the natural philosophers<sup>820</sup> are incorrect in claiming that all perceptible things are always changing, though they speak of all things not as moving in a circle,<sup>821</sup> but as coming into being and ceasing to be, increasing and diminishing, and in general being altered. In fact, they say that coming into being and ceasing to be *are* alteration.

**232,13 (265a10-12)** And so the discussion has shown that change cannot exist continuously or perpetually to contrary [states].<sup>822</sup> Let that, then, suffice as our statement that circular motion alone is continuous.

#### [Chapter 9]

**232,16 (265a13-16)** We shall now argue that [circular motion] is also prior to the other forms of motion; for,<sup>823</sup> as we also said earlier,<sup>824</sup> it is either circular, rectilinear or mixed, and so while the first two are prior to the mixed one (for it is combined from them), circular [motion] has to be shown to be prior to rectilinear.<sup>825</sup>

**232,19 (265a16-24)** Everything that moves does so over either an infinite or a finite straight [line]. Now it is not infinite, nor, if it were, would something move over it (for what is impossible does not come about, and it is impossible ever to have traversed an infinite [line] and to be traversing it);<sup>826</sup> but were there motion over a finite [line], then if there is a turning back,<sup>827</sup> the motion [would be] neither continuous nor unidirectional; but if there is a cessation without a turning back, the motion [would be] subject to ceasing to be. So only circular [motion] is both eternal and unidirectional. Hence it is prior both in nature and in time.

**232,25 (265a24-7)** In fact, even if [circular motion] had not been shown to be eternal, but  $only^{828}$  some [motion] as capable of being

eternal, [circular motion] would in this way too be prior to the [motion] incapable of this.<sup>829</sup>

**232,27 (265a27-b1)** The logical consequence is that only circular motion is continuous and eternal; for while rectilinear [motion] has a beginning, end and middle within fixed limits, so that what moves has something from which to begin and at which to end,<sup>830</sup> circular [motion]<sup>831</sup> has neither a beginning nor a limit; for the [circular] line does not have one specific limit more than any other; for each [limit] is in the same way a beginning, middle *and* limit.

**232,32 (265b1-8)** So a sphere is always at its beginning and always at its end, and in a sense moves and is at rest at the same time; for it does not change its place as a whole. The cause of such simultaneous stability and motion is the fact that in the case of a sphere the centre is what is in equally strict senses the beginning and the limit [**233**]: the beginning because the sphere is derived from it (for the circle is at an equal distance in all directions from it); the limit, because the straight lines extending from the circumference terminate at it. So since [a sphere] moves not to, but around, the limit, and since the [limit] always remains in the same [place], [the sphere] is, on the one hand, always moving because it has not even achieved its limit, while, on the other, it always stays in the same [place] because it is always stable around<sup>832</sup> its limit.

**233,6 (265b8-11)** So circular [motion] is logically the primary motion among motions and it measures the other [motions]; for the day, night and hours are all, I think, motions and are measured from circular motion, and [the saying] 'human activities are cyclical' is derived from the circular motion [of the heavens].<sup>833</sup>

**233,9** (265b11-16)<sup>834</sup> Again, only circular [motion] can also be uniform, and of the things [that move] in a straight line those moved by force and contra-naturally are also clearly non-uniform, whereas all those [that move] naturally move faster by however much more they distance themselves from the place at which they were at rest earlier; for they have moved nearer to what is kindred.<sup>835</sup>

# [Chapter 10]

**233,14 (266a10-12)** That the first producer of change,<sup>836</sup> then, is eternal and unchanging has been demonstrated in the preceding [discussion]; now we shall argue that it is partless and incorporeal.

**233,15 (266a13-14)**<sup>837</sup> Suppose that everything that is being changed by a body is being changed not in accordance with its own nature but by force and from outside. In the case of the things that produce change and are changed in this way we always see the greater power able to make the same mass change over a greater period of time than the lesser [power], and in less time over the same distance. A mule, for example, could move<sup>838</sup> the same millstone for a whole day, but a human

being would be glad to reach midday, and while the former achieves a single revolution in a minuscule time period, the latter does so in a longer one.

233.22 (266a12-13: 266a14-b27)<sup>839</sup> So since this is obvious.<sup>840</sup> it is impossible for that which is being changed to undergo continuous and eternal change in infinite time by means of a body that is the primary one; for the body that produces change will be either finite or infinite. and while it cannot be infinite, the only alternative is that it is finite. But if finite, it will have its power as either finite or infinite. So if [the power] is finite, let another power greater than  $it^{841}$  be identified and *it* will produce change for a time period greater than that in which the finite one produces change in the same mass, but it will not be greater than infinity. But if [the power] is infinite, it will not produce change in any time period in the same magnitude in which the finite and lesser one [produces change] in a given amount of time. That is because the excess in power does not maintain a ratio but just as the amount by which [234] the infinite power is greater than the finite one [will be] unidentifiable, so the amount by which one time period (one with respect to which the infinite power<sup>842</sup> produces change over the same distance as that<sup>843</sup> in which the finite one does) is less than the other will be unidentifiable. So the infinite and greater [power] will either not produce change in the whole [magnitude] in which the lesser one has produced change, or it will not produce change in a time period. But both [consequences] are illogical and impossible. And, in general, an infinite power cannot <be><sup>844</sup> in a finite magnitude; for where something greater than the magnitude can be identified, so too can [something greater thanl the power.<sup>845</sup>

**234,7 (266b27-30)** And it is enough just from what has been defined to demonstrate without a full disputation that *the first producer of change is not a body*; for if the first producer of change is entirely unchanging it cannot be a body.<sup>846</sup> That is because every *body* that produces change is also changed;<sup>847</sup> for [it produces change] either by pushing, pulling, causing rotation or carrying, or <in accordance with one of the other procedures.<sup>848</sup> But regarding those><sup>849</sup> who release [projectiles] there is a different account, since things that have been thrown seem to move over a considerable distance even when [the movers] themselves are at rest<sup>850</sup> (for a missile moves for *some* period of time, even when the person who released it has come to rest),<sup>851</sup> and the problem posed is: *how are these things moved and by what*? They are, after all, moved neither by themselves (for they are not among *self-moved* things), nor by the thrower (for once *he* had released [the projectile] he was at a distance and inactive).

**234,15 (266b30-267a12)** Now it is claimed that an archer makes not only his projectile move but also the adjacent air, which is moved by the very person<sup>852</sup> who had already released the object that had been released. But this reasoning shifts the problem without solving it: for,

again, how is the air moved by the mover who does not maintain contact?<sup>853</sup> Not by [the air] itself (for it is not a living thing!),<sup>854</sup> nor by the person who effected the release (for he has come to a stop). So by what, then, given that everything that is moved is moved by something? [I ask] since even the [magnetic] stone<sup>855</sup> pulls not <only><sup>856</sup> the adjacent piece of iron, but also the one next to it, with which it has no contact. But when it departs, both the adjacent and contiguous [objects] simultaneously cease [to be pulled]. The explanation is that the piece of iron adjacent to the stone had no power of its own to be drawn towards it,<sup>857</sup> but took it on from the [magnetic] stone; and if removed from the [stone], it also immediately sheds its power simultaneously. So once the person who effected the release<sup>858</sup> had departed,<sup>859</sup> the air too would have to remain the same and come to a stop, and in this way the object being released would also have to fall to the ground immediately.

234,27 (267a12-16) Or is the adjacent air not only moved but does it also take on a power to produce motion,<sup>860</sup> with this not being of the same kind that the piece of iron [takes on] from the magnetic stone<sup>861</sup> but such that it makes it belong to itself<sup>862</sup> – [235] just as, I think, a flaming object too is not only heated by fire but also takes on a power of its own to produce heat and always imparts this in succession,<sup>863</sup> and progressively up to a certain point, then gradually ceases as the power imparted from the fire is diminished in the relay? So *this* is how one may say that (i) both air and water, by being twofold in their powers, and by sharing in both heaviness and lightness, are then transported out from themselves<sup>864</sup> to the point of acquiring from the thrower the source and endowment of motion;<sup>865</sup> and that (ii) for a time they come to resemble self-moved things<sup>866</sup> as they are simultaneously both moved and produce motion, but moved no longer by the thrower but by their own power, the endowment of which they had from the person who effected the release, just as water too when heated by fire is not only itself hot, even though the fire has departed, but also maintains for a considerable time the power to produce heat.

**235,13 (267a16-b2)** For it is better to describe [projectile motion] in this way than to assign the cause to mutual replacement (*antiperistasis*), which is necessarily generated from things as they are being released; the air, for example, undergoes a mutual repositioning [with the projectile], yet it is not because of this that there is motion. In fact, there is a mutual replacement (<a simple repositioning and relocation of places>)<sup>867</sup> of people who are walking, but it is not because of this that we walk! Mutual replacement possesses nothing capable of producing action or motion; for when air is replaced it is neither constricted so as to apply force and push forward, nor increased in size with respect to the mutual replacement;<sup>868</sup> for the object released is simultaneously pushed away<sup>869</sup> to the front by the person who has released it and the air is replaced at the back. So what is the cause of forward progress after this? But such motion is also obviously not continuous (for what pro-

duces the motion is also not one thing but *things* contiguous to one another), nor uniform (for it does not move in the same way when near to and distant from its source).<sup>870</sup> So if someone says that motion comes about as in the cases of objects that are released or of those that push and pull,<sup>871</sup> then the motion that comes about in this way is not continuous nor is it uniform, because in the case of objects being released what produces motion is one thing [in succession]<sup>872</sup> to another; while in the case of objects that push and pull it is because, even if what produces motion is a single thing, still with respect to *each* pushing and pulling a [new] source is generated as the puller and pusher desist; for producing motion<sup>873</sup> in *this* way is not without effort.<sup>874</sup>

**235,29 (267b2-6)** So clearly the first producer of change is partless,<sup>875</sup> given that it does not produce change by being changed, nor is it conjointly transformed,<sup>876</sup> but it can always produce change (for producing change in this way *is* effortless)<sup>877</sup> and only *this*<sup>878</sup> change is uniform (for the producer of change is not transformed).<sup>879</sup> But what is changed [**236**] must also not<sup>880</sup> be transformed in relation to [what produces change], so that the change may remain the same.

**236,1 (267b6-9)**<sup>881</sup> And [the first producer of change] must either be in the centre or on the circumference (for such are the first principles [of a sphere]), but the things that are nearest to what produces change move fastest, and such is the motion of the whole.<sup>882</sup> Therefore that which produces change is there.<sup>883</sup>

# Notes

**1**. Bold type is used in the notes to indicate passages not paraphrased by Themistius.

**2**. 165,6: after *topou* supply *metabainôn*; see Arist. *Top.* 122b33-4, and cf. 177,6-7 and 226,12 below, and Simpl. *in Phys.* 609,8-9.

**3**. cf. *Phys.* 4.4, 211b25-9 (Themist. 117,13-16).

**4**. 165,8: for *tauta*, too general to anticipate the single example that follows, read *tina*.

5. 165,9: before thôrax supply ho (Arist. 224a26; MS L); cf. 165,13.

**6**. 165,11: cf. [Arist.] *Postpraed.* 15b21-2 for the difference between a cloak that is indistinguishable from any other piece of cloth, and one transformed into a dedicated covering for the body. In this way the category of having (*ekhein*) is illustrated by having things on the body, such as a cloak or tunic, as distinguished from having something on, or as, a part (15b22-3).

7. 165,12: for kath' hauto read kath' hauta (Spengel).

**8**. Arist. 224a29-30 provides examples of *per se* change only for alteration in the cases of being healed and heated; here and at 165,10 Themistius offers examples of locomotion.

**9**. 165,13: after *thôrax* delete the comma and supply  $\hat{e}$ . In this reworking of these two examples of change in part (cf. 165,9 = 224a25-6 above) the disjunction between these two comparative phrases should be repeated.

**10**. Simpl. *in Phys.* 803,18-19 refers to the grinder's hand being the part involved in causing change; Aristotle identifies only a hand that strikes some undefined thing; cf. also 233,19-22 (*ad* 8.10, 266a13-14) below on the millstone.

11. 165,17: 'First' (prôton) is applied to this expression at Arist. 224a34.

12. See *Phys.* 3.1-3, especially 3.1, 202a13-14 (Themist. 76,8-9).

13. 166,1-2: remove the brackets on  $hout\hat{o} - metaballei$ ; place a colon before  $hout\hat{o}$ .

14. 166,3-4: Schenkl's supplement, <kaitoi ex ontos kai hê genesis eis on>, reflects Arist. 224b9-10.

15. In Phys. 3.1-3.

**16**. 166,8: for *apallatomai* in this sense see LSJ, *apallassô*, B.I.4; cf. Plat. *Lys*. 220B6.

17. This definition omits after 'changeable' the qualifier 'qua changeable' (hêi kinêton); see Phys. 3.2, 202a7-8.

18. See Phys. 4.5, 212a14-21 with Themist. in Phys. 118,23-119,2.

**19**. 166,12: place  $memn \hat{e}metha - diaphoras$  in brackets, deleting the colon that precedes it and replacing the stop that follows it with a comma; this clarifies the men/de contrast at 166,11 and 13.

**20**. Arist. 224b13-14 has 'someone might raise the problem as to whether the affections are changes, and whether whiteness is an affection'. This makes it clearer that *pathos* (affection) can refer to a process of being affected, and also to a quality such as whiteness, which is not thought of as changing. So if X acquires whiteness in a change, then by using only the first
of these senses, we have the unhappy consequence that X has changed into a change.

**21**. 166,14: a future indicative *estai* (Arist. 224b14) is restated as a potential optative *an eiê*, but its force in such a conclusion is still indicative; see Todd (3), 179 n. 4, and cf. below 169,22; 170,28; 171,9; 174,11; and 178,30, all apodoses, though this potential optative (on occasion drawn from other verbs; e.g. 167, 19 and 26 below) can be used in independent conclusions (see 181,16; 183,30-184,1 or 195,25).

**22.** 166,17: delete *kat*' and read *ouk auta ta pathê* (MS Laur. 85.14; coni. Spengel).

**23**. Whiteness is, in other words (cf. 174,20-1 below on 227b6-11), the species to which whitening belongs.

24. 166,19: for the second oude read oute.

**25.** 'Undergo a change' (*ekhei kinêsin*): cf. 184,27, and 213,12 and 15 below where (cf. Arist. 252b13-14) *ekhein* with *kinêsis* and *metabolê* describes the process of undergoing change.

**26.** 166,20-3: before *kinein de* at 166,20 replace the colon with a comma; place *hoion* – *lithon* (21) in brackets, with the comma before *hoion* deleted; and place *ou gar* – *anankês* (21-3) in brackets, with the colon after *metabolê* (22) deleted. The first parenthesis leads into a detailed explication of one of its two examples in the second.

**27**. 166,22-3: cf. Arist. *Meteor*. 3.6, 378a26-31, where vaporous exhalations within a stone are said to be solidified by the dryness of the stone. Themistius' point is that the stone's heaviness does not cause such a change but results from it. But if it did cause change, it would have to do so to something else.

28. 166,23: for kakeinoi ê tina read kan kinoiê tina (Diels ap. Schenkl).

**29.** cf. Alex. ap. Simpl. *in Phys.* 809,9-21 on Arist. 224b18-22. We should envisage a person turning into the colour white while moving from, say, Asia Minor to Athens, and also engaging in thinking en route (perhaps imagine Aristotle losing his sun-burn as he does some thinking en route to Athens in the winter from zoological research in Asia Minor). It then follows: (i) that the thinking is incidental to the specific change in colour; (ii) that the generic change of colour is 'in part', since the species white is 'part' of the genus colour; (iii) that the generic continental change is partial (since Athens is part of Europe); and (iv) that the specific change of colour and location is *per se*. Both Themistius and Simplicius call the move to Athens a *per se* change, although Aristotle does not do so explicitly; cf. 165,6-7 above, where a person's change of place is incidental to the person but intrinsic to the place.

**30.** 'Within fixed limits' (*en hôrismenois*). Cf. 167,12, 217,10-11 (cf. 213,8), Simpl. *in Phys.* 810,29-811,4, and Arist. 261a34 where *horoi* ('boundaries') is used to describe the parameters of a change.

**31**. When Themistius recycles this point at 217,9-11 below he includes things that change in part as also being subject to infinitely numerous changes, which could be true only because of their infinite divisibility.

32. See Themist. 217,10-11 below.

**33**. This remark (cf. Plat. *Phaedr*. 245B3) may be directed to students who have studied Aristotle's *Categories*; cf. [*Postpraed*.] 12a17-25 where 'the intermediate' (*to ana meson*) is defined.

**34**. 167,15-16: for *ex antikeimenou* read *ex antikeimenôn*; cf. 167,12-13, where the plural, *ex enantiôn*, is used.

**35.** 167,16: before *metaxu* supply *ta* (Spengel, misreported by Schenkl as proposing *to*). The plurals in line 17 require this plural.

36. Arist. 224b30-1 states in impersonal terms that there is change from an

intermediate, and continues in impersonal terms to say 'it uses it [the intermediary] as a contrary relative to each [contrary]', which has been paraphrased (rather than translated) as 'it [sc. the intermediate] serves as contrary to either of the two contraries' (Hardie/Gaye; Ross, 393). Themistius correctly interprets the subject of 'uses' as the process of change, specified as 'the things that are transformed from [the intermediaries]'.

**37**. Arist. 224b32, 'for the intermediate is in a sense ( $p\hat{os}$ ) the extremes', is unpacked here in the claim that the sense in which the intermediate has this status is analogous to mixture or blending, processes that can, however, only imperfectly capture an evolving transformation, since they identify a completed intermixture of constituents, whereas here they serve to illustrate an unstable mixture, defined by its source in the single extreme from which the change began.

**38**. The noun *metabolê* has a prefix (*meta-*) (mirrored in 'trans-formation') that associates it with change.

**39**. Arist. 225a3-6 has these in the order (*i*), (*iii*), (*iv*) and (*ii*), which Themistius has altered presumably to highlight the polarity between (*i*) and (*ii*).

**40**. In this context *hupokeimenon* cannot be translated as 'substratum' (Urmson [2]). 'Entity' (Waterfield), adopted here, reflects Ross, 616-7 on *Phys.* 225a3-7: '[By *hupokeimenon*] Aristotle means a positive entity ... to be laid down or presupposed as implied in change, *viz.* as its *terminus a quo* or *ad quem*'.

**41**. Since Themistius' comment on this text is about five times its length, and the longest exegesis in Books 5-8, I have included a translation that can be correlated with the paraphrase and serve to indicate the commentator's interaction with the source text.

42. 168,7: delete *legetai* (a gratuitous repetition that creates implausible syntax) and for  $m\hat{e}$  ex hudatos read ek  $m\hat{e}$  hudatos (to produce the required parallel with ek  $m\hat{e}$  leukou in 168,6). Aristotle's examples of 'not X' are not restricted to non-substantial entities. See, for example, *Int.* 16a26-9 where 'not-a-person' (ouk anthrôpos; cf. 169, 8-9 below for Themistius' use of it) is described an onoma aoriston, an 'indefinite name'.

**43**. The Aristotelian commentator Aspasius (early first century AD) formulated this difference (see Simpl. *in Phys.* 814,28-815,2); Themistius, like Simplicius, derived it from Alexander. See Lautner in Urmson (2), 126 n. 32.

44. 168,9: delete en tôi (with a corrector in MS W).

**45**. Themistius imports the terminology of 'a this' (*tode*) for the subject of a change; see also 169,17 (plu.) and cf. 171,6 and cf. Arist. *Metaph.* 12.2, 1069b10-11 where coming into being and ceasing to be are said to be 'with respect to a this' (*kata tode*). Themistius *ad loc.* (*in Metaph. Lambda* 4.30-3) introduces the same case of air becoming water used here.

**46**. Themistius inserts this reference to matter from the discussion of change in *Physics* 1; it leads into the digression that follows, for which *Phys.* 1.7, 190a31-b17 (Themist. 27.13-28.15) has prepared the way.

**47**. 168,16-19: in this sentence clearly both explanatory clauses, not just ou - ousian (168,17) need to be parenthetical, and so delete the colon after *kuriôs* (168,18) and place *holon* – *melan* (168,18-19) in brackets.

**48**. By 'student' here I mean anyone who needs coaching to get the point; I am not suggesting that this is an actual minute of classroom dialogue, though it is entirely plausible that its genesis lay in pedagogical experience.

**49**. 168,23: punctuate *hoti 'ek tou aeros hudatos mê ontos'*, taking *hoti* as introducing, as it can (see LSJ, *hoti* II.1), the direct speech required by this context. Cf. 168,32-3 below.

**50**. cf. 168,9-14 above.

**51**. Here (168,24-5) as at 170,7 below (cf. also 205,20), I translate *hupomenein* as 'remain', and also *menein* at 175,29 and 180,2; *menein* and *diamenein* at 212,13 and 16 below are also interchangeable. In this absolute usage they mean 'to remain the same'; the complementary use of *tauton* ('the same') at 205,26 and 234,26 justifies the supplement here.

**52.** 168,31: for 'grey' (*phaion*) read 'red' (*eruthron*) to make this triad of colours identical with that found at 168,28.

**53**. 168,32-3 (cf. 168,23): punctuate so that direct speech is introduced by *hoti*: i.e. read *eipois an hoti 'aêr...'*.

54. cf. Arist. Cat. 3b24-7, and Phys. 1.6, 189a32-3 (Themist. 21,28-9).

**55**. See 167,25-168,6 above.

**56.** 169,5: transpose *men* to precede *pantelôs*, to balance the *alla* clause in which *men* (omitted by MS **W**) is inappropriately located.

57. See Phys. 1.9, 192a25-34 (Themist. 33,27-34,8).

58. cf. Arist. 225a20-1 with Int. 16a12-13.

**59**. 169,16: after *sumbebêken* replace the comma with a stop; see 165,3-7 above (on 224a21-3).

**60**. 169,18: after *oun* delete the question mark and transpose it to replace the stop after *sumbebôken*. This dismissive question combines the question and answer found in Schenkl's text: i.e. Schenkl has "To what then [*sc.* are they incidental]?" [Answer]: "They are incidental to things that are changing"." But the object here is to deny that not-beings are involved in change at all, and such a denial is well conveyed by this rhetorical question.

61. See further 177,18-20 and Phys. 5.6 passim below.

62.225b5-9, summarized here, forms the conclusion to *Phys.* 5.1 in modern editions.

**63**. See Arist. *Cat.* 3b24-7.

**64**. 170,1: after *eidei* delete the comma; place *touto*-*sunekhôreito* in brackets, followed by a stop rather than a colon.

65. See Phys. 1.7, 190b30-3 (Themist. 29,3-6).

**66**. The literal sense of *apousia* ('being away from', 'absence') is exploited here so that it means 'non-substantiality'; cf. Simpl. *in Phys.* 833,22-4. The indefinite *tis* ('sort of') indicates that the term is being used in such an extended sense.

**67**. That is, in addition to the interlocutor's error corrected at 168,32-5 above. **68**. See 168,6-169,7 (on 225a12-20) above.

**69**. 170,6: after *metabol* $\hat{e}$ i replace the colon with a question mark; cf. 170,16-17 below for a similar sequence of a question followed by an explanatory statement.

**70.** 170,7-8: after  $p\hat{o}s$  (170,7) supply *men*; replace the question mark after  $z\hat{o}i\hat{o}n$  (170,8) with a comma, and replace the stop after *enantia* (8) with a question mark. This emendation creates the contrast needed here, and the brackets after *sperma* (170,7) are to be extended to close after *enantia*. Cf. Themistius' biological example (not in Aristotle) with one used by Gill (2), 92 to illustrate the complexity of the contrariety involved in coming into being.

71. For a French translation of Themist. 170,8-19 see Rashed (3), 137.

**72.** cf. Arist. *GC* 2.4, 331a14-18, which provides a basis for the present discussion by representing coming into being as being between contraries. On the problem of squaring its requirements with the scheme of *Physics* 5 see Gill (2), 54 with n. 19 and Broadie, 143-50.

**73.** 170,13: after *hudati* supply *holôi*. Cf. 174,19 below where, as here, a complementary adjective might be understood, but the ellipse seems too extreme.

74. See Simpl. in Phys. 834,7-19 for a more expansive treatment of this

response, though it is not identified as Alexander's. But since Simplicius' later reference to Alexander at 835,10-11 begins 'Next he shows', it almost certainly extends back beyond the lemma at 834,20-1 to 834,7, where Simplicius' version of Themist. 170,8-19 begins (as Schenkl *ad* 170,10 noted). (See Baltussen (1), 148-9 on the problems of identifying the parameters of 'fragments' that are 'deeply embedded' in Simplician prose.) Alexander's commentary on this passage, in its residual Arabic version (Gannagé, 106, sct. 48 = Philop. *in GC* 232,24-31), allows for the elements being generated out of one another as contraries. But Rashed (3), 133-41, in a discussion of Averroes' reception of the views of Alexander and Themistius on this issue, introduces other evidence for the distinction that Themistius, as we would expect, is drawing on Alexander's commentary on the *Physics*.

**75.** Averroes dismisses Themistius' solution as incompatible with the evidence of the GC (see Rashed [3], 136, with n. 404); he thinks that the intermediary element does not in itself undermine the contrariety between fire and water when one changes into the other.

**76.** Themistius does not repeat Arist. 225b13, the claim that change is *per accidens* for relatives, probably because of the earlier analysis of relatives in *Phys.* 3 (see next note). Ross, 621 thinks that his text presupposes a reading in which a negative, missing in the Aristotelian manuscripts, is supplied in the claim that when one of two correlatives changes, the other is *not* truly described by it but does not change.

**77**. At *in Phys.* 3.2, 75,5-18 (= Philop. *in Phys.* 368,18-28) Themistius argues (at 75,11-15) that there is no change involving relatives, since there is no passage from potentiality to actuality but instead 'a transformation from potentiality to actuality comes into being as instantaneous (*athroos*)', happening not 'gradually' (*kat' oligon*) but 'atemporally' (*akhronôs*). Cf. also 206,14-24 below (on *Phys.* 7.3, 247b1-13) on atemporal activity for the cases of knowing and being in contact (cf. 197,18-19 below on the latter). The principle stated there (206,21-3) is equally applicable to relatives: 'things that do not need a time period to be transformed from potentiality to actuality come into being atemporally'. Arist. 247b2-3 had stated that knowing was said to be 'in the state of being somehow relative'. On related evidence and the modern analogue to such change without coming into being, 'Cambridge Change', see Sorabji at *Sourcebook*, vol. 3, 80-1 and at Urmson (3), 1.

**78**. Note that numerals in Greek are expressed as plurals with the article; so here *ta deka* and *ta pente* just mean 10 and 5; see Gildersleeve, para. 535.

**79.** In the *Categories* Aristotle frequently identifies double and half as an example of relatives (e.g. 1a29-2a1, 6a39-6b1, 6b17-18, 7b16-17). Themistius' point is that this relation is not created by a transformation, as would be 5 added to 5; contrast *Phys.* 8.1, 251b7-9 where change is involved in the adjustment of relatives. Here, however, a pre-existent 5 and 10 are just 'counter-posed' (cf. *antitethentôn*, 170,23) as half and double. See especially *Cat.* 7b15-21 where half and double are classified as relatives existing 'simultaneously by nature' and thus as mutually destructive.

**80**. Themistius changes from 'proposition' (*protasis*) to 'statement' (*axiôma*), indicating the informal blending of Aristotelian and Stoic logical terminology respectively. For *axiôma* in the sense of 'axiom' see 195,18 below. For a definition of a proposition (*protasis*) see Arist. *An. Pr.* 24a16-17.

81. For the language used here see Arist. Cat. 4a34-4b1.

**82**. 170,27: *tropê* ('modification') is interchangeable with *metabolê* ('transformation'); see Sharples (3), 131 n. 447.

**83**. cf. Alexander ap. Simpl. *in Phys.* 837,30-838,1, demonstrably Themistius' source. Lautner, at Urmson (2), n. 98, notes that Ross, 621 rejects this claim in the same terms as Simplicius: namely, that an agent can cause what it acts on to rest rather than be changed.

**84**. 170,31: before the second *kinein* supply *to*. Cf. Arist. 225b15, where change is said not to involve acting and being acted on 'because there is not a change of a change'. To convey this generalization Themistius needs the equivalent for Aristotle's noun 'change' (*kinêsis*) that this articular infinitive provides.

**85**. Omitted is Aristotle's first argument (**225b16-33**), which consists of two related points: (*i*) that a change is not a subject (*hupokeimenon*) (b16-21); and (*ii*) that a change can only change incidentally (b21-33). He presumably regarded both as subsumed under later arguments, (*i*) under 226a10-12, and (*ii*) under 226a19-23, and therefore not in need of separate paraphrasing.

**86.** cf. Arist. 226a10, 'matter must be underlying' (*hulên dei hupeinai*); cf. 168,12-14 above for the contrast between underlying matter and the 'this' that changes.

**87**. 171,9: before *allo* supply *ei gar kinêsis kineitai* as an *ad hoc* solution to a passage that Schenkl left as a crux.

88. 171,10: after kinêsin supply einai (Schenkl) followed by a stop.

**89**. At 226a13-14 the Aristotelian text apparently read by Themistius (as Simpl. *in Phys.* 854,20-1 recognized) must have included a phrase deleted in Ross' text, which, with deletions bracketed, reads: 'For the process of change [and not change] [or of coming into being] must be of something from this into that'. Themistius must have included 'and not change and not change are 'simultaneous' from the question 'But how will this also exist simultaneously?', which follows this sentence at Arist. 226a14-15. To use Themistius' own example, he is in effect asking how will there simultaneously be a change (the horse running) and no change (the horse still the horse). He eschews the example at Arist. 226a15-16, that learning is not the coming into being of learning, i.e. a change of a change, but, by implication, a single change in an unchanging subject. Instead, he just makes the point that a changing change is paradoxical because it combines a changing and an unchanging component.

**90**. 171,10: delete *to* (*<tou>to* coni. Schenkl) before *geloion* and supply 'again' (*eti*) (Spengel; coni. Schenkl; cf. Arist. 226a16).

91. 171,12: after kath' heauta replace the comma with a stop.

**92.** Themistius enlarges on Aristotle's brief examples at 226a21-2. In his version, if someone goes for a run and feels better *as he runs*, then the change of place involved in running is incidentally changed by his improved health (i.e. he runs with greater vigour). Aristotle's other example is of someone becoming healthy while learning; for Themistius this would have to mean that the learning process improves if you feel better while engaged in it. This is not an unreasonable way to unpack these examples. Others, though, envisage someone who has recovered taking up running or learning, with their activities then being incidentally endowed with their improved health, rather than the recovery being an event that occurs during the activities; see, for example, Ross, 395 ('a person ...being healed took to running').

93. See Themist. 167,5-12 above ad Arist. 224b26-8.

**94**. Omitted is Arist. **226a23-4**, a reference back to the earlier demonstration that change does not occur in the categories of substance, relation, and action/being-acted on, thereby eliminating what Netz, 214 considers a star example of Aristotle's stylistic tool of 'framing' a discussion.

**95**. For these differentiae see Arist. *Cat.* 1b18-19.

**96**. See Ross on 226a30. These extremes are the contraries in the category of quantity, though in the *Categories* (6, 5b11-29) it is claimed that a quantity has no contrary. However, the present claim can be read as complementing rather than violating the principle of the *Categories*; see Bogen, 18-19.

**97**. The issue here is that the verb associated with *phora* has a passive sense; i.e. *pheresthai* can mean 'be carried', even though it is usually translated 'move'. So *per se* it is not associated with *self*-motion. See Ross on 226a33-b1.

**98**. 172,3: before *stênai* delete *to*, so that *ekhei* can be directly followed by an infinitive, as it must be when it means 'be able' (see LSJ, *ekhô*, A.III.c.i); cf. 168,11 above. The articular infinitive *to stênai* may have resulted from the close similarity between 172,1-3 and Arist. 226a34-5, where such an infinitive is, however, used in a different syntactical structure.

**99**. 172,3: 'by their own power' (*eph' heautois*) is Arist. 226a34-5. Simpl. *in Phys.* 862,30-863,1 saw the contrast here as being with self-moving things, where the soul is the source of moving and being stationary.

100. Simpl. *in Phys.* 864,15-17 reports that Themistius follows Alexander here in taking more and less for Aristotle to apply only to 'transformation with respect to quality', 'perhaps because more and less are exclusive (*idia*) to quality'.

101. 172,7: after *enantia* place a stop, leaving  $\hat{e}$  to introduce an answer to the indirect question embedded in the preceding sentence.

**102.** Arist. 226b14 speaks of 'when, where and as' something unchanging might be naturally disposed to change; Themistius identifies only the first and third of these items.

103. See 177,18-20 below and 178,3-4 (on Phys. 5.6, 229b25-6).

104. Ross' text is a rearrangement (=  $226b18 \cdot 23 + 227a7 \cdot 10 + 226b26 \cdot 7 + 226b23 \cdot 5$ ), supported as far as  $227a7 \cdot 10$  is concerned by the fact that Themistius begins the chapter with this text, after omitting comment on  $226b18 \cdot 23$  in favour of dealing with the terms defined there in the course of the chapter. In his rearrangement Ross was following Cornford at Wicksteed/Cornford, vol. 2, 36 n. 1, to whom the credit for exploiting Themistius must go. Cf. also Arist. *Metaph.* K12, where 1069a2 \cdot 5 can similarly be transposed to 1068b27, as Cornford suggested, followed by Ross in his edition of the *Metaphysics*, though not by Jaeger in his *OCT* edition. Admittedly Themistius says that in paraphrasing he will on occasion transpose passages; cf. in An. Post. 1,21 where he refers to 'readjusting and rearranging' (*metharmozesthai, metatithenai*) passages. Solmsen (1), 273 [424] n. 10 might have used this evidence to fortify his objections to Ross' rearrangement instead of assuming that the Themistian evidence is necessarily derived from a manuscript.

105. See above 169,23-8 (Arist. 225a34-225b5).

**106.** Literally, '[is] in opposites', which is variously rendered as 'implies', 'involves', or 'is between'; I am relying on the sense of *en* described at LSJ, A.I.6. Cf. also 213,35 below.

**107**. This focus on the issue of what is in between the contraries that define change establishes a continuity with the previous chapter absent in Aristotle's prefatory indication of his intention to define the concepts of 'together', 'apart', 'in contact' and 'continuous'.

108. 172,26: restore the text to *duoin gar tinôn to metaxu* and place it in brackets; delete the colon that precedes it and replace the one that follows it with a comma. Spengel changed to to  $t \hat{o} n$  (MS **M**) and posited a lacuna after  $t \hat{i} n \hat{o} n$ , but by understanding the verb 'to be'; he thought that *tinon* should be made more explicit by treating  $t \hat{o} n$  as a residual suffix for  $\langle eskha > t \hat{o} n$  or

<hekaterôthen on>tôn. But the epexegesis here is clear since the three things referred to in the preceding clause are all identified.

**109**. *pragma* (context') (Arist. 226b28) identifies the milieu of an ongoing change, such as the pitch of the vocal sound in the immediate example. Other translations include 'material' (Hardie and Gaye), 'subject matter' (Urmson), and 'process' (Waterfield). Ross on 226b27-31 stresses the importance of a term capacious enough to cover all types of change.

**110**. This emphasis on locomotion requires that *kinêsis* and *kineisthai* be translated as 'motion' and 'move' at 173,1-4 until the discussion returns to the topic of change in general at 173,4.

111. Rather than 'pentathlon' as the direct object of 'leap' one might have expected 'in a pentathlon' (*en pentathlôi*). The interruption to which Themistius is referring may be in a long rather than a triple jump (see Miller, 66-8), i.e. the break between the run up to the starting-point and the start of the jump (see Miller, 67 for an illustration).

**112.** 173,3: the leading question here must be taken as inviting the answer 'no'; the use of oukh, traditionally associated with invitations to positive answers, does not preclude this.

113. In a horse race around an oval circuit, the turn at the end, though supposed to be accomplished without interruption (*Iliad* 23,335-40, famously quoted at Plat. *Ion* 537A8-B5), could involve some hesitation and thus a 'contextual' interruption, to which Themistius is referring, while the motion still appeared to be continuous. At 176,13-14 below continuity between the stages of a relay is denied, although the context remains the same and temporal interruptions can also be minimized.

114. This looks ahead to the discussion of the unity of change in the next chapter and to the wider discussion of the continuum in Phys. 6.

**115**. Here *genos* is either equivalent to *eidos* (species), or is being used loosely to mean a kind; cf. Arist. *Phys.* 6.1, 231a23 where *sungenes* ('of the same kind') is used to define being in succession in the same broad sense.

**116.** 173,19: before *ephexês* supply ta (cf. 173,11 above) to ensure a clear reference to the class of things that are in succession.

117. Simpl. *in Phys.* 876,18-21 notes Themistius' supplementary point here. It is not, however, altogether convincing (see Lautner, at Urmson [2], 142 n. 194) since the two pairings here could be seen as the same in species, i.e. as two successive temporal events in the same festival, and two adjacent public spaces in the agora of a Greek city. Simplicius suggests that Themistius is contrasting these cases with the successiveness of houses and lines, but presumably the houses do not have to be identical in design and structure to be of the same species, nor do the lines have to be of the same length.

**118**. On discussions of the continuum by Greek Aristotelian commentators (though not Themistius) see Furley (3), 20-7.

**119**. Simpl. *in Phys.* 877,11-19 quotes Alexander's claim that to be in contact bodies must have position (*thesis*), which temporal events do not; cf. Themist. 174,14-16 below.

120. 173,30: for genêtai read genoito (Spengel).

**121.** 173,31: on 'fusion' (*sumphusis*) see Berryman (2), who discusses how Aristotle's student and commentator Eudemus tried to elaborate this concept beyond what appears to be its duplication of continuity.

**122.** At *Iliad* 23,666-7 the hero Epeius 'made contact' (*hapsato*) 'with a hard-working mule' as a gesture of confidence that he would win this beast as the prize in a forthcoming pugilistic competition in the funeral games for Patroclus.

123. The summation at 227a32-b2 is omitted.

124. 174,19: before phoran supply pasan (cf. Simpl. in Phys. 882,8).

**125**. 'First from the objects of perception' is Themistius' gloss; cf. An. Post. 2.19 (see 100a17-b3) where the examples of concepts formed from perception are infimae species; cf. Themist. in An. Post. 63,9-24.

126. For this distinction see also 166,17-18 (on 224b15-16) above.

**127**. 174,22: delete *gar* and read with Arist. 227b12 *genê* and *eidê* rather than *genei* and *eidei*. *gar* may be the residue of a sentence with a verb complemented by the dative singulars, though it is not clear that *ginetai* (Diels ap. Schenkl) would be adequate.

128. Aristotle's example (227b13-14) is that knowledge is a genus for different kinds of knowledge, yet a species of  $hupol\hat{e}psis$  ('apprehension' is the favoured translation, glossed as  $gn\hat{o}sis$ , 'cognition', by Simpl. in Phys. 883,9).

**129**. Themistius omits Arist. **227b16-17**, a helpful illustration of the repeated motion of a point within fixed parameters.

130. 174,26: for horizometha read horizoimetha, to complement sunkhôrêtheiê.

131. At 174,29 for katho read kath' ho.

**132**. Aristotle emphasizes that a change must be 'one in substance (*ousia*)' (227b21-2).

133. 175,10-11: after *khronon* delete *hena* and the stop that follows it, and place *heis* – *dialeipei* (175,10-11) in brackets. Having already said at 175,8 that the forthcoming list of items have to be 'one in number', he does not need to single out the time period as being 'one' to any greater extent than by the parenthesis created here. 'One' may have been added as a gloss based on Arist. 227b30-1.

134. Themistius does not follow Arist. 227b31-3 in identifying these two changes as mutually incidental (*kata sumbebêkos*).

135. 175,15: for ophthalmian read ophthalmias (Arist. 228a2).

**136**. But Arist. 228a3 notes that they are one in species.

**137**. At *Sourcebook*, vol. 3, 192, no. 6(h).19, Themist. 175,16-18 is translated within a section, pp. 176-204, dealing with 'Persistence over time'.

138. Here (175,22) alla is assentient; see Denniston, 18-19.

**139**. The verb here (*diaspasthai*, 175,23) is used of dismemberment, or the fragmentation of a continuous whole (cf. Arist. *Cael.* 290a6).

140. This is Themistius' generalized version of the problem that Aristotle develops. Cf. Eudemus ap. Simpl. *in Phys.* 886,1-4 (= F97 Wehrli): 'alteration and locomotion have unity in the same way as time; for neither alteration nor locomotion persist, but resemble time's being in flux and always becoming different. That is why this [process] is to be spoken of as one in species and not in number.'

141. It could be more appropriately addressed with reference to Arist. *Cat.* 4b13-18, the claim that substances can receive contraries; cf. 4b14-15 for the examples favoured here of the contraries white/black and sickness/health.

142. Themistius does not clarify this distinction with Aristotle's example of someone in the same state (presumably of health) being able to take discontinuous walks at different times (228a16-17). Gill (1), 20 argues that the sentence reflected in Themistius' paraphrase here (i.e. 228a17-19: 'if [the activity] were one and the same, it would be possible for one and the same thing both to cease to be and to be repeatedly') 'leaves it open that for some entities, namely, states and affections, it is possible for ['one and the same thing to both cease to be and to be repeatedly']: a particular state of health can be reproduced in any number of subjects'. Themistius' paraphrase, 'one state also has multiple activities',

however, seems to envisage only discontinuous activities associated with the same state in one subject: e.g. the healthy man who engages in the discontinuous activities of walking, running and riding.

143. See 173,27-9 above (ad Arist. 227a11-13).

144. Simpl. *in Phys.* 890,13-20 either draws on the same source as Themist. 176,5-10, or else is elaborating that text.

145. The brief reference to a torch race at Arist. 228a28-9 is expanded into a reference to a famous Athenian relay race with an igneous baton, the *Lampadêdromia* (cf. Themist. Or. 19, 335,18-19 Downey), on which see Miller, 141. Aristotle may have drawn on Plat. *Rep.* 328A3-6 (cf. Simpl. *in Phys.* 891,31-892,3).

146. 176,11-13: place both the examples (i.e. dramôn - homoeideis) in brackets, with the colon after *genei* (176,11) deleted. The plural *sunekheis* (176,13) means that the denial of continuity applies to both of them. In Ross' punctuation at 228a26-9 the singular *sunekhês* refers only to the second one.

147. 176,13-14: after the first ou (13) delete the colon; place  $ou \ gar - peras$  estin in brackets.

148. Since the stages of a relay are identical, discontinuity is in effect equivalent to one runner covering the same distance repeatedly (i.e. stopping and turning back), and this is a form of motion that is necessarily discontinuous; see *Phys.* 8.8, 2622a12-263a3 (Themist. 228,15-24) below. Simpl. *in Phys.* 891,21-2 quotes as applicable to this case the generalization at Arist. 228b5, that a change that 'is interrupted by a stop (*stasis*)' is not one. Themistius rephrases this in saying that stages have a 'limit', or point of termination.

**149**. Themistius omits **228b3-11** in which these three criteria are elaborated since, as he says, they have been explained earlier; see 227b23-228a1 above with Themist. 175,5-14.

**150**. Here 'finalized' might be a better translation for *teleios*, since it would pick up on its connection with *telos* ('end'), reflected in the use of 'limit' (*peras*) in this sense.

151. Some translators convert the clauses that refer to change 'across a magnitude' into talk of the 'path' of change, though that term privileges locomotion over the other changes mentioned in this context.

**152.** 'Fit directly on to' (*epharmottein*, 177,1): the idea here is one of perfect continuity, such that a straight line cannot fit onto one that is bent. The verb often describes geometrical coincidence, as, for example, with celestial circles (Geminus, 5.32 and 43).

153. cf. Phys. 7.4 at 206,28 (on Arist. 248b10-12) below.

154. Themistius supplies 'impulsion'  $(rhop\hat{e}, 177,9)$  for a text at 228b31 in which a noun has to be understood from a definite article in the phrase  $h\hat{e}$  eis to auto ('the ... to the same [sc. place]'; others have supplied 'motion' (Urmson) or 'tendency' (Waterfield). Themistius'  $rhop\hat{e}$  may reflect *Phys.* 4.8, 216a13, where Aristotle refers to things that have a 'greater impulsion of heaviness or lightness'. He uses the term in a different context at *in Phys.* 130,21. On *rhopê* in Aristotle see Hussey, 229-30.

155. Arist. 229a2 refers to motion (*phora*), but Themistius reproduces the earlier example (cf. 176,27 = 228b17 above) of a deflected straight line.

156. cf. 172,7-8 above.

**157.** cf. Arist. 229a5-6 for the generic version: 'How can [change] that is composed of alteration and motion be uniform?'

158. In this selective statement of the role of contrariety in different types of change Themistius omits **229a9-b2** (a detailed analysis of change between contraries) and **229b14-21** (a discussion of the status of intermediates in change, already addressed at 167,15-25, on *Phys.* 5.1, 224b28-35 above).

**159**. Such a distinction is required because oppositions cover contrasting cases, which are introduced here from 5.6 (229b23-7 below; cf. 169,21-2 and 179,19-20 [*ad* 226b15-16] above), along with paired changes as oppositions, and change in opposition to its privation, *stasis*, 'a stop' (equivalent to *êremia*, 'state of rest').

160. 177,18: delete *hê* (MS W).

**161**. 177,21: for *enantiôn* read *enantiou*; Themistius used collective plurals (*ex enantiôn eis enantia*) earlier (170,10; 172,6-7) to describe changes between opposites, but the numbers clearly cannot be mingled.

162. Arist. 229b13-14 is omitted; it describes coming into being and ceasing to be as 'transformations (*metabolai*) but not changes (*kinêseis*)', a distinction that Themistius uses (see 169,23-8 above) but does not discuss.

163. 177,28: before *eis* supply (with Arist. 229b12 and a correction in MS L)  $t\hat{e}i$ . These phrases in the Aristotelian text offer a different sense, 'transformation from it is contrary to [transformation] into it', with 'it' being an awkward singular reference to a plural antecedent, 'contraries' (hence Urmson's 'from them ... to them'; Ross, 400, lives with the discrepancy). Themistius (cf. Simpl. *in Phys.* 905,9-10) offers 'from the same thing to the same thing' *ek tou autou* ... *eis to auto*), which leads smoothly into the description of being and not-being as the points of origin and termination for coming into being and ceasing to be.

164. 177,29: before ontos supply tou; cf. the article with  $on/m\hat{e}$  on at 177,30-178,2.

**165**. The locution 'goes into being' (*eis to on erkhetai*, 177,29-30) with 'coming into being' as its subject is used presumably to avoid the tautology *genesis ginetai* ('coming into being comes into being'). At 166,3-4 (on 224b8-10) above, which is recycled here, the same thought is expressed without auxiliary verbs.

**166**. The redundant general conclusion (**229b21-2**) concerning the contrariety of changes from different opposites is omitted.

167. To be a privation without qualification stability would have to be opposite to a form (*Phys.* 1.7, 190b30), and change is not a form. See Themist. 170,1 above where there is a cross-reference to *Phys.* 1.7, 190b30-2, on which Alexander, ap. Simpl. *in Phys.* 219,14-19 (*ad Phys.* 1.7, 190b29) noted the special sense in which a privation was opposite to change by reference to the present passage from *Phys.* 5.6. On the general distinction between a privation and an opposite see Alex. *quaest.* 2.11, with Sharples (1), 107 n. 351.

168. 178,6: Schenkl noted that 'two' here is qualified in one of Aristotle's MSS and at Simpl. *in Phys.* 907,2 by *hupokeimena*. While this may not justify supplementing the text by emendation, it points in the right direction; cf. 167,27-168,4 above where *hupokeimenon* refers, as here, to the contrasting 'entities' that set the termini of a change.

169. The variables *A* and *B* are used instead of Greek demonstratives.

**170.** cf. Arist. 230a3-4: 'it is absurd [that the state of health be contrary] to the [change] from sickness to health [instead of the change from health to sickness]'.

**171.** cf. Simpl. *in Phys.* 907,20-2, who describes the process of change that terminates in rest by saying that it has the 'greatest affinity (*oikeiotês*)' to the terminal state of rest, and *ipso facto* cannot be contrary to it. Its being 'named after' (*prosêgoros*) the process of change implies that its name can be derived from the process that results in change: so 'I am in good health' is not contrary to, but complemented by, 'I am becoming healthy', while being contrary to 'I am becoming ill'. Thus states of rest (e.g. health), are contrary to changes, such as getting sick, which eliminate them, but they are defined by the processes that establish them (e.g. becoming healthy).

172. 230a7-18, which deals with cases of change from things that have no contraries, is omitted.

**173.** 178,19: the prepositional phrases in the text (*eis to katô/eis to anô* = upward/downward; lit. 'into what is above/below') describe the *directions* of motion. To describe stability (*monê*) in upper and lower positions they have to be emended to *en tôi katô/en tôi anô*; cf. Simpl. *in Phys.* 910,11-13 and also 178,8-9 above. Schenkl pondered emendation since *en tôi anô* is found in three manuscripts. See also on 230,20 below and cf. 230,27.

174. 178,23: for all'oute read all'oude.

**175**. 179,1-2: delete *ar'oun* (rightly identified by Schenkl as a repetition from 178,31), and supply  $h\hat{o}i$  to (one of Schenkl's suggestions).

**176.** Simpl. *in Phys.* 911,9-11 notes that commentators used this text to show that the Peripatetics identified what was fated (*heimarmenon*) with what was natural. Lautner at Urmson (2), n. 275 thinks that he may have based this statement on the present Themistian passage. For this identification see Alexander, *Fat.* 169,18-20, and *Mant.* 25, 186,20-3, where *Phys.* 230a31-2 is cited in its support.

177. 179,3: after *pilêthentes* replace the stop with a comma, so that *epi de alloiôseôs* can balance *auxêsis men* at 179,2. The example is Aristotle's (230b2-3); Ross (*ad* 230b2) thinks that indoor 'hot house' cultivation is intended, but the verified ancient example he offers involves plants, not grain (see Bostock [2], 273).

**178.** 179,5: before *alloiousthai* supply to to create a complementary articular infinitive to the subject of this clause, to *hugiazesthai*.

**179**. See Arist. 230b4-5 for this illustration. The Hippocratic medical 'theory' was that fevers reach 'critical' or decisive points at specifiable days in their development to either remission or death; see, for example, *Prognosticon*, ch. 20, or *Aphorisms* 4.36.

**180.** 179,10: the reading in the apodosis of this contrary to fact conditional has to be  $\hat{e}n$  an (see Simpl. in *Phys.* 911,30 and cf. 201,7). The imperfect tense cannot bear, nor does it elsewhere in this author's text, a counter-factual sense without an (as, for example, can the imperfect *edei*; see 234,25 and 27 below, or *exêrkei* at 166,8); cf. also 210,32 below for the same emendation.

**181**. See 178,8-9 above, the basis for this analysis; Themistius implies that there is no need to recall the general concept of an opposition introduced at 177,18-20.

**182.** 179,17-18: Arist. 230b16 refers to stability above  $(an\hat{o})$  in contrast with motion 'downwards from above'  $(an\hat{o}then \ kat\hat{o})$ . Themistius' text in lines 17 and 18 is missing  $kat\hat{o}$  ('downwards') as a complement to  $an\hat{o}then$ ; rather than supply it by emendation I have taken it as implied and added it as an explication.

**183.** 179,20: after *phusin* replace the colon with a comma, then read *all'oukh* <*hê kata phusin têi kata phusin> tois autois* etc. The subject of this sentence has to be 'natural motions' to lead into the example of the contrariety of the natural motions of earth and fire, but something must have dropped out of the text of the order, 'but <one natural motion> is not <contrary to another natural motion> for the same things but for separately distinguishable things, e.g. ...', for which I have supplied the required Greek. It could have been omitted because of a similarity to the preceding clause (*hê – phusin*, 179,20), which describes the contrariety of contra-natural stability and natural motion.

**184. 230b21-8** is omitted; it raises the problem of whether something can be coherently described as coming to rest as the result of contra-natural motion.

185. cf. with this paragraph Phys. 6.9, 240a19-29 = Themist. 201,8-19.

*kinêsis* and *kineisthai* are not restricted to the locomotion discussed in the preceding paragraph but include alteration and increase (191,22-30 below on Arist. 234b10-20). Waterfield, 137, switches his translation of *kinêsis/kineisthai* from 'movement'/'move' to forms of 'change' at 230b32 because of Aristotle's insertion of *holôs* ('in general'), which Themistius omits, and which other translators have not taken as a signal to widen the terms of the passage to include all forms of change. Urmson (2), 116 uses forms of 'change' for the whole of 230b28-231a2, except for 'motion' for *kinêsis* at 230b29.

186. 180,2: for *menoi an* (Schenkl) read *menei* (MS W; Spengel); *menomen* (MSS MSL).

**187**. See *Phys.* 6.4, 234b10-20 (Themist. 191,22-30) and especially *Phys.* 6.10, 240b17-31 (Themist. 202,7-13).

**188**. See 178,3-4 above.

**189**. Ross deletes **231a5-17** (omitted here) as another version of 230b10-28, mistakenly included after the concluding statement at 231a2-4. Simpl. *in Phys.* 918,13-14 notes that Themistius, like Porphyry (162T Smith), chose not to paraphrase it; see also Romano, 44.

**190**. See *Phys.* 5.3, 227a6-17 (Themist. 173,22-174,1) above.

**191**. See *Phys.* 5.3, 227a23-7 (Themist. 174,1-10) above; on fusion see on 173,31.

**192.** 181,7-9: delete the question mark after *eskhaton* (181,7) and place *ou* gar - eskhaton (8-9) in brackets.

**193.** 181,10-11: convert this sentence into a question by adjusting the accentuation to make *tini* an interrogative instead of an indefinite adjective, thereby better justifying the explanatory sentence that follows.

**194.** 181,13: 'merge' (*enduesthai*), used at Plat. *Tim.* 66A3 to describe how particles insinuate themselves to cause different kinds of taste.

**195.** 181,13: *hama* ('with' = 'together with'), a preposition governing *holois* ('wholes'), with its sense reflecting the earlier uses of *hama* (181,7.9) to mean 'together' in the sense of being in contact in such a way that there is continuity.

**196.** This is equivalent to saying that two bodies are in the same place (cf. the reference to place at 181,15-21 below); see Themist. *in Phys.* 104,15-16, and Todd (6), 77 n. 28, on the source of this paradox in Peripatetic polemics against the Stoic theory of total mixture (*krasis di'holôn*). Neither Themistius here, nor Simplicius (*in Phys.* 927,6-9), identify Aristotle's claim as that of two bodies being in the same place; Bostock (1), 181-2, however, does.

**197.** 181,16: read *suntethentôn* ('having been combined') for *suntithentôn* ('combining'). At 181,11 above the present passive tense was used to describe the non-additive process involved in combining partless things; here the same result has to be identified for the completion of that process by the perfect passive tense.

**198**. 181,16: for *estai* read  $ei\hat{e}$ , the potential optative used in conclusions; see on 166,14 above.

**199**. 181,16: for *kat' auto* read *kath' hauto*.

**200**. 181,19-20: after *topôi* delete the comma; place kai - grammes (181,20) in brackets.

**201**. 181,21: after *megethos* supply *<peritton>* ('surplus'); cf. 181,14-15; this ensures the required conclusion that indivisibles do not yield a larger product when added together.

**202**. In an indivisible parts and wholes cannot be distinguished, whereas a continuous whole is the sum of its parts and when combined with another whole yields a magnitude that is the sum of each whole's set of parts.

**203**. That is, the problems arising from partless things having no extremities.

**204**. 182,1: for *stigmê* read *stigmên stigmêi*, which will be co-dependent on *ephexês einai* with *to nun tôi nun*. Cf. Arist. 231b6-7, and MS **W**, which added *ephexês* to the first of these phrases too.

**205**. Numbers are in succession to one another (Arist. 227a2-3; Themist. 173,16-17 above), but not contiguous (Themist. 174,4-5 above); thus in that respect they are dissociated, or, as put here, 'separately bounded' (*diôrismena*, 182,5).

**206.** 182,7: before *metaxu* ('in between') supply ti ('something'); cf. the reference back to it at 182,9.

**207**. 182,10: this refers to Arist. *Phys.* 4.6-9. Eudemus (F99 Wehrli) took the option of intervening void seriously, arguing that it would create 'no magnitude at all' (Simpl. *in Phys.* 929,2, tr. Konstan [3]), an argument probably known to Themistius via Alexander, but perhaps omitted because of the arguments against the void in *Phys.* 4. See Furley (3), 30-1 on the wider implications of Eudemus' considering the void as well as a line as intervening between points.

**208**. Themistius avoids introducing the general principle mentioned by Aristotle (231b6-10, cf. 231b12), that nothing of the same kind can be in between things that are in succession, perhaps because of the discussion at *Phys.* 5.3; see 173,9-22 above on 226b34-227a6. Also, his omission of Aristotle's reference to time (i.e. succession involving nows, 231b9-10) is presumably because of the discussion at the end of the chapter (184,28-185,3 on 232a18-22), not to mention *Phys.* 6.3 below.

**209.** 182,12: before the second  $gramm\hat{e}$  delete the colon; place  $gramm\hat{e} - metaxu$  in brackets.

**210**. 182,13: 'identify' is *lambanein*, often translated 'take' where a point, or other geometrical concept, is its object. But outside such formal contexts, it is best taken as describing the action of selecting or identifying an entity.

**211.** Points can be identified anywhere on a line (cf. *en hapasêi grammêi*, 182,13), and so, if a line is infinitely divisible, any two points apparently in succession to one another are supplanted by the points generated by infinite divisibility.

**212.** Numbers can be in succession without being contiguous (Themist. 174,4-5 above), or in contact; but indivisibles cannot be in contact (cf. 181,11-12 above), and so a fortiori cannot be in succession.

**213**. 182,23-7: Baltussen (2), 21 includes this text as T16 in a collection of additional material on Eudemus, in light of Simplicius' quotation from Eudemus via Alexander at *in Phys.* 930,35-931,3 (= Wehrli F100, which continues with 931,3-6 to include the reference to the circle that Themistius takes up next; see at 182,23-183,2 below). Themistius refers to Eudemus by name only once in the whole paraphrase, at 119,26 (on *Phys.* 4.5); see Todd (6), 33 and cf. Baltussen (2), 19-20.

214. See 181,2-22 above on Arist. 231a21-b6.

**215**. If one line exceeds another by a point, then if the greater one is divided, the indivisible point that makes it greater is also divided. Therefore no continuum can be greater than another by an additional amount that is also indivisible.

**216**. If one line can be greater than another by a point, then a circular line can also exceed another circular line by a point, but with more elaborate consequences than in the case of a straight line. For if the point by which one circle is larger than another is taken to be the centre, and if it cannot by definition be divided, then the diameter of the circle will paradoxically mark two unequal areas, one larger than another by a point, undermining the concepts of diameter and semi-circle.

217. As Konstan (3), 23 n. 13 notes, Themistius' use of the illustration of the

circle differs from that of Simplicius in making it appear, by latent implication, that Eudemus is referring to the area and not to the circumference of circles and semi-circles.

**218**. Themistius restricts his comments to magnitude and motion, although Aristotle mentions time; but there is a later argument on time at 232a18-22 (Themist. 184,28-185,3). On the arguments against indivisibles in the rest of this chapter and their fortuna see Sorabji (1), 365-83. In this chapter and the next 'motion' and 'move' translate *kinêsis* and *kineisthai*; the analysis clearly privileges locomotion.

**219**. 'Motion over this' (*epi toutou*) (183,3) reflects Arist. 231b22, where there is no preposition, which Ross, 640 defends; he argues that Themistius is paraphrasing rather than transmitting a reading.

**220**. See *Phys.* 4.11, 219a10-14, with Themist. *in Phys.* 145,19-146,10; see Todd (6), 57-8 with nn. 414-22.

**221**. 183,18: for *legomen* read *legômen* (MS W; Spengel) better to anticipate what immediately follows.

222. 183,23: hou (Arist. 231a30), as Ross ad loc. noted, must mean 'to where'.

**223.** 183,24: delete *kai peporeusthai* so that the pairing here (*poreuesthai* ... *kai einai*) can match its repetition at 183,25-6. In both cases Themistius uses the present tense of the verb 'to be' to identify completed action; i.e. as equivalent to 'being [in a completed state]' (cf. 193,10-15 below). Certainly 'in Thebes' cannot complement the perfect infinitive of the verb form deleted; i.e. 'have travelled in Thebes' is nonsense, though Schenkl would have tolerated it, since at 183,24 he says '*kai einai* delevi', although he did not insert the square brackets to indicate this deletion.

224. The reference is to 183,9-10 above.

**225**. 184,2: for the first *mête* read *mêde*.

**226.** 184,4: for *ep'autou* read *ep'auto* to reflect *eph'ho* (184,3) in the clause anticipating this inference.

**227**. 184,4: before *eph' ho* supply *tou*.

**228.** Themist. 184,9-28 = Usener, *Epicurea*, no. 278; Themist. 184,9-13 is translated at Furley (1), 113-14 with reference to the Epicurean theory of motion as a response to Aristotle's criticisms. Cf. Simpl. *in Phys.* 934,23-30, who avoids the polemic found in the present text, while Themistius, unlike Simpl. *in Phys.* 925,13-22 does not link Aristotle's earlier argument against indivisibles (231a21-9) with the Epicurean argument for there being parts in the atom. See also Konstan (1), 402-7 and (2), 5-10.

**229.** cf. also 185,8 and 12 below for similar sarcasm directed against the Epicurean theory of motion. In general, the hero worship accorded Epicurus of Samos (341-270 BC) in the school that he founded, and among followers for centuries thereafter, invited this kind of reaction from philosophical opponents. Cleomedes, *Caelestia* 2.1 is perhaps the most extreme example; see Bowen and Todd *ad loc.* Cf. especially 2.1.467 Todd for a sarcastic reference to Epicurus' 'sacred wisdom' (*sophia*).

**230**. See Themist. Or. 22, 67,19-20 for a deprecation of overly aggressive intervention with drugs by physicians.

231. 184,11: delete the first tês (MS W; Philop. in Phys. 862,30); cf. 184,14.

**232.** At 184,15-16 (= Arist. 232a8-9) Themistius uses this gloss instead of the noun  $kin\hat{e}ma$  (232a9) (used at 202,18 = 241a4 below) to describe a state of instantaneously completed motion ('jerk' as it is sometimes rendered) to form a contrast with the process of moving ( $kin\hat{e}sis$ ). For the same gloss (*perata kin\hat{e}seôs kai kekin\hat{e}sthai*) see 202,18 below (on *Phys.* 6.10, 241a3-4) and cf. Simpl. *in Phys.* 934,13; cf. also 196,15-16.

**233.** cf. Arist. 232a6-8: 'if something is moving over the whole line ABC, and the motion that it is undergoing is the [parts] DEF, and if over the partless [line] A it is not moving but has moved, then the motion [DEF] will not consist of motions but of completed motions...' Themistius turns this into the claim that if moving simply is completed motion then a process of moving cannot be broken down into constituent parts. So if all motions are instantaneously completed, they are indeterminable in terms of temporal units, as the next argument claims.

**234**. 184,17: here 'at' (*kata*) means that something is 'not in some larger place of which only part is occupied at once' (Ross, 655, on *Phys.* 6.9, 239a25).

**235.** 184,20-1: the articular infinitives previously used to depict processes and completed actions are replaced with nouns formed from participles (to parôikhêmenon and to enestos [not  $-\hat{os}$ , line 21]), which would seem to refer to past and present time ('that which has gone by'/that which has been established') rather than to things that have passed by a spatial extension or still inhere in it.

**236.** 184,21: before *hou* supply eph' so that this sentence can mirror that at 184,18.

**237.** 184,27: for *to* read  $t\hat{o}i$  (MSS **SL**) to complement *huparkhein* with a dative case and establish the sense of being a property, or, as here, 'holding of' in the logical sense.

**238**. 184,31: the argument requires a reference to the partlessness of a time period, although the text has 'the partlessness of a *magnitude*', and so (in light of comments by Niko Strobach) I have emended *megethous* to *khronou*. That Epicurus accepted indivisible units of time is implied by arguments in his *Letter to Herodotus* (see Furley [1], 121-9), and assumed, as here, by his critics (Sext. Emp. *Math.* 10,148-54; Simpl. *in Phys.* 934,25-6). It may also be implied by a papyrus fragment (*P. Herc.* 698, fr. 23 at Scott, p. 290), though the context concerns perception rather than motion, and indivisible time is argumentatively placed in a disjunction with 'time *per se*' (presumably a divisible time period with duration).

**239.** 185,1: the use of *kata* with the genitive case here to describe spatial traversal is unorthodox; we would expect epi.

**240**. Themistius emphasizes the general implications of this text, omits the formal demonstrations (**232a27-b20**), and exploits the conclusion (232b20-3) in addressing the opening statement (232a23-7). Aristotle's arguments are designed to show that relative speeds are evidence that the times and distances needed to define and compute these speeds can only be continuous, i.e. infinitely divisible; Themistius stresses that relative speeds are incompatible with distances and times being indivisible.

**241.** This illustration may have been used as an alternative scenario for Zeno's 'Achilles' paradox, though not by Themistius (199,23-200,28 below). For the 'swift steed of Adrastus' (*Iliad* 23,356-7) trying to overtake a tortoise see Plutarch, *De communibus notitiis* 43, 1082A with Cherniss, 845 note b.

**242.** Since Epicurus cannot explain motion at all (cf. 184,13-185,3 above), a *fortiori* he cannot explain variations in speed; for similar anti-Epicurean sarcasm see 184,9-10 above.

**243.** cf. the artisanal common sense invoked at Themist. *in Phys.* 4.8, 132,17-26, in a polemical digression against those unwilling to admit that in a void speed cannot be proportionate to weight.

**244.** Vanderspoel, 91 thinks that this text specifically refers to Themistius' journey to his native Paphlagonia with his children in the autumn of AD 355 when his father died, though it is not certain that he undertook such a journey (see Penella, 10 n. 37).

**245**. 185,18: delete  $\hat{e}$  diaphtheirousin, a redundant gloss on apolluousi (cf. diaphtheirei, 185,4).

**246.** If A is faster and B slower, then A and B are distinct and move as such 'one after another' (allo kai allo) at different speeds through the same time period.

**247**. cf. Plat. *Phaedr*. 246E4-5, also cited at Themist. *Or.* 2, 46,15 Downey-Norman. For the same thought-experiment with the tortoise and the Sun see Sext. Emp. *Math.* 10,154.

248. 185,30; for diaxei read diêxei (MSS W, Laur. 85,14); cf. 184,26.

249. 185,31: before isôi khronôi supply en.

250. See 185,6 above.

**251**. 186,8: for to  $Z\Theta$  ho khronos read ho  $Z\Theta$  khronos to align this expression for a delimited time period with those at 186,2.7.9.

**252.** 186,9: the text printed by Spengel and Schenkl has (to use my equivalents) the same variables (fh) for the time period in this explanatory clause (added by Themistius) as in the preceding clause ('so that again...') reproduced from Arist. 233a2-3. But if A traverses CJ in a time period less than fh (which is the time taken by the slower object B), then Themistius' explanation of the further division of fh should specify a shorter time period, say, fi. Spengel realized this, though his apparatus criticus failed to attach his suggestion 'perhaps [read] "in the time period less than fh" (en tôi elattoni tou  $Z\Theta$  khronôi)' to his p. 373, line 14. Then Schenkl failed to pick up on his suggestion, and in his apparatus at 186,9 claims incorrectly to have printed a reading corresponding to my fg while also citing MS S as having added a variable to fh (let's call it fhi), which implies that its scribe was correctly attempting to define a shorter time period. So in the Greek at 186,9 for  $Z\Theta$  read ZI. Simpl. in Phys. 943,13 does not explicate Arist. 233a2-3 in terms of a reduced time period specified by variables.

**253**. 186,10: since CJ corresponds to two partless units, not to the termini of a single line, C is some undefined part of CJ, given that no ratio is specified for the parts of CJ.

**254**. The process here (conveyed by *metalambanein* and *metalêpsis*) is not just substitution (Ross, Konstan) but *inter*-substitution or 'taking in alternation' (Hardie/Gaye).

255. 186,11: before *braduteron* supply to; cf. 189,6.

256. See 6.1, 232a18-22 (Themist. 184,28-185,3) above.

**257.** 186,10-20: the following statements are equivalent in meaning and can be substituted for one another (D = distance, T = the time period, F and S = a faster and slower object): (*i*) F covers more D in less T than S; (*ii*) S covers less D in more T than F; (*iii*) F covers the same D in less T than S; (*iv*) S covers the same D in more T than F. In the subdivisions of T and D in the infinite regresses initiated here, F will always be ahead of S in dividing T, and S ahead of F in dividing D, since F will always need less time and S will always cover less distance.

**258**. What follows is a corollary of the definition of uniform speed at 185,31-2 above.

259. 186,30-187,1 = Zeno no. 22 Lee.

260. Arist. 233a21-31 = Zeno at DK 29A25.

261. Zeno of Elea (b. c. 490 BC), a pupil and follower of Parmenides.

**262**. 187,6: after  $m\hat{e}kos$  supply kai khronos; cf. Arist. 233a24 and the reference to time at 187,12-14 (= 233a28).

**263.** See *Phys.* 3.7 *passim.* Zeno ignores this distinction by treating the infinite division of a finite spatial length (possible) as being like the increase of a magnitude to an infinite size (impossible; see *Phys.* 3.7, 207b15-21).

**264**. 187,7; for to read tou, which, like tou de at 187,9-10, is governed by a form of *haptesthai* ('be in contact').

**265**. This introduces from *Phys.* 3.6-7 the infinite in potentiality, not otherwise mentioned in Book 6, but used later in this book in connection with Zeno's paradoxes of motion (199,17-22 and 200,8-10 below); cf. 199,1-3. See also 229,21-30 (on *Phys.* 8.8, 263a4-b9) where it is in the relevant Aristotelian source text.

**266.** For more elaborate versions of (i) and (ii), see *Phys.* 6.7, 238a20-30, and 6.7, 237b23-b19 respectively. Ross, 15, links Themistius' omission of *Phys.* 6.7 with the fact that its subject matter is covered at 8.10, 266a12-b27, but that explanation is at least complemented by his treatment of its content in the present chapter.

267. 187,21: for estai read estô (Arist. 233a34; MSS SL).

**268**. Implied here, and in the demonstration of (i) below, is that the moving object is finite and its speed uniform. On non-uniform velocity see *Phys.* 6.7, 237b34-238a19.

**269.** 187,24: 'Measure out' (*katametrein*) means that **BE** is one of a set of exact submultiples of **AB**, whereas 'exceed' (*huperballein*) means that the closest such set to **AB** will exceed it. Themistius ignores the case of deficiency (*elleipein*, 233b3) whereby the closest set of submultiples will be less than **AB**.

**270.** 188,5: after *diexeisin* replace the colon with a stop and replace the stop after *adunaton* with a colon; for this punctuation cf. 201,14 and 203,3 below, and the punctuation in Ross's edition at, for example, *Phys.* 186b18, 186b30 or 241a20-1.

271. 188,13: for hupothoimetha read hupothômetha (Spengel).

**272.** 188,13-189,1 is approvingly quoted, with several syntactical changes, at Simpl. *in Phys.* 951,31-952,18.

**273.** See Brague, 145 on this phrase (*theia sômata*) used to refer to the circular-moving celestial bodies, and see 203,24 below for the principle of repeated circular motion. Simpl. *in Phys.* 952,9-11 inserts a general reference to *Phys.* 8 regarding the demonstration of the conditions for discontinuous motion; see *Phys.* 8.8, 264a7-b1 with Themist. 230,12-28 below.

**274.** In *Phys.* 6.7 (*iii*) and (*iv*) are addressed in summary terms as corollaries of the principal demonstrations; see 238a36-b16. In other words, this reference back is in fact a reference forward, unless there is an implicit assumption that 6.7 is being incorporated into this exposition. Themistius might have made such an assumption, given that he saw paraphrases as directed to those who had already studied Aristotle once; see his *in An. Post.* 1,11.

275. The demonstration using variables at 233b24-9 is simplified.

**276.** The digression begun at 186,30 now ends with a recapitulation of the arguments of 6.1-2 (up to 233a21) against a continuum being composed of indivisibles.

**277**. That is, in the opening section of 6.1 above, at 181,2-183,2.

**278**. See above 184,28-185,3 on Arist. 232a18-22.

**279.** 189,16: delete *en hôi* (Schenkl's supplement) and the preceding comma after *khronôi*; the sentence makes sense as it stands.

**280.** 189,8-20: Let distance D and time T each consist of three indivisible parts, ABC and XYZ respectively. Let a faster and slower body (F and S) move in a ratio of 3:2 (i.e. ABC/AB) in terms of distance covered. F will traverse ABC, and S will traverse AB, both in time period XYZ, but S will cover A in  $X + \frac{1}{2}Y$  and B in  $\frac{1}{2}Y + Z$ . But Y is *ex hypothesi* indivisible. Unlike the cases described at 186,10-20 above, a relative speed is defined for F and S, and so we can add to the four propositions identified there (*v*) in the same time period T, S will cover

less D than F. But if T and D are stipulated as consisting of sets of indivisible parts, some part of T will then be divisible, unless all bodies move at the same speed, and there is one universal ratio for T/D, which is another way of saying that to preserve indivisible units of time and distance, motion has to consist of 'completed motions' (kinemata), identical atemporal 'jerks'; see 184,14-18 (on 232a6-9) above. Sextus Empiricus, *Math.* 10,144-47, has a different argument in which two indivisibles move at an equal speed towards one another from the extremities of a set of indivisible parts that are uneven in number; since they can only meet half-way by dividing the middle part, then this shows that it has to be divisible.

**281.** Themistius omits **233b29-31**, the claim that the slower object will traverse one of the two indivisible units of distance 'in more time' than the faster one; specifically, it will take half again as long to accomplish this. This is the corollary of its halving the second of the three temporal indivisibles posited; i.e. in terms of the preceding note, if F traverses A in X, S will traverse A in X +  $\frac{1}{2}$ Y.

**282.** See *Phys.* 4.10, 218a16-18 with Themist. *in Phys.* 141,6-19 on the now as partless; cf. 222a10-20 (Themist. 157,10-30) on the now 'spoken of in a strict sense'.

**283.** 189,23: supply *kai* ('and') between 'one' and 'the same' (cf. 190,2-3 below); delete *nun* after this expression where it is a gratuitous specification of the existing subject (cf. Simpl. *in Phys.* 955,13-14).

284. 189,23: delete esti (Simpl. in Phys. 955,13-14; Spengel).

**285**. 189,24: after *hoion* supply *te* (a typical ellipse; see 181,9; 199,17; 219,7) to provide a verb on which the infinitive *episkepsasthai* can depend.

**286.** 189,27: after *mellon* replace the colon with a question mark; this is a direct question, like the corresponding one at 189,31, not an indirect one.

**287.** 189,30: for *parelêluthotos* read *parelêluthos* (Spengel); the genitive case dependent on *ouden* is unacceptable, and the phrase *ouden parelêluthos* ('nothing that is past') is immediately complemented by *ti parelêluthos* ('something that is past') (189,31), which would rule out Spengel's other suggestion that *tou* precede the existing *parelêluthotos*.

288. See Phys. 6.1, 181,2-22 (on 231a21-b6) above.

**289**. On the nows not being constituents of time see *Phys.* 4.10, especially 218a18-25 (Themist. 141,19-32); on the continuum not consisting of indivisibles, see *Phys.* 6.1 *passim*, and especially 231a24 (Themist. 181,3).

**290**. This is Themistius' sarcastic interjection, reflecting the dismissal of the void in *Phys.* 4.7-8.

**291**. 'This now' is a pseudo-time period that cannot be divided into past and future, but if such division were possible, then it would have to be divisible into the past and future.

**292.** 190,19: after *mellon* replace the colon with a stop, and after atopa the stop with a colon.

**293.** 190,20-1: rather than understand the verb 'to be' after 'the time period in between', take *houtos* – *mellon* as in apposition to it, and enclose it with dashes. Also, the comma after *nun* (20) should be deleted to make the relative clause that follows definitional. On the extended now see *Phys.* 4.10, 218a25-30 (Themist. 141,32-142,4), though there the past and future merge, so that past events are simultaneous with present ones, whereas when this extended now undergoes division it yields multiple nows that are not, as they should be, simultaneous.

294. Themistius prefers this illustration to Aristotle's demonstration at 234a26-30 in which the impossibility of motion in the now is demonstrated by the same reasoning used against motion in indivisible time periods in the

preceding chapter. I have used (as also at 207,25-9) a uniform system for measurement based on the digit (*daktulos*), a finger-breadth; 24 digits = a  $p\hat{e}khus$ , the word actually used here. See also the Greek-English index under *daktulos*. Exact modern equivalents are impossible; readers may ponder the size of their own fingers.

295. See 185,33-186,10 above ad 6.1, 232b26-233a4.

**296.** 191,1 (= 234a32): *elegomen*, found in some Aristotelian MSS, would create a reference back to *Phys.* 5.2, 226b12-16 (Themist. 172,17-19). Ross uses the text in Themistius and Simplicius to retain the present tense.

**297.** 191,9-10: *nun* ('now') and *tote* ('then') introduce contrasting clauses by carrying a strong logical sense, with *nun* meaning 'as the truth stands' and *tote* 'as envisaged by the case of motion in the now being accompanied by rest'.

**298**. 191,10: the optative *dunaito* needs to be complemented with *an* (as is *êkolouthei* in the next clause); cf. Spengel's emendation accepted by Schenkl at 195,1 below; cf. also 190,4 above. *mêde en tôi nun* was probably originally *mêd' an en tôi nun*.

**299.** 191,17: for *mête* read *mêden* (*mêde* coni. Schenkl) to complement the claim in the preceding clause. Schenkl's concern about this abruptly expressed sentence being corrupt is legitimate.

**300**. A reference to something indivisible undergoing change anticipates the later claim (192,12-22 below; see especially 192,17-18) that indivisibles form a limiting case in instantaneous change; i.e. an indivisible point (Themistius' example) is immune to the principle that one part of it is at the start, the other at the end, of a change. On the moving point see further on 201,31 below.

**301**. 191,27-8: place *oute – dunaton* in brackets; delete the colon preceding it.

**302**. Arist. **234b17-20**, which Themistius omits, allows intermediary states of colour, such as grey in the change from white to black, to be terminal points in a change; see also *Phys.* 5.1, 224b30-5 (Themist. 167,15-25).

**303**. Arist. 234b10-20 provoked other commentators to address instantaneous change; see Simpl. *in Phys.* 966,15-25 and Alex. *in Sens.* 134,5-10.

**304**. Themist. 191,22-192,2 = Theophrastus F155A FHSG; see Sharples (2), 77-9 for discussion and references to other treatments, notably by Alexander; see also Heinaman, 252-3. Theophrastus F155C, also from his *On Motion* (= Simpl. *in Phys.* 107,12-16 on *Phys.* 1.3, 186a13-16), shows that he raised the problem with reference to Aristotle's response to Melissus regarding instantaneous change at *Phys.* 1.3, 186a15-16; see on 192,10 below.

**305**. 192,4: for this position as Alexander's see Simpl. *in Phys.* 968,15-30 (cf. on 192,8-10 and 197,5 below), and cf. the Arabic vestigium at Giannakis no. 13, 167 with n. 15, where the examples of freezing milk and sunburn are introduced.

**306**. 192,5; for *metaballei* read *metaballein* (Spengel); this allows one articular infinitive (*to legein*, 2-3) to take another (*to metaballein*, 4-5) as its predicate, with an implicit copula. The second verb refers to a theory by describing its direct implementation; i.e. 'transforming' one part earlier than another is equivalent to saying that that is the case (for other examples of this intermediary verb being bypassed see 183,15-16; 184,15; 201,2-3).

**307**. 192,6: the darkening could be that of a shadow cast when the sun's ray is suddenly impeded, though Alex. ap. Simpl. *in Phys.* 968,25-7 (also Giannakis, no. 13) envisages instant sunburn. Philoponus in the Arabic summary of his commentary has this case as that of 'a face which comes to be pale instantaneously when it is exposed to the sun' (tr. Lettink, 92), but 'pale' here must mean 'illuminated', and resembles the case of light instantly entering a confined space (197,7-8 below).

**308**. 192,7: the comparative *eupathesteron* (MS Laur. 85,14; Alex. ap. Simpl. *in Phys.* 968,24-5) might be preferable.

**309.** 192,8-10: Simpl. *in Phys.* 968,30-969,4 notes Themistius' criticism of Alexander here. His own response (969,4-11) is that, if Alexander is right about instantaneous change being part by part, Aristotle is wrong in claiming (at 234b10-20) that a changing thing must be totally divisible between the origin and goal of a change. He adds (969,11-14) that without instantaneous change even in a part, Aristotle's objection to Melissus (see next note) on the ground that instantaneous change occurs would be misguided.

**310**. 192,10: at *Phys.* 1.3, 186a15-16 Aristotle argues against the Eleatic, Melissus of Samos (fifth century BC), that change, including qualitative change ('alteration', *alloiôsis*), must have a beginning by saying that Melissus reasons 'as if instantaneous change does not come about' (hôsper ouk athroas gignomenês metabolês). Simpl. in Phys. 966,15-19 identifies this text as generating the problem about instantaneous change that Themistius now associates with Theophrastus (cf. also Simpl. 998,13-16). See Themist. in Phys. 1.3, 7,15-8,24 ad 186a4-22, especially 7,29-8,2 where instantaneous qualitative change is identified for ice and cheese, and the beginnings of the relevant processes are said to be unidentifiable: 'And so when Melissus says "everything that comes into being has a beginning", we shall ask him "what sort of beginning?" For everything has a beginning that is one with respect to time, [i.e. everything] that comes into being with respect to magnitude without qualification, as with a human being, a horse, an olive tree, a plane tree, but not everything [has a beginning] that is one with respect to magnitude, as, for example, what comes into being with respect to alteration and instantaneous transformation; for both ice and cheese come into being, but it is impossible to identify for the magnitude a beginning from which it first began the freezing'. Alex. ap. Simpl. in Phys. 978,35-979,7 deals with the implications of Aristotle's response to Melissus for the divisibility of changing things asserted at 235b1-5.

**311**. This refers to the demonstration at **234b23-235a10** that change is divisible, which Themistius omits.

**312.** cf. 191,29-30 above. Simpl. *in Phys.* 966,32-967,14 discusses why locomotion presents a special problem in allowing instantaneous change. He refers to *Phys.* 6.1, 232a10-11, where in rejecting the claim that motion could be in instantaneous movements (*kinêmata*) Aristotle had said that someone could not have walked without first walking. Themistius blunts the edge of this inconsistency by implying that qualitative changes are primarily, if not exclusively, perceived as instantaneous.

**313.** Themist. 192,12-22 =Simpl. *in Phys.* 969,14-24 (with minor variants; see next note).

**314**. 192,15: for *noêsai* read *nomisai* (Simpl. *in Phys.* 969,16; Spengel); it is clearly Aristotle's *belief* rather than *thought* that is being described.

**315**. 192,18: before the infinitive *metaballein* supply to to create an articular infinitive to match to ... *metaballein* in the next line.

**316.** By rejecting Alexander's position (192,2-8; para 2 above), Themistius accepts that instantaneous change occurs throughout all the parts of a *divisible* body (cf. 197,2-3 and 216,10-11 below), and can be *perceived* to do so. Simpl. *in Phys.* 969,4-13, however, argues that the evidence of perception is insecure, and that the key issue is whether *anything* changes instantaneously; if that is the case, then Aristotle cannot be exempted from the charge of inconsistency with the principle of change through time introduced at 234b10-20 above.

317. The demonstrations used to support this claim at 234b23-235a10 are omitted.

**318**. Supporting illustrations of the complementary divisibility of change and time (**235a18-34**) are omitted, as is a concluding comment (**235a34-b1**) on the divisibility of length and on changing things as finite or infinite, also raised at **235b4-5** in advance of *Phys.* 6.6 below (cf. 237a2-11).

**319**. 193,1: Schenkl's suggestion (*meta de <tauta diairetê kata>* etc.) is used for an unavoidable lacuna.

**320**. This whole/part distinction is created by extracting from 235a13-17 the claims that the change of a changing thing is 'of all of it' (*pantos*, 235a14), and that the thing that is changing is divisible.

**321**. 193,5: Arist. 235a17-18 in Ross' text refers only to '[change] of place *per* se, but [change] of quality incidentally', but the majority of manuscripts have a reading attributed to Alexander (ap. Simpl. *in Phys.* 975,24-6) that has '[change] of quantity' for the first of these phrases, and as Ross, 648 notes, Themistius must have taken 'quantity' to refer both to change of place and change of size, as had Alexander. Ross agrees that both should be referred to here and tentatively conjectures reading '[change] of place and of quantity'.

**322.** 193,5-6: after  $sumbeb\hat{e}kos$  delete the colon, and after  $t\hat{o}i$  delete gar; cf. Simpl. *in Phys.* 975,19, to which Schenkl refers, where the gar clause is appropriately complemented by a main clause.

**323.** 193,6-7; for the third to (line 6) read tôi; and for tôi prôtôi (line 7) read to prôton (MS L), with no comma after it to create a second articular infinitive, to prôton einai (for the syntactical sequence see Arist. 235b10-11). This version of Arist. 235b1-4 omits a reference to the infinite in connection with what undergoes change, and just stresses divisibility (the original theme of the chapter; see 234b10). Its phrasing starts from 235b1-2, picks up on the statement (235b3-4) that 'divisibility is at once (euthus) present in what is being transformed', and substitutes prôton in the sense of 'prior' (= proteron) for euthus (the temporal adverb used in its logical sense: 'primarily', Ross, 409, 'in the first instance', Hardie/Gaye). See Alex. ap. Simpl. in Phys. 978,35-979,7 on this text in connection with the problem of instantaneous change and his solution of it as occurring 'part by part'.

**324.** 'When first' (*hote prôton*, Arist. 235b7), which may mean 'as soon as' (Konstan and Waterfield, following Ross, 409), but a literal translation (as in Apostle) lets this commentator's explications emerge more clearly. I have italicized 'when' and 'first' since they are juxtaposed in the Greek.

**325**. 193,11 and 14: the participles used to describe coming to Athens need to be interchanged in these places. In 193,11 a person has just reached Athens, whereas in 193,14 the reference is to his having done so in the past; thus the former needs the perfect participle (*elêluthota*), the latter the aorist participle (*elthonta*), not *vice versa* as in Schenkl's text; cf. 193,14-15. A similar interchange of participles can be justified at Simpl. *in Phys.* 979,17-18.

**326.** 193,11: here (and at 193,14 and 15) the Greek translated 'has [come] to Athens' corresponds to the verb 'to be' with the suffixed form used for Athens (i.e. *Athênaze*), when it is the place towards which someone is moving, so that literally this expression means 'is Athens-wards'. Spengel wanted to change all three of those forms to the locative form Athênêisi, 'at Athens'; cf. Simpl. *in Phys.* 979,19 where for the instances here at 193,11 and 14 he has *en Athênais*. But the use here of the directional form effectively identifies the precise moment (the 'when first') at which travel to Athens is completed (see also on 193,14 below), with the verb 'to be' used as a perfect tense as at 183,24 and 183,26 above (the locative forms there are irrelevant since the first moment of completed action is not an issue). At 193,14 ('has not [come] to Athens *now*') also implies that 'now' is applicable to the positive statements

as marking the first moment of completion, and so justifies glossing 'is Athenswards' as 'has come to Athens just-now'.

**327**. 193,11-12: Schenkl deleted *kai ton genomenon* ('and is one who came to be', i.e. reached Athens); it should have been the perfect tense, *kai ton gegonota* ('and is one who has come to be'); cf. 183,27 above. It was almost certainly an inept gloss that entered the main text.

**328**. 193,12; for  $\hat{e}ux\hat{e}th\hat{e}$  (a rist passive) read  $\hat{e}ux\hat{e}tai$  (perfect passive) so that 'when first' can, as in the other four such clauses at 193,10-15, be complemented, as it must be, by the perfect tense.

**329.** 193,14: replace the comma after *nun* with a colon. Cf. the version of this sentence at Simpl. *in Phys.* 979,18-19 where Simplicius says of someone who came 'to Athens' (*Athênaze*) a year ago 'it is no longer necessary that he is in Athens (*en Athênais*); but he was [in Athens] when he had first come'. But if the person has not left Athens in the interim, then of course he is 'in Athens' a year later; but what he is no longer in is a state of having arrived for the *first* time. And when he did arrive for the first time, he was not 'in Athens' but had just then come 'to Athens'. Simplicius' confusion (or perhaps the confusion in his text) helps vindicate the use of *Athênaze* in this context.

**330**. Arist. **235b9-13**, on transformation as the process of leaving a point of origin, is not addressed.

**331**. 193,16: delete de (cf. Arist. 235b9; Spengel). Themistius also has kai rather than  $\hat{e}$  before *apoleipei*.

**332**. 193,19: for *hotan* read *hote* (Arist. 235b14; Spengel); cf. 166,15 above and 193,10-15 below.

**333.** The notion of an intermediary is spelt out here, whereas Aristotle uses the generic notion of something other than that into which a thing has changed in a passage (**235b22-7**) not reproduced by Themistius. The intermediary state here is that of incomplete change, in contrast with a change between opposites, which can be completed within the extremes of contraries (see *Phys.* 6.4 above, **234b17-20**, which Themistius does not paraphrase).

**334**. cf. 172,22-3 above (on *Phys.* 5.3, 227a9-10).

**335**. 'Immediately' (193,28) is added to Arist. 235b27-8 to emphasize an action that has just been completed.

336. The demonstration at 235b34-236a2 is omitted.

**337.** 194,1; 'in which ... first' (*en hôi prôton*) mirrors Arist. 235b32, *en hôi prôtôi*. Here and in three other places where the same phrase occurs (194,8 and 21 [= 236a9]; 195,6 [= 236a26]) Spengel wanted to follow the Aristotelian text and emend *prôton* to *prôtôi* (the reading at Themist. 198,10 and 20 below). But *en hôi prôton*, ('in that [time] in which first') is equivalent to 'when first' (*hote prôton*; 193,10-15 above), and the essential meaning is not altered by emending to mirror the Aristotelian text.

**338**. Themistius makes the case of ceasing to be part of the whole discussion, instead of being relegated to 236a5-7.

**339.** Seeing is a property of the eyes, which are a part of the person's body, and possessing two right angles defines the genus triangle, of which the isosceles triangle is a species. So the person's body and the isosceles triangle are analogous to what Aristotle describes in the omitted demonstration at 235b34-236a2 in terms of subdivisions of a whole (*AC*). So if something is in the process of changing in *AB* or *BC*, which are parts of *AC*, then it will not have completed changing and there will be something prior to the part in which it is changing, just as seeing is a property of the eyes prior to being a property of the body, and having two right angles is a property of the triangle prior to being a property of the isosceles triangle. This analytical procedure should not be seen as a review

of a series of instants to determine which is the first, but as way of trying to zero in on a specific instant as the first. See further Strobach, 63-78, especially 66-7 on the present text.

**340**. Alexander (ap. Simpl. *in Phys.* 983,25-984,2) in a slightly more expansive version of this paradox also attributes it to 'the sophists'. The death-bed version used here (cf. also *Phys.* 8.8, 230,5-10 below) is probably derived from Diodorus Cronus from whom the Sceptics took it; see Sext. Emp. *Pyrrh. Hyp.* 3.110-11 and *Math.* 10.269; also 10.346 (where there is a reference to 'Cronus'). Sextus (*Pyrrh. Hyp.* 3.111) noted that this argument can be applied to anything involved in coming to be and ceasing to be, and can be used to deny both processes. It is used more generally in an argument against motion directly attributed to Diodorus at Sext. Emp. *Math.* 10,87 (= Döring F123); see Sedley, 84-5. Plat. *Parm.* 156C-D can be regarded as the source of this paradox and of its Aristotelian solution via the concept of the indivisible now.

**341**. That is: is it either a time period or an instant? The Greek phrase *en hôi* (*sc. khronôi*) used in the disjunction that follows is ambiguous between 'in the time period in which' and 'at the time at which'.

**342**. The specific demonstrations at **236a15-35** are omitted in favour of a discursive rationale.

**343**. cf. *Phys.* 6.3 above (189,29-31; 190,1.10) for the now as the beginning of future time.

**344**. 194,25: *katantân*, literally to come down on, is used in exactly this sense at Themist. *in Phys.* 96,26-7 to refer to the impossibility of resolving a division.

**345**. 194,25: delete the stop after  $prôt\hat{e}$ , place  $h\hat{e}$  gar – protera in brackets followed by a colon; this places ei men/ei de (194,23 and 26) in clearer coordination.

**346**. See 190,28-191,2 above (on *Phys.* 6.3, 234a24-34), where this claim is made with particular reference to locomotion.

**347**. cf. *Phys.* 6.3, 190,19-29 (on Arist. 234a19-21) above on the situation of an 'elongated' now, i.e. one that is a pseudo time period with the same properties as the now. At 195,1 for *êremêsei* read *êremêseie* (Spengel); Schenkl cannot justify *êremêsei* by pointing to 200,7-8 where an optative in an apodosis with *an* is conjoined with a future indicative in the protasis, since there the indicative describes the actual consequence of the counter-factual situation. Here, however, two interrelated counter-factuals are conjoned and should be in the same mood.

**348**. 194,30-195,3: place to te  $gar - s\hat{o}ma$  (194,31-195,1) in brackets, deleting the colon preceding it, and replacing the stop after  $s\hat{o}ma$  with a comma; this better coordinates between the two conditionals (*ei men*, 194,30; *ei de*, 195,1).

349. In Phys. 6.3 above, passim.

350. This final sentence reflects the conclusion (a34-5) of the demonstration at 263a27-35.

**351.** Themist. 195,8-26 (not 8-21 as at *FSHG*, 315 and Sharples [2], 79) = Theophrastus F156A FHSG; cf. F156B = Simpl. *in Phys.* 986,3-17, translated below. See Sharples (2), 79-82 for a discussion. The amount of text to be attributed to Theophrastus is unclear. Simpl. *in Phys.* 986,6-7 (at F156B) uses *phêsi* ('he says') in his version of Themistius' first sentence here, and it is marked as a quotation by Diels *ad loc.* and FHSG. Sharples (2), 80, thinks that the Themistian text may indicate additional Theophrastan content, and also refers (80-1 with n. 204) to evidence from Averroes that suggests that the whole of this paragraph may represent Theophrastus' position. All that is certain is that Themist. 195,13-26 represents a more succinct and tentative version of the position expressed at Simpl. *in Phys.* 986,8-987,8 (appended below). Both texts accept the need for symmetry between an indivisible beginning and end of a

change, while acknowledging that the divisibility of parts precludes the identification of a first or last change. The real issue is whether Theophrastus answered his own question in the same way, and if he insisted that Aristotle be consistent in accepting that there was an indivisible beginning of change. While later commentators have provided an answer, Alexander was probably their source, yet Themist. *in DA* 108,9-12 (in FHSG 307A) says that Theophrastus provided solutions for problems, and so the commentators may have elaborated or adjusted his solutions and not originated them.

**352.** At 195,10 since *peperasmena* refers to the fixing of limits at both the beginning and end of a change, and since the cognate noun *peras* ('limit') is used in this context to mean only the end, this verb needs the alternative translation provided here.

**353**. 195,14: before *ekeino* supply *ei* and place a comma before *pôs* (Schenkl); cf. the resulting *all'<ei>ekeino* with the frequent *ei de touto* (e.g. 202,29; 228,22).

**354.** FHSG, 317 arguably over-translates *lambanein* as 'apprehend' in these closing lines. Sharples (2), 80 even claims that in F156B (translated below) Simplicius does not consider 'the topic of what can or cannot be apprehended' until *in Phys.* 986,30-987,8. But the verb here is used for identifying something, or 'taking' it in a geometrical context (see on 182,13 above), which may imply, but does not necessarily mean, an act of apprehension (whatever that means in this context).

355. See Themist. 195,26-31 on 236a35-b10 below.

**356**. See 198,13-19 (ad 239a10-22) on the equivalent claim: that there is no first time of rest.

**357.** 195,25: the contrast needed in this sentence between the last change and the limit reached by a process of change is not supported by the Greek that offers 'both (*kai*) the last change ... and (*kai*) the limit', which the translators at FHSG 156A illegitimately, if understandably, force into a contrast with 'but the [limit]' for the second clause. Rather than similarly translate a non-existent text, I supply *ei* before the first *kai* to give the appropriate contrastive sense of 'even if'.

**358**. This passage is a valuable commentary on the Theophrastan problem. FHSG F156B has only Simpl. *in Phys.* 986,3-17.

**359**. Simplicius is commenting on Arist. 236a7-27, but his starting point is 236a13-15 (cf. 985,30-1).

**360**. 986,6: before *tês kinêseôs* omit Diels' supplement *ta* (as did Konstan, 84 n. 68). I take this genitive as dependent on *phusin*, with *thaumasta* and *onta* pseudo-plurals, since it is a *single* thing that is remarkable here.

**361**. Diels ends the quotation from Theophrastus at 986,7 (the end of the first sentence); I have added the second question as integral to the platform for the response that follows.

**362**. 986,15: after *peras* place a comma rather than a stop, and a comma after  $gramm\hat{e}$  (986,16) so that the analogous reference to the now and a  $kin\hat{e}ma$  can follow directly with the ellipse understood.

**363**. For the now see *Phys.* 6.3 above. The *kinêma* (on which see 184,15-16 above and 202,18 below) is introduced here as the only kind of change possible in the now, one that collapses the distinction between a change being initiated and having duration and its coming to completion, in that way qualifying as an indivisible beginning and end.

364. Themistius himself does so, at 184,15 above, and 202,18 below.

**365**. In other words, *2-a* is indistinguishable from *1-a*.

**366.** *katalambanein* ('firmly fix', 987,3), i.e. we cannot identify a beginning or an end once the infinite divisibility of a continuum is factored in. Prior to that the indivisible now (used analogically at Themist. 195,20 and Simpl. 986,16),

the beginning and end of any continuous stretch of time, can be identified. Its role is undermined once infinite divisibility is taken into account simply because it is 'undivided' (*atomos*). Simplicius' distinction between a continuum *per se* and *qua* infinitely divided must be his own since it is unattributed.

**367**. **236b10-17** is omitted: 236b10-16 is a further demonstration that there is no first change, and 23616-17 refers to quantitative change as no exception to the principle of infinite divisibility as it excludes the identification of an indivisible first thing in change.

368. 195,27; for katha read kath' hon.

**369**. See 6.4, 235a18 (Themist. 193,5-6) above. At *Phys.* 8.3, 253b23-6 and 28-30 (Themist. 216,9-12) qualitative change's being incidentally 'co-divisible' with what is changing is linked with instantaneous change, as it is by Simpl. *in Phys.* 989,23-6 in addressing the present text. Themistius limits himself to claiming that a continuous change in temperature can be conjoined with an identifiable beginning for an incidental change in colour.

**370**. Themistius omits Arist. **236b19-32**, which recapitulates material from the preceding chapter regarding the first time of change.

**371.** The reference to traversing is based on the demonstration at Arist. **236b34-237a2**, which Themistius converts into a generalization.

**372**. 196,2: Schenkl filled his own lacuna here with Simpl. *in Phys.* 992,17-18, *metêllakhen ek tinos eis ti (ei gar en tautôi eiê, ouk an kinoito), to de metêllakhos kekinêtai*, which Spengel had included in his text. *metallattesthai*, usually translated 'altered', has a separate equivalent here to avoid terminological confusion.

**373**. In Aristotle's exposition this reference to infinite divisibility (237a8-11) precedes comment on the relation between completed change and the now.

**374.** 196,3; for *hou* read *ho* (Spengel), the same accusative of spatial extent with a verb of motion as here at 196,4-5; cf. also Arist. 231b27 or 232b30.

**375.** 196,5: after *proteron* replace the colon with a comma; the infinitive *kekinêsthai* depends on the main verb of the sentence, *sumbêsetai*, at 196,4.

**376.** 196,7; for *autou* read *auto*; 'actual extremity' better anticipates the reference that follows to the now than would a reference to 'the extremity of the change of it (the thing that changes)'.

**377.** 196,8: delete *aei*, Spengel's conjecture (implausibly positioned within a prepositional phrase) for the impossible *dei* (MSS **SL**). The other MSS have nothing here, and presumably *dei* was a misguided conjecture.

378. 196,9: before kekinêsthai delete to (cf. Arist. 237a6-7).

**379**. 196,11: this indefinite phrase, *en hôi dê tini tou khronou*, may be glossed as 'in any element of the whole time' whether that is a extended stretch or an instant; see Ross (ad 237a14).

**380**. 196,12: after *metaballein* replace the comma with a stop.

**381.** 196,14: after proteron supply alla kai to kekinêmemon kineisthai proteron (cf. Arist. 237a18: alla kai to metabeblêkos anankê metaballein proteron), an omission that could have been caused by homoioteleuton (the repetition of proteron at the end of each clause). Spengel pointed the way but Schenkl hesitated, claiming (ad 197,24) that here and elsewhere Themistius is content only to include one limb of a balanced pair of clauses. Oddly neither scholar identified the Aristotelian source for this emendation.

**382.** 196,17 (cf. Arist. 237a21-2): after *autôi* delete the comma and delete *ex hou metaballei*, not just to align the text with its Aristotelian source, but because the deleted clause is a misguided intrusive gloss on *en hôi estin*, in conflict with the principle (cf. here 196,11-12) that there can be no process of change in the now; hence the now cannot be 'that from which' change occurs.

**383**. Here (196,20) Arist. 237a27 has a future perfect, 'will have completed a different transformation' (*allo estai metabeblêkos*).

**384.** 196,20: cf. Arist. 237a26-7, 'since ... all time is divisible, in half [a time period] it will have completed another transformation, and again in half of that [half]'. The second clause here shows up the inadequacy of 'in that' (*en ekeinôi*) in the Themistian text; he would have to be saying that transformation is completed 'again in the same way in that [half]', instead of in half of the first half in which it occurred. I have therefore used Arist. 237a27 to emend to *en <tôi hêmisei> ekeinou*. The supplied phrase could have been omitted since it replicates one in the preceding clause, and once omitted *ekeinou* could have been changed to *ekeinôi* because of the retained preposition.

**385**. 196,22; for *de* read *men*; this to establishes a clearer contrast with *epi de* in the next line.

**386.** The passage is summarized in this opening sentence to allow for a reintroduction of the issue of instantaneous changes as the limiting case on change in time; the distinction involved for other changes (qualitative and quantitative) is that unlike locomotion they involve contradiction and contrariety (Arist. 237a35-237b3), while still occurring in a time period.

**387.** 196,25: for *metabalein* read *metaballein* (MSS **SL**; Spengel); cf. Simpl. *in Phys.* 998,8-9. Spengel raised the possibility of including the reverse situation, which could have been omitted through homoioteleuton: i.e. if the original text were *kai to metaballon eis to metaballein dia tou metabeblêkenai*. But such a supplement would interfere with the transition to further discussion of instantaneous change, and would pre-empt the full statement at 197,9-11 (= Arist. 237b4-6) that the process and completion of transformation precede one another. Alexander, ap. Simpl. *in Phys.* 966,32-967,2, for example, emphasized that the issue of instantaneous change turns on something having changed without changing.

**388.** cf. Simpl. *in Phys.* 107,1-11, where the atemporal change involving qualities is distinguished from an infinitely divisible object for which the process of transformation does precede completion; Simpl. 107,7-8 refers to Arist. 236a27-8.

**389.** 197,4: delete *ouk*. The preceding negation with *en khronôi* would be negated by it and would produce a positive statement ('not in time period over which not ...' = 'in a time period in which'), exactly the opposite of what Themistius needs to say here.

**390**. 197,5: see Alex. *in Sens*. 134,1-10 (on Arist. *Sens*. 447a1-6) for qualitative change as instantaneous only with respect to the constituent parts of a whole that is changed 'part by part' over time. Also, see Alex. ap. Simpl. *in Phys*. 968,5-20 for his general position.

**391.** Themist. 197,4-8 = Theophrastus, F155B FHSG (the source of Simpl. *in Phys.* 998,13-16, cited but not quoted at FHSG); see Sharples (2), 77-9. Themistius' source is Alexander (see Simpl. *in Phys.* 997,31 and 998,13-16; cf. Giannakis no. 15, 168 with n. 17); cf. also Themist. 197,1-5 with Simpl. *in Phys.* 998,9-13. For instantaneous illumination in a confined space see also Cleomedes, *Meteora* 2.4.85-7, and for Alexander on it see Sharples (2), 78-9 and (3), 127, while for light as 'not an alteration but a relation [*skhesis*]' see Alex. *in Sens.* 134,11-19.

**392.** cf. 192,1-2 above, and Theophrastus, F155C FHSG (= Simpl. *in Phys.* 107,12-16) where in connection with Aristotle's admission of instantaneous change at *Phys.* 1.3, 186a13-16 the general problem of the possibility of such change is raised in the form of a question as to whether alteration, if it does not involve infinite divisibility (which is only incidental to it), can undergo instan-

taneous change. Sorabji (1), 53 with n. 5 takes both passages as showing that Theophrastus thought that 'there can be a first instant of having changed', but the evidence may show a problem being raised rather than solved; see Sharples (2), 78 and 81-2. At 197,6 *huphorasthai* strongly suggests that Theophrastus may have agreed with Alexander in regarding illumination as a questionable case of instantaneous change.

393. cf. Phys. 8.3, 253b14-26 with Themist. 216,7-11.

**394**. In the division of a finite line, there are two series: one of increasingly smaller divisions producing a smaller section of the line, another of an increasingly larger size formed of the residue of the ongoing division.

**395**. 197,18-19: Alexander had linked instantaneous change with contact; see Giannakis, no. 16 (169 with n. 18) and Alex. ap. Simpl. *in Phys.* 997,30-998,3, where Alexander is said to have rationalized Aristotle's restriction of his claim (at 237b11) to 'things that are divisible and continuous' (see previous note) 'because there are some things to which we apply "coming to be" though they do not have their being through a process of coming to be; for example, we speak of physical contact as having come to be, though not as being in the process of coming to be' (my translation). Simpl. *in Phys.* 998,16-19 (probably still following Alexander) subsequently refers to the issue of contact being 'ungenerated' (*agenêton*) as having been raised at Arist. *Cael.* 1.11, 280b6-8 (see Themist. *in Cael.* 64,35-65,16), though at *DA* 2.11, 423b14-17 (Themist. 75,14-17) allowance is also made for instantaneous physical contact. Cf. also 206,19-23 above (on *Phys.* 7.3, 247b7-9).

**396**. 197,20: after *egineto* supply *hudôr* to form a parallel with *oikia* after the same verb at 197,21.

397. 197,25: after homoiôs supply de (cf. Arist. 237b17).

**398**. 198,3-12: a process and its achievement are contrasted here through the present continuous and aorist infinitives respectively, though at 198,4 process is also conveyed by an auxiliary verb in 'to proceed to this cessation' (*epi ... paulan ... ienai*). 'Achievement' is conveyed by the 'ingressive aorist' (Smyth, 1924-5), translated 'reach a stop/state of rest' here. Unlike the completion of a process expressed by the perfect tense (the 'perfective-stative') it pinpoints the state entered into when the process has entirely ceased, whereas completion is possible without the process ceasing (see 196,1 above, for 'having changed' not being equivalent to 'having ceased from change', and 196,14-15 where completed change is said be only 'like' [*hoion*] a limit or cessation of change rather than the real cessation being analyzed here). See also on 203,16-23 and 215,27 below.

399. cf. Arist. Phys. 4.10, 218b13-18 (Themist. 143,10-15).

**400**. This summary omits the demonstrations (**238b32-6** and **239a2-10**) that show that the divisibility of time precludes there being a first time for coming to a stop.

**401.** The analogy between coming to a stop and changing is, as Aristotle acknowledges by a reference back (238b35-6), derived from *Phys.* 6.6, 236b19-32, where at 236b21 as at 238b35 the expression 'with respect to something else' (*kath' heteron*) is used in connection with a process beginning (or terminating) anywhere in a time period. Themistius' uses 'incidental' (*kata sumbebêkos*) in the same sense.

402. Simpl. in Phys. 1009,14 supplies 'nows'.

403. On this gloss on kata (Arist. 239a25) see also on 184,17 above.

404. cf. Phys. 6.3, 233b35-234b3 (Themist. 191,18-19).

**405**. 198,26; for *khronon* read *topon* (cf. 198, 29; see Simpl. *in Phys.* 1010,23; it is also a conjecture in MS Laur. 85,14 and a correction in MS Par. Gr. 1888). This follows up a suggestion by Niko Strobach.

**406.** 199,1: replace the question mark with a comma, so that the further description of the now can follow directly as a response (introduced by  $\hat{e}$ , 198,27) to the preceding question, not as a further speculative question, as in Schenkl's punctuation. Cf. the paraphrased version at Simpl. *in Phys.* 1010,24-5, where this sentence is also taken as an assertion, not to mention its earlier articulation at *Phys.* 6.3, 234b7 (Themist. 191,19-20).

407. 199,1: delete te and read tout' auto (Spengel).

**408**. In *Phys.* 8.8 a moving object will be shown to have to stop at an actual point (262a23-5; 262b30-263a3; Themist. 228,26-229,3) and in a time period between the nows (Themist. 228,22-4). The notion of an actual now envisaged here would involve converting it into such an actual point, and a fortiori would mean dividing time into an actual set of infinite parts, the consequence Zeno was said to face: see *Phys.* 6.2, 233a21-31 (Themist. 187,7-17), 8.8, 263a4-b9 (Themist. 229,21-30), and the next chapter (6.9, 239b11-14; cf. Themist. 199,17-22 and 200,8-10).

**409**. cf. the earlier account of the now as potential and 'in conception' at *Phys.* 4.13, 222a18 (Themist. 157,16-18). As at 187,11-17 above (cf. 199,17-18 and 200,8-10 below), the concept of potentiality is inserted into an Aristotelian text from which it is absent.

**410**. The Aristotelian arguments (= Zeno DK 29A25-8) restated here have no independent value for the interpretation of Zeno's paradoxes. The lengthier treatment of the 'Achilles' paradox at 199,23-200,28 below, in contrast with the summary treatment of the others, may reflect pedagogy.

411. 239b5-8 = Zeno DK 29A27.

**412**. Themist.199,4-6 = Zeno no. 34 Lee.

**413**. See *Phys.* 6.8, 239a23-b4 with Themist. 198,27-199,1 above. This reference back is Themistius'; cf. Simpl. *in Phys.* 1009,26-7 who thought that this earlier argument was designed to help refute Zeno.

414. 199,10: before *nun* supply *<to>* (Laur. 85.14; Spengel).

**415**. 199,10: delete the comma after *sunekhous*; cf. Arist. 239b9, a generalization that 'no other magnitude either' is composed of indivisibles.

**416**. Arist. 239b9-14 = Zeno, DK 29A25.

417. 199,17: after *khronôi* replace the comma with a colon.

**418**. 199,17-18: after de (17) delete the comma and also delete prôton (18) ('first'), which cannot be construed. Given its position, it is not marking the first item in the refutation, and it makes no sense as a modifier for actual infinite division. It was probably inserted from the margin where it may have served to identify item (*i*) in this argument; cf. a similar intrusion at 207,15 below.

**419**. cf. Themist. 187,7-20 above, his response to the fuller version of Zeno's argument at 6.2, 233a21-34, to which Arist. 239b13-14 refers; in both contexts the distinction between the actual and potential infinite is inserted by Themistius in light of *Phys.* 8.8, 263a4-11 (Themist. 229,21-30).

**420**. 199,19: after  $diast \hat{e}ma$  delete the comma; place  $ouketi - sunekh \hat{e}$  (20) in brackets.

**421**. See 187,12-20 above.

**422**. 239b14-20 = Zeno, DK 29A26.

**423**. *tetragôidêmenos* (Arist. 239b25) may mean 'theatrical' (KRS, 272; cf. Simpl. *in Phys.* 1015,8-10, who sees the whole pursuit as tragic, or comic), but Themistius takes it to refer to a dramatization based on Achilles' Homeric 'epithet' (the sense of *onoma* at 199,24); see the next note.

**424**. *podôkestatos Akhilleus*; this is the standard Homeric epithet for Achilles. Simpl. *in Phys.* 1014,7-9, makes etymological play with another epithet, *podarkês*.

**425.** In the duel between Achilles and Hector in Homer, *Iliad*, Book 22, one phase (22.136-259) involved four circuits of the walls of Troy, with Achilles in pursuit of Hector until Hector was divinely manipulated into stopping running, unlike Zeno's tortoise who is hypothesized as never ceasing to trudge. Themistius, whose cultivated father Eugenius was a Homerophile (cf. Themist. *Or.* 20, 7,16-20 Downey-Norman), perhaps originated this elaboration, also taken up at Simpl. *in Phys.* 1014,6-9 and 22-3.

**426.** 199,26: for *hou* read *ho* in this relative clause; the accusative of the relative pronoun has to be the object of the verb of motion rather than the locative relative 'where'.

**427**. The distances here could also be expressed in terms of a stadium (i.e. a track of a stade in length, and about 200 yards), but such a specific embodiment of distance is required only by the fourth argument below.

428. See 199,17-18 above.

**429.** 200,10: before gar supply men and after logon (200,11) replace the stop with a comma; this gives the sentence ei d' allôs - braduteron (11-13) the adversative status it needs.

430. See Phys. 6.2 above with Themist. 184,14-17 on Arist. 233a26-32.

**431**. 200,21: for *oute* read *oude*.

**432**. See the more developed version of this argument at 229,21-30 (on *Phys.* 8.8, 263a4-b9) below; cf. also 186,30-187,17 (on *Phys.* 6.2, 233a21-31) above.

**433.** 200,21: the compound form of the verb used here (*prosneanieuesthai*) is rare; for its uncompounded form see Plat. *Gorg.* 482C4 where Callicles, not unlike Themistius here, remarks that Socrates seems 'youthfully brash in his arguments'.

**434**. See 199,4-12 above.

435. 239b33-240a17 = Zeno DK 29A28.

**436.** 'Stadium' (*stadion*) refers to a track a stade in length, seen here as having what we would call three lanes occupied by the three equal 'masses' (*onkoi*), or as they are often glossed, 'rows of bodies'. Eudemus, ap. Simpl. *in Phys.* 1016,24-5 substituted 'cubes'. 'Bodies' (KRS) and 'volumes' (Konstan) are also possible; I have gone with the latter.

437. 201,3: after *dieisi* supply *para* (cf. Arist. 240a11).

438. A sophism is 'an eristic deduction' (Arist. Top. 162a17).

**439**. 201,5: for Schenkl's lacuna read his *isa onta* rather than to his other suggestion, *isotakhê kai isa onta* ('being at constant speed and equal').

**440**. *thaumasie* ('astonishing man') is a common Socratic response in Platonic dialogues to objectionable statements.

441. Simpl. in Phys. 1020,10-11 describes the remaining arguments in this chapter as sophistries that share with Zeno's paradoxes the goal of denying motion.

442. 201,10: delete kai (Spengel).

443. 201,10: before ex hou supply en tôi (Spengel).

444. 201,14: after *metaballon* add *alla metaxu* (Spengel; cf. Simpl. *in Phys.* 1020,17 app. crit. for its being independently proposed), followed by a stop, so that the reference to an intermediary in the refutation can be appropriately anticipated. Also, replace the stop after *all' adunaton* with a colon; cf. on 188,5 above.

445. cf. 172,22-3 (= 227a9-10) above.

**446.** Themistius omits Aristotle's additional claim at **240a24-5** that what changes will be predominantly ('in most or in the most significant of its parts') in one or the other of the components of the contradiction.

447. 201,19: diorismos ho] read ho diorismos.

448. Themistius reworks Arist. 240a29-32 into an objection raised by an imaginary 'they' to whom both the question posed here (how can things that move around 'a stable centre' – a gloss on Aristotle's 'move within themselves' – be at rest?) and its rationale (such things are really at rest) should be attributed by being placed in quotation marks; Schenkl only punctuated the rationale this way.

**449**. cf. Arist. 240a12: circles and spheres are alleged to be at rest and in motion at the same time.

**450.** Arist. 240b4 cites the example of man being incidentally an educated man. Similarly, a circumference identified from point A back to point A is incidentally the given circle's circumference, since it can equally well be replicated from any one of an infinite set of points, just as something can, in principle, have any number of incidental properties (*Phys.* 5.1, 224b26-8; Themist. 167,6-11, and Themist. 217,10-11 *ad Phys.* 8.4, 254b7-12).

451. The demonstration at 240b20-9 is not reproduced but its content is paraphrased.

**452**. 201,30-1: on the addition of 'or the magnitude' ( $\hat{e}$  tou megethous) see Ross on 240b10. He accepts the explanation at Simpl. *in Phys.* 1025,4-8: that this addition caters for the case of a point which is not directly in a body but is in a line (an extended magnitude) that is in the surface of a body.

**453.** 201,31: the example of the point is based on Arist. 241a19-20; cf. also Arist. *Phys.* 5.4, 227b16-17, and *Phys.* 4.11, 219b19 where *ad loc.* Ross argues that *stigmê* ('point') should be taken to be a moving particle of matter rather than a geometrical point. Themist. *in Phys.* 150,12-18 (on 219b19) was willing to accept the notion of a moving point; cf. also 191,23-4 above.

**454.** Arist. 240b15-17 offers just a generic example of a moving sphere, whereas Themistius, as Schenkl noted, offers a succinct version of Alexander's analysis (ap. Simpl. *in Phys.* 1026, 5-11) of the different motion of the circles on a sphere in astronomical terms, with motions on the great circles contrasted with those on circumpolar circles, reflecting the explanation of the differing lengths of days and nights that formed part of elementary spherical astronomy. Themistius, to judge from his commentary on *Metaph. Lambda* 8, adhered to the traditional homocentric model for celestial motions, though he once (*in Cael.* 115,23-4) briefly mentions Ptolemy; see Bodnár, 203 and Brague, 144.

**455.** 202,4-8: to reflect the contrasting men/de clauses here, delete the stop after *holou* (202,4), place *idoi* – *kuklon* (lines 4-6) in brackets, replace the stop after *kuklon* with a comma, and continue the sentence through the first sentence of what Schenkl marked as a new paragraph at 202,7; finally, change the colon after *enuparkhein* (202,8) to a stop.

**456**. 202,11: *prôton* is Schenkl's conjecture, built, it would seem, on *ton* (MSS **MSL**). He acknowledges that the Aristotelian source (240b22) has *prôtôi*, which, as we have seen (on 194,1 above) does not have to be reproduced.

457. 202,11: remove Schenkl's lacuna inserted on the authority of a secondary scribe's rewriting in MS L, and for *ei de ekeino* read *ei d' en ekeinôi*. At Arist. 240b28-30 something partless is envisaged as being at one stage of a temporal interval, which Aristotle divides into two successive parts, identified as **AB** and **BC**. He can then envisage the partless thing being at **AB** 'with respect to the time in which it is being transformed', and conclude 'Therefore it will be at rest; for being in the same [place] for some time is [by definition] being at rest'. Without the lacuna Themistius' version of this possibility at 202,10-11 ('when it first begins to be transformed, it will be at rest') is followed by a restatement (at 202,11-12) of the case that Aristotle identified at 240b27-8 where the partless thing is envisaged as being 'at (*en tôi*) **BC**' (the source of my emendation above); this, he says, is impossible, 'for then it will have completed its transformation (*metabeblêkos*), whereas it is assumed that it is in the process of transformation (*metaballein*)'. Themistius' rephrasing at 202,10-11 does not justify the lacuna.

**458**. 202,12: for *en toutois* read *en toutôi* (cf. Arist. 240b24-5). The singulars for the beginning and end of change in the Aristotelian text refer to pairs of variables in the illustration at **240b20-9** that Themistius does not directly reproduce.

**459.** This conclusion (202,12-13; cf. 240b24-5 and *Phys.* 6.4, 234b10-17 [Themist. 191,24-8]) is elliptical. Both Arist. 240b24-30 and Simpl. *in Phys.* 1027,6-12, define more fully the alternative by which something partless saves its indivisibility by being either at rest or at the end of a process-free change.

**460**. 202,18 (= 241a4): *kinêmata* ('completed changes') is the nominal equivalent of *to kekinêsthai* (202,20) ('having been changed'). Themistius' gloss (cf. 184,15 where it replaces *kinêmata* at Arist. 232a9, where the term specifically refers to completed locomotion) justifies my translation. Others have used 'discrete changes' (Waterfield), 'jerks' (Furley [1], 112-13), 'moves' (Konstan, 27 for Simpl. *in Phys.* 934,11-12 = 232a8-9) or 'movings' (Hardie/Gaye). Abrupt motion is reflected in the modern Greek use of *kinêma* to mean *coup d'état*.

**461**. See the Greek-English index under *daktulos*, 'digit', for the conversions made here.

**462**. Aristotle identifies this as a point throughout the present passage; Themistius leaves it to be implied by the expression 'partless thing'.

**463**. To 'measure out' is to be an exact sub-multiple of a whole; see on 187,24 above. Thus if a partless object moving over a line undergoes a set of movements corresponding exactly to the units of the line, then those units are also partless.

**464**. 203,3: after  $diast\hat{e}ma$  replace the colon with a stop, and after adunaton replace the stop with a colon; cf. on 188,5 and 201,14 above for the same adjustment.

**465**. cf. 6.2, 233b15-32 (Themist. 189,1-20) above for the demonstration that objects cannot move at different speeds in indivisible time units. The present argument is its corollary: that indivisible objects cannot move in divisible time units.

**466.** 203,5: delete *alla* (Spengel) and the comma preceding it; this is a standard 'synonymous doublet' (Smyth, 3042.i); cf. 183,3; 186,27-8; 187,10; 189,22; 199,10-11 above.

**467**. 203,10-11: after *enantia* replace the stop with a comma and attach the next clause ('and these are the extremities of transformation') to the preceding sentence rather than the following one by replacing the comma after *metabolês* with a stop.

**468**. 203,11: since 203,11-13 reproduces Arist. 241a32-b2, it is reasonable to accept Spengel's suggestion (for which he did not cite the Aristotelian source) and read after *auxêseôs* (203,11) <*kai phthiseôs. auxêseôs*> (separated by a colon) with Arist. 241a33. These words could have been omitted through homoioteleuton (the repetition of *auxêseôs*).

**469.** Arist. 241a32-b2 must refer to organic growth and decline, not to limits on natural processes achieved by, say, overeating and slimming down. As well as *Phys.* 1.4, 187b13-22, cited by Bostock (2), 281, cf. *PN* 479a30-b5, where the cycle of natural growth and decrease in the heart and lung is represented as an anatomo-physiological process, with the limit of decrease being death.

**470**. The specific references to animal and celestial motion are Themistius' insertion, reused at the end of the next argument too (203,22-3). Arist. 241b2-3 has just the generic claim that not all locomotion is between contraries.

**471.** 203,16: for 'from it to it' (*ap' autou eis auto*) read *aph' hautou eis hauto*; cf. *Phys.* 8.8, 264b18-19 and Themist. 231,24, where Schenkl's text needs the same change to convey the fact that circular motion doubles back on itself. Spengel, who proposed the emendation at 231,24, favoured emending here to *apo tautou eis tauto* ('from the same [point] to the same [point]'); cf. Arist. *Phys.* 227b15-16 and *Cael.* 271a20.

**472.** 203,16-23: something that can undergo the process of cutting achieves the state of being cut ('getting cut'); cf. 198,3-12 above on the same use of the aorist in this 'ingressive' sense. Cf. Arist. 241b8-10: 'So if something that moves were to undergo transformation into something, then it will also be possible for it to "get transformed" (aorist infinitive) [or "achieve a state of being transformed"]. Infinite motion precludes the distinction between a process and its achievement which is involved in all non-instantaneous change (cf. *Phys.* 6.6 above), since it has no limit into which something undergoing transformation can succeed in 'getting transformed'.

**473.** This impossibility is one in principle, i.e. where the contrary is necessarily true. Cf. Arist. *Metaph. Delta* 12, 1019b23-7 where the same example of the incommensurability of the diameter with the side of a square is also used.

**474**. 203,24: 'again and again' (*palin kai palin*; cf. *Phys.* 220b13) anticipates the upcoming reference to circular motion. This paragraph is a more emphatic statement than Aristotle's exploratory exercise.

**475**. 203,25-8: *allên men* (203,25) is balanced by *all'ou* (203,27); so delete the comma after *dunaton* (203,25) and place *hoion* – *kinêsis* (203,25-7) in brackets.

**476.** They differ in species; see *Phys.* 5.4, 227b23-228a1 (Themist. 175,5-14) above. At 203,28 I follow Ross' punctuation by placing a stop after *hapasôn*, and a comma after *mian*; cf. Arist. 241b18-20.

477. 203,29; for ton khronon read tôi khronôi (Arist. 241b19; Spengel).

**478.** Themistius does not look ahead to *Phys.* 8.7 and 8.8 (261a27-265a12) (contrast Simpl. *in Phys.* 1035.12) where this claim is sustained at length.

**479.** For studies of *Phys.* 7 see Manuwald (1) and Wardy. Themistius' selective and summary treatment of this book ('he does not maintain continuity', Simpl. *in Phys.* 1051,13) has been taken as evidence that it is 'an excressence on the main plan' of the *Physics* (Ross, 15), though abbreviation, even if not always this extreme, is integral to Themistius' method (see his *in An. Post.* 1,22-2,1). Ross, 13 suggested that at 204,16-205,2 Themistius may be reflecting the alternative version of *Phys.* 7 extant in the manuscripts, but perhaps unconvincingly (see Manuwald [1], 10 n. 28).

**480.** There is no comment on **ch. 1, 234b34-243a31** (cf. Simpl. *in Phys.* 1036,15-17 and 1051,9-13), the subject matter of which is addressed in *Phys.* 8.4-5 (see Ross, 15). *Phys.* 7.1 was the basis for a polemic, preserved only in Arabic, by Alexander of Aphrodisias against Galen in defence of the principle that all motion needed a mover; see Pines, and the translation by Rescher and Marmura. This work, probably an excursus in Alexander's commentary on 7.1 (Pines, 22) rather than a separate treatise, seems to have been known to Simplicius (see *in Phys.* 1039,13, with Hagen, 105 nn. 33-4), and perhaps also to Themistius, who elsewhere criticized, probably via Alexander, Galen's ideas on place, void and time (see his *in Phys.* 114,7-116,9; 144,23-145,2; 149,4-19, with Todd [6] *ad loc.*).

**481**. Omitted is **243a35-40** (there is no text corresponding to 243a1-10) in which Aristotle says that he is beginning his account with locomotion (*phora*) since it has priority among changes, a thesis fully developed in *Phys.* 8.7. Cf., however, Arist. *Phys.* 7.1, 242b59-62: 'if that which produces motion primarily with respect to place, i.e. bodily motion, is necessarily either in contact with or

continuous with what is moved, as we see with all [bodies], then it is necessary that things that are moved and that produce motion be continuous and in contact with one another, so that a single thing comes to be from them' (my translation). 7.2, 243a32-5, which Themistius reproduces, picks up on this claim by referring to the cause of motion and the object that is moved as being 'together' (*hama*), i.e. in contact, with their extremities together, without, as in the case of continuity, being one (cf. 173,25-30 above on *Phys.* 5.3, 227a21-3).

**482**. 204,3: for *huph' heautou* read *huph' heautôn*; cf. *en heautois* later in this line and Simpl. *in Phys.* 1049,9.

483. Simpl. in Phys. 1049,6-8 identifies this motion with that of animals.

**484**. 204,5: for *phoran* read *kinêsin* so that the shift from claims about change to the specific case of locomotion is accomplished, as at Arist. 243a36, without using the tautologous expression *tên kata topon phoran*, 'locomotion with respect to place'.

485. The analysis of the various dynamic processes  $(243b3\hbox{-}244a4$  and  $244a7\hbox{-}14)$  is omitted.

486. cf. 234,10 below for this tetrad in an analysis of projectile motion.

**487.** 'Pressure' (*rhumê*, 204,10) is not in the Aristotelian text. It can be used of a missile projected with additional force to reach a greater velocity; see Cleomedes, *Meteora* 2.1.149. On projectile motion see *Phys.* 8.10, 266b27-267a21, especially 267a12-16 with Themist. 234,27-235,12 below. Simpl. *in Phys.* 1049,28-1050,9 anticipates this later account in addressing the present text.

**488**. 204,9-10: this is a corrupt version of Arist. 243a20-b2, 'throwing exists when [the cause of motion] produces the motion derived from it as stronger than the natural motion [of the object moved]'. My *ad hoc* text is created by deleting *autou men ouk epakolouthountos*, the residue of Aristotle's descriptions of two types of pushing at 243a18-20 (see on 235,19-20 below), which identifies the way that a cause of motion does or does not 'follow along' after the initial impulse (cf. Simpl. *in Phys.* 1049,18-24). Also *sphodroteras* (204,10) is transposed to follow *genêtai* and emended to *sphodrotera* to provide a comparative adjective on which *tês kata tên phusin kinêseôs* can depend (cf. Arist. 243a20-b2).

**489**. 204,12: before *ôthounta* supply *ton* (Spengel).

**490**. This argument for nothing (reading *ouden* at 204,14) being in between what alters and what receives alteration is severely epitomized; the contrast between animate and inanimate things at **244b12-15** is postponed to the end of the chapter (205,9-11), and **244b15-245a5**, on the different awareness of change in living and inanimate things, omitted.

**491**. cf. 173,25-6 on *Phys*. 5.3, 227a7 above on contact as the extremities being together.

**492**. 204,16: for *ta aisthêta* read *ta alloioumena*; cf. Arist. 245a3 and Simpl. *in Phys.* 1058,10.

**493**. These coordinated lists (*sustoikha*) involve sets of opposites listed in a column; see Ross on *Phys.* 201b25.

**494.** At Arist. 245a5 air is said to be continuous with the final agent of alteration (*to eskhaton alloioun*, 245a4). Ross thinks that only the sense of touch is intended with particular reference to 'the awareness ... of the heat or coldness of distant objects', as Simpl. *in Phys.* 1060,10-12 says; cf. Philop. *in Phys.* 875,29-32. If Themistius is making the same point, it is in a compressed form when he says that the body of a perceiver has contact with fire via air.

**495**. Smell and taste being together means having *direct* contact with the object of perception (cf. Arist. DA 421a19 and 422a8-10) rather than perception through a *medium*; on touch, where an intervening medium is involved (DA 422b34-423a17), see 206,19-21 below.

**496.** 205,9: before *tou phthinontos* supply *tinos*; cf. Arist. 245a14. It is 'something belonging to the decreasing thing' that departs, not the decreasing thing itself.

**497**. 205,9: for *apontos* read *apiontos* (Karl Schenkl [1827-1900], H. Schenkl's father); cf. 216,2 and 8 (bis) below for the same verb used to describe decrease. **498**. The conclusion at **245a16-245b2** is omitted.

**499.** Wardy, 152-251 discusses the extent to which this chapter presents a notion of the higher order properties supervening on lower order ones; see also Berryman (3), 66-8 and Verbeke (1) and (2).

**500**. Arist. 245b4-5 says that alteration is in just those things 'said to be affected *per se* by perceptible things'.

**501**. cf. Simpl. *in Phys.* 1063,26-9 where imposed shapes are said to have a nature intermediary between things that come into being and those that are altered, but incline more to the former since they do not retain the same name. Arist. 246a3-4, however, refers to the 'comings into being' (*geneseis*) of shapes, without fine-tuning the distinction between this process and coming into being proper; see further Wardy, 180-209.

**502.** 205,24: for  $ei\hat{e}$  read  $\hat{e}i$  (Spengel), the subjunctive required for this indefinite relative clause. For the phrase 'underlying nature' see *Phys.* 1.7, 191a8.

**503.** 205,30: for alloiousthai to read to alloiousthai. 'Altered' is in quotation marks since matter is not altered when things come into being except in an extended sense, implied by 'special condition' (*hairesis*, 205,30; cf. LSJ, II.4). For alteration and coming to be as distinct see Arist., *GC* 1.4, and *Phys.* 5.1, 225a12-34 (Themist. 168,6-169,23) above.

**504**. An amphora is a large pot used to carry wine; for a line drawing of one see Todd (6), 7.

505. 206,9: for legei read legoi (Spengel) in this conditional.

**506**. This is a section heading rather than a paraphrase. For proportion and disproportion in connection with the moral virtues see Arist. *NE* 2.2, 1104a11-27. The impossibility of alteration in relatives is a corollary of *Phys.* 5.2, 225b11-13 (cf. Themist. 170,20-30 above) where it shown that change does not occur for relatives.

**507**. 'Ways of apprehending' (*lêpseis*); *antilêpsis* is more often used in later Greek for activities of perception and thinking.

**508**. Arist. 247b5-7 is rephrased here in more emphatically genetic terms; cf. Arist. An. Post. 2.19 (esp. 100a3-5) with Themist. in An. Post. 63,2-65,10. Cf. 'amassed' (athroizesthai, 206,15) here with Themist. in An. Post. 63,20 and 29. Cf. also Themist. in DA 95,9-34 for a related paraphrase of Arist. DA 3.4, 429b5-9. In general, Themistius followed Alexander in reading the present passage as involving induction from particulars; see Simpl. in Phys. 1075,4-5 and Hagen, 118 n. 265.

**509**. The plural *autois* (206,17) must refer to the activity of the intellect as a set of activities.

**510**. Themistius' comments on contact are provoked by Arist. 247b7-9; see Themist. *in DA* 72,37-73,1 (on *DA* 2.11, 422b34-423a2) on the simultaneity of touch and its objects, and cf. 197,18-19 above with the note *ad loc*.

**511.** Unlike Arist. **247b11-13** Themistius does not emphasize that knowledge and its acquisition is a state of rest, and omits comment on Arist. **247b13-248a6**, which identifies states of unrest (sleep; inebriation; an immature mentality) that impede learning, or the exercise of acquired learning, both of which are nonetheless not cases of coming to be. He also passes over the conclusion at **248a6-9**.

512. This further clause is Themistius' addition; see Wardy, 264, with n. 2.

**513**. 206,25: after *hapasôn* delete the colon; place the question ti gar - phoras in brackets.

**514**. 'Sharp' (cf. Arist. 248b7) is not used synonymously (i.e. *is* used homonymously) in these cases, or when it is applied to an alteration and a case of locomotion (cf. Arist. 248b10-12). Cf. *Phys.* 5.4, 228b28-30 (Themist. 177,4-8) above where in the discussion of the identity of a change, slow and fast are said *not* to pick out species since they apply to all forms of change. The subsequent discussion of non-synonymy at **248b12-249a8** as possibly not the only criterion that excludes comparability is omitted.

**515.** This paragraph is an attempt to synthesize the rest of the chapter around the trichotomy of changes identified in Book 5. A detailed discussion of the incomparability of alterations in terms of speed (**249a29-b19**) is omitted, and no attention given to a similar discussion regarding coming to be and ceasing to be (**249b19-26**). Themistius' general point is that comparability in terms of speed would misrepresent changes by identifying their genus at the expense of specific differences. Thus, to use Aristotle's example at 249a11-13, rectilinear and circular motion would be indistinguishable if compared only with reference to speed.

**516**. 206,31: *phoras – toioutôn* is placed within dashes, with *neuseôs, ptêseôs, badiseôs* bracketed within it, to identify more clearly the three species of change. Alteration (*alloiôsis*) (Arist. 249a10) is not explicitly identified except through the phrase 'chilling and the like'.

**517**. For these three activities used to exemplify the motion of animals see Arist. *PA* 1.1, 639b2-3.

**518**. Themistius is addressing the issue of the same thing undergoing different changes in the same time period: e.g. in time t half of X turns red, and the other half moves a given distance (cf. 249a9-11). Are the alteration and locomotion here identical? No, says Aristotle; there are two different changes, which if defined by duration alone are not generically identical. But if X's two halves *both* turn red, then these two changes do belong to the same genus (i.e. change) because they are synonymous, whereas co-temporal alteration and locomotion are in various ways (cf. 249a23-5) only homonymously changes; they have 'something in common' without being 'comparable'.

**519**. On this chapter see Hussey, 215-20, Kouremenos (1), Owen (3), and Wardy, 300-36.

520. This discursive analysis replaces the demonstration at Arist. 249b30-250a15.

**521.** 207,14: for *sumbainei* read *sumbainoi* (Spengel). Schenkl refers in his apparatus criticus to his *index verborum* under *an* where he classifies this case as one in which *an* modifies the infinitive *kinein* at the end of the clause, but its proximity to *sumbainei* justifies changing this indicative to a potential optative.

**522.** 'Distance' (*diastêma*) rather than 'space' (*topos*) (207,15) might have been expected here.

**523.** 207,15: *paradoxon*, if an adverbial form equivalent to *para doxan*, is unparalleled, and it can hardly be a contrasting modifier balancing *ison* with *topon*. One would expect *ison men* to be balanced by *anison de*, and I have adopted that reading on the hypothesis that *paradoxon* was originally a reader's response to the idea of one person replicating proportionately the action of a plurality and then later replaced the correct reading. The 'unequal space' here would be less than 1/50th of a stade, to use the example in (c) above, and as such not equal to the distance required by strict proportioning.

524. The weight represented by a talent depending on the different system

used ranges between 250 and 370 kilograms. The world record for weightlifting in the strongest class (165 kg) in the clean-and-jerk is currently 263.5 kg (= 589.9 lb).

**525**. 207,18: for *autôn* read *autôi* (*sc. tôi kinêtôi*); cf. 206,24 for the dative case used with the positive form of this adjective.

**526**. 207,19: the qualified metaphors reflect the fact that the verbs in question can refer both to numerical and physical relations:  $h\hat{e}ttasthai$  which means diminished or defeated, and *isazein* which means being equal to a task as well as numerically equal.

**527**. For this example, probably derived from the assaying of coins, see 216,4-5 below (on *Phys.* 8.3, 253b14-23) and cf. Simpl. *in Phys.* 1197,21-2.

**528**. Measures are given in multiples of the minimal unit, the finger's breadth or 'digit' (*daktulos*) (approx. 0.7 of an inch); i.e. 4 digits = a *palaistês* (a palm's length),  $24 = a p\hat{e}khus$  (the length from finger-tips to elbow). See further the Greek-English index under *daktulos*.

**529**. 207,27: for *oude*  $p\hat{e}$  read *oudepô* (an untranslatable 'not yet' anticipating 'until' and meaning jointly 'only when') (MSS **SL**), and delete the second *oude*.

**530**. 207,28: for *tou tripêkhuaiou* read *tôi tripêkhuaiôi* (Spengel); *tripêkhuaios* = 3 *pêkheis* = 72 digits.

**531**. 207,30: for *proselthon*, *ho ti* (Schenkl) read the simpler solution proposed by Spengel, *ho proselthon*.

**532**. 207,31: *neôs* ('of a ship') can be deleted as a gloss from the otherwise ambiguous phrase *epi de tês neôs neôlkias*; the noun *neôlkia* can apply only to the beaching of a ship. See 216,2 below.

**533.** The definite article here probably implies a quotation, though it could form an abstract noun, which might be translated as 'minimal marginality' (see n. 536). For this use of *para* to indicate marginal quantities in either the direction of increase or decrease see LSJ, *para*, C.III.6.

**534.** 207,33: 'crop up' (*anakuptein*) (cf. Plat. *Theaetet.* 171D1 and *Phaed.* 109D-E, remotely echoed at Themist. *Or.* 20, p. 14,18 Downey-Norman; add to the references at Penella, 60 n. 20); the metaphor is that of a head emerging above a threshold, and, as such, fits well the idea of a major difference being made by a minuscule addition.

**535.** 207,33: transpose *kathaper* to precede *kai ho sôritês* (proposed by a reader); clearly the comparison here is with the general application of the sorites argument, not with examples of its application.

**536**. The force of 'just as' (*kathaper*, 207,33) does not imply a direct analogy. In the cases of ship-hauling and tipping the balance there is a *practical* unpredictability about how much extra force will produce the desired result, which Hussey, 219, calls the 'threshold proviso', and to which Themistius is sensitive (cf. 207,19 and 22). In the sorites argument, to use Themistius' own examples, it is in principle impossible to determine the point at which we can definitively call someone rich rather than poor, or bald rather than hirsute, because it is possible to claim at each stage of an ongoing series of additions (of money) or subtractions (of hair) that the concept in question is not applicable because of being 'within a little' (para mikron), i.e. always minimally less that the required total (see n. 533). The sorites ('Heaper'), named for the heap that could be the object of uncertain, or vague definition, originated with Eubulides of Miletus (fourth century BC) (whom Themistius may be referring to in an Arabic work on logic attributed to him [see Badawi, 180], and also mentions en passant as a critic of Aristotle at Or. 23, vol. 2, 79,9 Downey-Norman). For discussions see Döring 111-12, Sedley, 89-95, Barnes, and Burnyeat. Simpl. in Phys. 1197,35-7 mentions it in commenting on the superficially related question
(Arist. *Phys.* 8.3, 253b14-23) of whether a single water drop will wear away a rock in proportion to the attrition caused by a large number of drops. As Barnes, 39 n. 43 notes, this may indicate that the entirely distinct puzzle of whether minuscule (or microscopic) causality could be identified proportionately had been loosely assimilated, as it easily could be, to the sorites. Themistius' comparison of this argument to the issue of the 'threshold' in mechanical kinetics seems to be in the same vein. His interest in the sorites has a precedent in a text attributed to Alexander of Aphrodisias, Fr. 1, ed. Vitelli, translated at Sharples (3), 90-2; its content overlaps in several places with the relevant material in the present context, though it is not an exceptical exercise.

**537**. For baldness see Diog. Laert. 2,108 (F64 Döring), in a report of Eubulides as the author of the sorites; and for indeterminacy in the notions of wealth and poverty, see Cic. *Acad.* 2.92.

**538.** 208,1: the particle opening this sentence, *oukoun*, should be accented paroxytonically to allow it to introduce a negative statement, instead of, as in Schenkl's text, as a perispomenon, which creates a positive sense. At this point in the argument it is *not* remarkable that individuals are less powerful than groups (cf. 207,16 and 20 above), and the next sentence explains why.

**539**. 208,4: before *hekastou* supply *tou ex* to make this expression depend on *allos* as a comparative (see LSJ, *allos* III.2) and to anticipate its reappearance in the next clause (*to ex hekastou* at 208,4-5).

**540**. 'They are in a way manifest' (*emphainetai ge pôs*, 208,4) seems to be an admission that we cannot totally discount an ineffective individual whose actions are cancelled out when separated from a group, since we can at least observe them.

541. 208,5: after *hekastou* replace the comma with a stop; for *te* read *de*.

542. 208,5: for *pleiô* read *pleiôn* (Spengel) to agree with *dunamis*.

**543.** 250a19-22 = Zeno, DK 29A29. Simpl. *in Phys.* 1108,18-28 (see Wardy, 319-20 and nn. 29-30) reports that Zeno's argument was directed against Protagoras to show 'that our reflective beliefs sometimes conflict with the evidence of our senses – a highly effective refutation of Protagoras' doctrine that the truth for anybody is whatever seems to him to be the case, where "seems" applies indifferently to both sensation and judgement' (Sedley, 112 n. 85). Whether Zeno wrote the dialogue with Protagoras that Simplicius mentions is questionable; see Hagen, 90 n. 448.

544. A *medimnos* was a medium-sized corn-measure, often translated 'bushel'.

**545**. For the case of the eroding water drops see below *Phys.* 8.3, 253b14-23 (Themist. 215,22-216,2 below), where Aristotle (253b18) associates it with the case used just above of the manual power needed to haul a ship.

**546.** The verb used here, *suntemakhizesthai*, is not in LSJ, and is a *hapax legomenon*, as confirmed by a *TLG* word search. Cf. also the rare uncompounded form at Themist. *in An. Post.* 14,7, and the Platonic noun, *temakhion* used at *Symp.* 191E7 to describe the separation of bipartite proto-men in Aristophanes' myth (cf. Themist. *Or.* 26, 148,8 Downey-Norman). For another Themistian coinage based on Plato see Todd (4).

**547**. Aristotle refers to *two* movers of equal weights combining forces to move twice the weight an identical distance in the same time. Schenkl (app. crit. *ad* 208,12) identifies 208,12-30 as Themistius' own contribution ('Themistii sunt'), but 208,12-19 is also an alternative to the Aristotelian example, whereby proportionality (*analogon*) is trivially maintained (250a28). By not retaining Aristotle's simple proportion, Themistius opens up the possibility that when the forces combined are great in number then the collective capacity for motion will

not increase just in direct additive proportion but in some form of exponentiality, grounded in group psychology (208,16-19), or analogous to geometrical progression (208,23-4).

**548**. 208,17-18: I have translated the key idea here, which is conveyed by *dunameôs epigenomenês meizonos* (208,18), and have omitted *thermês – kai*, the residue presumably of a statement that anticipated the description of increased equine temperature identified by *ekthermainomenôn* (208,18).

**549**. These final two paragraphs represent Themistius' own elaborations. He omits comment on the conclusion, **250a28-b7**, where Aristotle deals programmatically with proportionality in cases of alteration and increase.

550. 208,20: before baros supply to (Spengel).

**551**. 208,19-21: two contrasting leading questions have been created here by placing question marks after *pherein* (20) and *alêthes* (21), and transposing  $m\hat{e}$  (20) to precede *anankaion* (21). This reflects a reader's suggestion.

552. 208,23: for *sumbainein* read *sumbainei* (Spengel).

**553**. 208,23: *tois dia pollou*, taken spatially (see LSJ, *polus* IV.1) refers to constructions where extensive space is involved because of the multiplication of size described below.

**554.** That is, the power of a collectivity is not the sum of the powers of its members but a total augmented analogously to the quadrupling of a double power in geometry presumably by constructing a square on double the side of a smaller square such that the augmented square is four times as large as that of the original one. Since Plat. *Men.* 82E14-83B8 has such a construction as a false start in the slave boy's conversation with Socrates, it may well be what Themistius has in mind.

 ${\bf 555.}$  cf. Arist. Cael. 4.6, 313a14-15 for the principle that shape causes not motion itself but faster and slower motion.

**556.** At the outset (204,2-3 *ad* 243a11-12) self-motion and forced motion were distinguished, without self-motion being linked with that of living things (as often in Book 8). Now the self-motion of inanimate objects due to sphericity is identified, though in principle such objects cannot be self-moving (see *Phys.* 8.4, 255a5-13 with Themist. 218,2-13). What they have is a quasi-self-motion, 'quasi' glossing *hoion* used here at 208,27 with *hodopoieitai* to convey how motion is facilitated by sphericity, as it does later with 'self-moved' (*autokinêtos*) at 235,8 below when air is described as facilitating projectile motion.

**557.** On why spherical (and circular) objects are easily moved see Ps.-Arist. *Mech.* 8, where at 851b21-3 they are said to be in contact with the ground minimally (the justification for my supplement here) and so experience no friction. 'Stationary' (*bebêkos*) reflect the geometrical use of this verb (see LSJ, *bainô*, A.2.b) to refer to something 'standing' on a line.

**558**. 208,27: after *haptomenon* delete the comma; after *hoion* delete *gar* (MSS **SL**).

**559.** The most easily moved non-spherical object would be a circular one, such as a wheel, which is also analyzed at Ps.-Arist. *Mech.* 8.

**560**. Anaxagoras of Clazomenae (*c*. 500-428 BC), here paraphrased in terms that primarily reflect Anaxagoras at DK 59A12-13.

**561**. Empedocles of Acragas (c. 492-432 BC).

**562**. For the phrase 'in alternation' (*en merei*) see the Empedoclean fragments at DK 31B17, line 29, and, 31B26, line 1, though Themistius undoubtedly inherited it from Aristotle.

**563**. 209,19: for  $sunag\hat{e}i$  read  $poi\hat{e}i$  (cf. Arist. 250b28). Themistius has turned reported speech at 250b26-7 into direct speech by using *poiei* (209,17) to describe what causes the alternation of change and rest, before going on to

specify how this occurs in Empedocles' system. He then says that Love 'congregates' (*sunagêi*) things from many into one, without providing a verb to describe Strife's action in the opposite direction. Arist. *Metaph*. 1.4, 985a23-9 makes *Love*'s action separative, Strife's aggregative, with *diakrinein* and *sunkrinein* as the respective verbs. Rather than try and reflect this language here, I have replaced *sunagêi*, with *poiêi* on which it was probably a misguided gloss.

**564.** Simpl. *in Phys.* 1125,22.4 = Themist. 209,19-20; he notes (1125,15-22) that Themistius takes Aristotle to be claiming that there is a period of rest at the culmination of each of Empedocles' cosmic cycles as a prelude to further change. On Aristotle's reading of Empedocles, whom he quotes as 250b30-251a3 (= DK 31B26, lines 8-12), see Bollack, 127-36 and O'Brien, 252-61.

565. 209,20: for sunekhôs read sunekhês.

566. Themistius' gloss here is used by Ross, 429.

**567**. In Bk. 6 of his *Against Aristotle on the Eternity of the World* Philoponus criticized the arguments at Arist. 251a9-252a5 that are paraphrased here, and Simplicius responded in his commentary on the *Physics*; see Wildberg, 122-43.

**568**. cf. *Phys.* 3.2, 202a7-8, followed to the letter here; contrast 166,8-9 above. **569**. 'Objects' (*pragmata*) is Aristotle's term (251a11) for the entities on which change depends.

**570**. 210,7-8: 'locomotion' corresponds to *phora* and *pheresthai* with *kata topon* (210,7-8; cf. Arist. 251a14-15), literally, 'motion/to move with respect to place'.

571. 210,13: after kinêsis delete the comma.

**572.** 210,13: after *pragmasi* replace the comma with a colon to precede the direct question that follows; cf. 210,30 below.

573. 210,15: for eskhon read eskhen (Spengel).

**574.** In other words, this argument does not conflict with that of Book 5 where 'change' (*kinêsis*) was reserved for changes in quality, quantity and place, with coming to be and ceasing to be classified as separate kinds of transformation; see  $225a25\cdot34$  with Themist. 169,18-23. But in that context things were not envisaged as coming into being for the first time, as change is in the theory under attack here.

575. See 210,3 and 210,6-9 above.

**576.** 210,26: for Schenkl's lacuna supply *hexei pantôs* (MSS **CSL**) to have a verb modified by *epitêdeiôs*. Angle brackets are used here only out of deference to Schenkl's text since the lacuna reflects Schenkl's view that the 'missing' verb had to be in the second-person singular to complement *didôs* in line 24.

**577**. 'Suitably' (*epitêdeiôs*), i.e. in potentiality; cf. 220,5 below where *dunamis* and *epitêdeiotês* are conjoined; see Todd (1).

**578**. 210,30: after *homoiôs* replace the comma with a colon before this direct question; cf. the revised punctuation at 210,13 above.

**579.** 210,32: supply *an* with  $\hat{e}n$  in the apodosis of this (present) contrary to fact conditional; see on 179,10-11 above, and cf. 202,13-14, where the word order suggests that *an* should be placed after *houtôs*; cf. also 173,3; 202,17; 232,26.

**580**. **251a28-b1** is omitted; it is a digression in which Aristotle makes a secondary distinction regarding the way that changes are caused singly and doubly.

**581**. 210,34: for *arkhetai* read *arkhetô* (MSS **SL**); cf. *proüparkhetô* in the preceding sentence.

**582.** 211,1-2: delete the colon after *hupothesis* and place the question *ti* gar – *ou* in brackets, followed by a comma, to clarify the contrast between the *men/de* clauses at 210,35 and 211,2.

**583**. 211,5: for *êremein* read *kinein* (a marginal reading in MSS **L** and Par. 1888).

**584.** A reader, with perhaps *Phys.* 7 in mind, raised the question of whether this argument rests on the general assumption that there must be contact between what causes change and what is acted on (articulated at 220,28-9 below on the basis of 7.1, 242b62-3). However, given the programmatic nature of the present argument, to inject so specific a principle is beside the point when the concession forced here is in terms of time: i.e. that change must be caused by a *prior* interaction of some undefined sort between changer and changed.

**585.** See *Phys.* 4.12, e.g. 220b14-19 (Themist. 153,10-14). Themistius omits Arist. **251b12-13**, a reference to the earlier definition (cf. *Phys.* 4.14, 223a29-b12) of time as 'the number of change, or a change'.

**586.** cf. the Sceptics' argument against 'ungenerated' time at Sext. Emp. *Pyrrh. Hyp.* 3.149: that time comes into being either 'in itself' or at a different time; if in itself, then time *both* comes into being (for the first time) *and* already exists, since it is coming from itself.

**587**. See Plat. *Tim.* 38B6. Themistius has not retained the close reflection of this text at Arist. 251b18, where it is conjoined with an equally close echo of *Tim.* 28B1 and B7; see Renehan, 141-2.

**588**. Democritus of Abdera (uncertain dates; *c*. 460s-350s BC), the main instigator of Atomism after its foundation by Leucippus (fl. *c*. 430s BC). Arist. 251b15-17 (paraphrased here) = DK 68A71.

**589.** 211,32: to reflect the aposiopesis created by the unanswered *men* (211,30) replace the stop after *einai* with a dash.

**590.** 211,35: delete *en khronôi* ('in time' or 'in a time period') as a gloss on *nun* ('now'). This predication of time cannot include a reference to time, but only to the two markers, earlier and now, used throughout this chapter. Also, given the reference to 'the now' at 212,1 as the terminus of the past and the beginning of the future, this addition would be misguided.

591. See Phys. 6.3, 234a3-24 with Themist. 189,31-190,28 above.

**592.** 212,5: for *tou nun* read *to nun* (MS Laur. 85,14; Spengel). One has to think of *the now* together with (*sun-epinoein*) change, not of *the changing now* (as *tou* would entail by complementing *ginomenou*); along with it there would be nothing to think of. This is the prelude needed for thinking of the now as the end of the past and beginning of the future, i.e. with a time period on both sides of it and an earlier time limited by the now.

593. See 211,23-4 above.

**594**. This sentence encapsulates a much lengthier critique of Empedocles at Arist. **252a19-32**.

**595**. This is Themistius' epithet; the adjective for slow, *bradus*, can, as in English, be used both literally and figuratively.

**596.** Aristotle deals more summarily with Anaxagoras, offering a brief reference at 252a10-11 and no explicit critique. Themistius makes the inexplicability of the Anaxagorean Mind's initiating change a prelude to claiming that there is no rational explanation for infinite rest ending and the universe beginning, an argument that Sorabji (1), 233 calls the 'Why not sooner?' argument (literally 'why not more quickly [*thatton*]?' in this text) against a beginning for the universe.

**597.** Themistius adds this comment, implying that if there is no ratio or ordering, then only one of the two states that can be put into a temporal framework, i.e, eternal change or eternal rest, can be identified. Both will be addressed in *Phys.* 8.3 below.

598. That is, always in the same way.

**599.** Themistius omits Arist. **252a34**, a reference to Democritus as a proponent of the view that it is an adequate explanation of why things are so that

they are always so. Instead he enlarges on the class of unvarying natural phenomena (the earth and fire of 212,32) by adding a mathematical truth, which always exists 'in this way', *sc.* naturally, and where the *logos* and *arkhê* (212,34) are the rationale and source for such truth.

600. 213,3: after *aitia* delete the comma.

**601**. *proêgoumenôs* ('in a primary [or fundamental] way', 213,3) implies reference to first principles.

**602**. 213,10: while *eis* might be supplied before *apeiron* (cf. Arist. 252b12, 'but nothing is changed to infinity'), the text can stand; cf. *Phys.* 6.10, 241b10, where change is said not to be infinite, or here 'unlimited', to reflect 'limits' (*perata*) in the preceding line.

603. 213,12: before proteron supply to (Spengel).

**604**. 213,14: before *apsukha* supply *ta* (cf. 213,17).

**605**. 213,14-15: after *khronou* delete the comma; place *hoion – suntheta* in brackets followed by a comma.

**606.** 213,16: after *êremounta* replace the comma with a stop; the next sentence makes a new point in a succinct reflection of 252b17-21.

**607**. 213,17-18: invert *proteron autou* so that *proteron* precedes *kinoumenou*. **608**. 213,18: after *apodeiknusthai* replace the stop with a comma so that the coordinated *men/de* clauses referring to non-living and living things can form part of a continuous sentence.

**609**. Themistius omits **252b27-8**, where this statement is extended to cover to apeiron, which may mean an infinite universe (Ross, 690), or an indefinite source (Bostock at Waterfield, 288), both of which have been rejected earlier in the *Physics*.

610. 213,26: after oud' delete the comma and place it after sunekhês.

**611.** See below *Phys.* 8.8, especially 264b18-28 (Themist. 231,23-232,9); the insertion of a reference to turning back and the use of 'again and again' anticipate the discussion of discontinuous rectilinear motion in that later context.

**612**. 213,33: for *mête kinoumena* read *mêde proteron kinoumena* (proteron *mête kinoumena* MSS **CSL**).

613. 214,3: delete on (Spengel).

614. cf. Phys. 8.3 below, especially 216,31-217,6.

**615**. 214,12: after *genesthai* replace the colon with a question mark; i.e. follow Spengel in taking  $\hat{e}$  (214,10) as introducing a question rather than a statement. Schenkl's colon may be simply an error since he does not mention Spengel's punctuation.

616. Arist. 253a8 adds this ordinal clarification.

**617**. On the Aristotelian material see, for example, Furley (2), Nussbaum, 114-42 and Morison, and cf. 222,14-22 and 224,5-19 below. Themistius sees locomotion as a response to externally caused changes; cf. Berryman (1), 97 for a modern analogue: 'Aristotle's reason for calling animals self-movers is the simple fact that they, unlike inanimate things, are able to move locally in response to other kinds of change'.

618. 214,12: for oude read oute (Spengel).

**619.** 214,12: Arist. 253a9-10 has an animal at rest and then apparently walking without an external cause and identifies its external cause as 'perhaps the environment' (253a13); see Morison, 69 on this tentativeness, though Ross, 432 takes  $is\hat{os}$  ('perhaps') here to mean 'presumably [sc. what else?]'.

**620.** cf. Arist. *MA* 701b14-15 on expansion due to heat, and 701b28-32 on change of colour.

621. 214,16: reposition exôthen before endidontôn (Spengel).

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**622**. 214,17: 'surely also' (*isôs kai*) (214,17), not 'perhaps also' (see on 214,12), since Aristotle has to be claiming that his account *is* necessary, since animals are obviously recipients of external input. *isôs* can innocuously tone down rather than question a confident assertion, see Bekker, *Ind. Arist.* 347b33-9.

**623**. The antecedent of 'it' (*ekeinên*) here, as at Arist. 253a17-18, must be the combination of thought and desire, with the feminine singular form applying to a collective feminine singular consisting of these complementary components of practical reasoning; see Arist. *DA* 3.10, 433a17-20.

**624.** Self-caused change in animals is limited to locomotion at 214,14 above, but the passively received changes from outside are non-locomotive until the change caused by being heated creates the appetitive basis for locomotion towards fluid. Berryman (1), 93-6 argues that *pneuma*, as deployed by Aristotle in *MA* explains the process envisaged here. Themistius introduces *pneuma* into his paraphrase of the *DA* (see Todd [3], 194 n. 11), though not with reference to animal motion in *DA* 3.9-11 (unlike Alexander, *DA* 77,5-15).

**625**. On digestion, thought and perception during sleep see Arist. *Somn*. 457b20-458a10 or *Insomn*. ch. 3. Here Arist. 253a18-19 just describes in general terms non-perceptual change during sleep as the cause of waking up. Further on sleep see 224,14-18 below (on Arist. 259b12-13).

**626.** 214,25: before tôn toioutôn alloiôseôn supply ek. (The phrase seems gratuitous, since houtô, 'thus', links the cause of being awoken with the heating and chilling mentioned in the previous line.) Then delete the comma after alloiôseôn to allow tou diegeiresthai to depend on aitias as the action that is caused, with the prepositional phrase created here identifying the source of that cause. aitias with two dependent phrases, as in Schenkl's punctuation, is anyway unacceptably awkward.

**627**. See 214,6-10 above.

**628**. This paragraph is later recapitulated at Arist. **254a18-b4**, a concluding summary that Themistius omits from his paraphrase.

629. cf. 214,6-8 on 253a5-7 above.

**630.** 215,7: Arist. 253a31-2 just refers to 'the goal (*telos*) of the treatise (*pragmateia*)'. By adding 'of change' Themistius might be referring to the fact that *Physics* 5-8 was widely known as the 'On Change' (*peri kinêseôs*) (see, for example, Simpl. *in Phys.* 924,6-16; cf. 801,15-16; see also Introduction, n. 6), though Aristotle is probably only referring to the immediate discussion in Book 8, and, as Simpl. *in Phys.* 1193,35-1194,1, says, to establishing firmly the final item in this list.

**631**. The argument of this paragraph is revisited at Arist. **254a23-33**, which Themistius omits from his paraphrase.

632. See Phys. 1.2, 184b25-185a1 (Themist. 3,10-13).

**633.** 215,18: for homoiôs read homôs (Spengel) to complement kaiper (215,16).

**634.** 215,17: place  $kai - taut\hat{e}n$  in brackets since it is dependent on the main verb, 'define', rather than the secondary verb, 'speak of'.

**635**. 215,17-18: delete *eipein* (215,17); *haplôs eipein* ('indiscrimately') is an emendation in MS  $\mathbf{M}$ , which Schenkl had no justification for following when *haplôs* alone suffices.

**636.** Themistius unpacks Aristotle's laconic reference here to something 'in between' (*meson*) increase and decrease; cf. Ross *ad* 253a13-14: 'there is an intervening normal size at which growth ends and decay begins'. Themistius argues that unless this 'normal size' is maintained for some time before decrease starts, decrease will coincide with increase. Bostock (*ad* 253b14) rightly refers to *Phys.* 8.8 below for corroboration; see specifically 264b1-9 (Themist. 230,28-

231,10) for the argument that unless change is discontinuous contrary changes will occur simultaneously; cf. also *Phys.* 8.7, 261b7-22 (Themist. 227,12-21).

**637**. 215,22: for *oute* read *oude* to introduce the illustrations of discontinuous change at 215,22-216,2.

**638**. Schenkl (app. crit. at 215,22) raises the question of whether the verbs in this conditional need a subject, such as 'fig-tree' (cf. 215,26); perhaps, but impersonal forms are frequently used for processes and states of completion in Aristotelian discourse, and can, if necessary, be translated with generic subjects.

639. 215,23: for to read tôi to complement homoion.

**640**. See 208,8-9 above, where this example is cited in connection with Zeno's claim that submultiples will always cause changes in proportion to totals; cf. also Simpl. *in Phys.* 1197,35-7.

**641**. These 12 digits are represented in the text as a 'hand-span'  $(spitham\hat{e})$ , the distance between the thumb and little finger, about 5-6 inches in an adult male.

**642.** 215,27: for *diistêsi* read *diestêsen* (MS Laur. 85,14; Simpl. *in Phys.* 1197,10). The aorist is needed to depict the achievement of a state, and this tense takes over at 215,24-216,17 from the initial perfect passives (cf. *êuxêtai* at 215,22-3) to identify successfully completed action. On this 'ingressive' aorist see above on 198,3-12 and cf. 203,16-23.

**643**. 215,27: after *hoi* add *men* to create identical pairs of coordinated clauses (*hoi men/heis de*) at 215,27-30.

**644**. 'Launch' (*kathelkein*), or dragging a ship from land to sea; for this 100 men are needed, whereas 50 (216,2-3) manage to remove what is presumably the same ship from the water, with the latter perhaps providing more traction.

**645**. See Phys. 7.5, with Themist. 207,16 and 20-3 above for ship-hauling, the impossibility of subdividing mechanical effects proportionately, and the minimal addition needed to cross the threshold and produce the desired mechanical effect, as here at 216,2-4.

646. 215,30: after ekoilanen supply an; cf. an saleuseie at 215,28.

**647.** 216,2: for *epêlthe* ('was added') read *apêlthe* ('departed'); cf. *apienai* at 216,8 (= Arist. 253b23).

**648**. 216,2: delete *tôn* and change *holon* to *holôn*, thus aligning the ensuing prepositional phrase 'by means of all [the drops] of a given amount', *hupo tosônde holôn*, with Simpl. *in Phys.* 1197,19 (*hupo tôn holôn to holon aphêirethê*, 'the whole [entity] was removed by the whole set [of drops]'), a text that Schenkl noted but chose not to exploit.

649. 216,2: see on 207,31 above.

**650**. cf. *Phys.* 7.5 (Themist. 207,23-5) above. A drachma (six obols) is a small coin relative to a talent, and so represents the 'small change' that crosses the threshold needed to effect an imbalance.

**651**. 216,9: after *endekhetai* replace the comma with a stop; cf. Ross' punctuation at Arist. 253b23.

**652**. See *Phys.* 6.5, 236b5-9 (Themist. 195,28-31) (cf. also Themist. 193,15-16 with 235a18) for alteration as an incidentally divisible concomitant of an infinitely divisible object. For freezing as a paradigm case of such change see Arist. *Sens.* 447a1-3, where it is said to occur part by part. On instantaneous change see Themist. 191,30-192,22 and 197,1-8 above. Themistius' addendum, 'over the whole magnitude' (*eph' holou tou megethous*), reflects his view that instantaneous change involves all the parts of a thing changing *en masse* (see 192,19 and 197,2-3 for similar phrasing) as opposed to this happening part by part over time, as Alexander of Aphrodisias argued (see 197,4-5; cf. 192,2-10).

**653.** 216,14: for *metaballon* read the aorist participle *metabalon* to refer to the completed process that entails rest.

**654.** This is Aristotle's quite different point that *change* does not occur continuously in all three of its forms: thus a stone does not continuously change place, or get softer or rougher, or change in size. Aristotle illustrates change of place at 253b31-3 by saying that a stone's downward motion does not go unnoticed. Themistius substitutes a pillar of which neither the surface nor location undergoes continuous change.

655. 216,16: for sklêrous read sklêroterous (Arist. 253b31; Spengel).

**656.** 216,19: after *êremei* replace the colon with a question mark. Cf. Arist. 253b33-254a1: 'Again, earth and each of the other [elements] of necessity remain in their own places, but are moved from them by force. So if some of them are in their proper places, then necessarily it is also not the case that all things are changing with respect to place'. Themistius' negated statements have to be taken as leading questions; otherwise they would be expostulations at falsity. At 216,17 the case for interrogation would be strengthened if *kai* were emended, as on palaeographical grounds it could be, to  $\hat{e}$ .

**657**. 'Area' ( $kh\hat{o}ra$ , 216,21), often translated 'space'; it is Themistius' interjection to define the Earth's natural place in broader terms.

**658**. This aside condenses 254a8-10, an argument made with particular reference to increase, that forced change requires a state of rest from which to start. Ross on 254a9-10 reasonably argues that this is a reference back to 253b13-23 above on the need for a state.

**659.** 216,30: the supplement *aei kineitai oute panta* after *panta* is not, as Schenkl indicates, that of Spengel, who suggested inserting after *aei êremei* the supplement *oute panta aei kineitai*, which would yield, 'that neither are all things always at rest <nor are all things always changing>'. Schenkl rearranged Spengel's word order and positioned the clause before *aei êremei*.

**660**. **254a18-b4** is omitted; it recapitulates and in part repeats the opening paragraph, 253a22-32.

**661.** The cases of (*iii-a*), that the things that are changing are always changing, those at rest always at rest, and (*iii-b*), that all things are equally disposed to change and rest, are included in (*iii-c*), though separately both components of (*iii-a*) would be subject to the refutations of (*i*) and (*ii*), as would (*iii-b*), by being reducible to either (*i*) or (*ii*).

662. 217,3: for toutou read toutôn.

**663**. See *Phys.* 5.1, 224a21-34 (Themist. 165,2-16) above, the reference back being by Themistius, not Aristotle.

**664.** See Themist. 167,5-11 (on 224b26-8) above on incidental change; the multiplicity of change in part is not mentioned there, as here. The lack of a 'fixed dichotomy' ( $h\hat{o}rismen\hat{e}\ diairesis$ ) is because incidental and partial changes can overlap, as, for example, if an educated person's hands are chilled (to extrapolate from the example at 165,4-5 with 165,8-9 above).

**665.** The opening comments on change in general lead into a discussion of locomotion; later references (**255b12-13** and **255b21-4**) to changes in quality and quantity that conform to the analysis applied to locomotion are not addressed.

**666.** 217,19: place *en heautôi* – kinôseôs in brackets, with the colon preceding it removed; this allows the contrast between the animal and its body to emerge more clearly.

**667**. 217,27: remove the brackets from *heteron* – *kinoumenon*; place a stop after *kinoumenon*.

668. cf. Themist. 201,31-202,2 (ad 240b11) above.

**669**. 218,1: before *legetai* balance the adversative clause by supplying *ouk orthôs oun auto* (Schenkl).

**670.** 218,1: for *hup' autou* ('by it') read *huph' hautou* ('by itself') (Spengel; misreported by Schenkl as *huph' autou*) to produce the required contrast with the next clause.

**671**. Arist. **255a12-18** (an argument that a body defined as so homogeneous that a distinction cannot be made within it between what causes change and is changed cannot be self-changing) is omitted.

672. 218,4: for oud' read outh' (MSS CL).

673. 218,5: for oude read oute (Spengel).

**674**. 218,8: *allôs te* is an unorthodox opening for a sentence; I am expediently translating *all*' ('but'), since an adversative idea is needed.

**675.** 218,10: *sumbainei*, as a reader suggested, might invite emendation since *sunebainen an* would complete this present contrary to fact conditional grammatically and fit with *ekineito an* in the next clause, especially once the stop after *sumbainei* is deleted, as it must be. But the present indicative can appear in the apodosis of a counter-factual (cf. 212,13-14), and the future indicative does frequently do so in the apodoses of 'future less vivid' conditionals (see above 183,12-13, 184,29-31, and 185,24-6); emendation may not therefore be justified to yield the required sense.

**676**. 218,15-17: place *ou gar – exôthen* in brackets; delete the preceding colon and replace the one following it with a comma.

677. 218,25: after *kinôntai* place a comma.

**678.** 219,1: before *metaballein* supply *hoion te*; cf. 219,7 below (*ho poiêsas hoion te theôrein*). The cause here makes it *possible* for air to be fully transformed into fire (the reference of 'such' at 218,30) prior to causing the activity of upward motion, as in the subsequent analogy someone makes it possible for the learner to study actively (have unused knowledge; cf. 219,12) before causing the activity of employing that knowledge in active study.

**679**. A later reference to this analogy with the exercise of acquired knowledge at **255b22-3** is ignored *ad loc*. since it is comprehended by the present paragraph.

**680**. 219,5: 'studies actively' (*theôrein*), traditionally translated as 'contemplate', describes not a learning process (hence 'study' by itself is misleading), but active and creative intellectual engagement, in which a human being is just as self-expressive as an elementary body engaged in natural motion.

**681**. 219,6: for *ean* read *ei* (MSS **SL**); *ean* is not, as Schenkl implies in his *index verborum*, 247, justified by Themist. *in Phys.* 33,23, where the text is confused.

**682.** 219,8: for *to* read *tou*, so that the articular infinitive *tou anô pheresthai* can depend on *aitios* as *tês theôrias* does on the same word in the preceding clause.

**683.** The metaphor in *methorion* ('border-land') at 219,12 is Platonic. It is used by Themist. *in DA* 64,28 and 88,29; see Todd (3), 299 col. 1.

684. For this distinction see also Themist. in DA 95,9-21 (ad DA 429b5-9).

**685**. 219,15: for *metabalein* read *metaballein* (MSS **SL**); cf. 219,21 below. In both places the potentiality is that of undergoing the *process* of transformation; hence the present infinitive is needed.

686. 219,18: delete te (as did the Aldine edition).

**687.** 219,20: for  $k\hat{o}luoi$  read  $k\hat{o}luei$ ; clauses introduced by *eiper* invariably take the indicative.

**688**. 219,26: for *hup'autôn* read *huph'hautôn*; cf. 218,1 and 219,16 above, or 204,2-3 (= Arist. *Phys.* 7.2, 243a12) for the contrast 'by another thing'/by itself.

Themistius omits the reference at 255b14 to the destination of natural elemental motion being the element's 'proper place', since he has addressed it at 218,24-219,1.

689. 255b21-4 is omitted; it identifies the actualization of an acquired quality.

**690**. When a supporting pillar is removed a wall may collapse as an incidental consequence, while a stone that is removed from a submerged bladder causes the bladder to surface incidentally (assuming that the purpose of the exercise was to retrieve the stone rather than the bladder). On the use of submerged bladders (or wineskins) to extract fluid from containers presumably too large to allow pouring see Ps.-Arist. *Problemata* 25.8. The stone kept the bladder submerged while it was being filled.

**691**. 220,4-6: after *kinêsin* (220,6) replace the question mark with a stop;  $\hat{e}$  (220,4) introduces an answer, not *pace* Spengel and Schenkl, a further question, which would hardly be appropriate, even in rhetorical form, in a summary of the whole chapter.

692. 220,4: before kinêseôs add to.

**693.** 220,5: before *dunamin* delete *to*, and transpose *dunamin* to follow *ekhein*, and to serve as a doublet for *epitêdeiotêta* in an appositional phrase; the two are interchangeable in later Greek, notably among the Aristotelian commentators; see Todd (1).

**694.** In other words, the generalization that everything is changed by something (220,2-3) is not in conflict with something's having an internal source of change, since the latter involves a potentiality for being changed, a general rationale that Themistius offers in place of Aristotle's example (256a1-2) of light and heavy things being moved.

**695**. In this chapter Themistius chooses to highlight the issue of the 'unchanging' factor in the explanation of change rather than reflect the analysis of self-motion in its first part (256a4-257a33).

696. 220,8: delete gar (Spengel).

**697**. 'Without going on to be moved' reflects the logical use of *ouketi* (220,14; Arist. 256a8) to negate something that 'no longer' applies. Cf. Hardie/Gaye: 'in the man ... we have *reached* a mover [not moved by anything else]'. See the Greek-English index for further examples.

**698.** 220,8-12: after *kinoumenou* (9) remove the comma and place *hoion* – *kinoumenou* (9-11) in brackets, with the stop after *kinoumenou* (11) replaced by a comma and the stop after *arkhên* (12) by a colon.

**699**. 220,15-16: place *ekeinos* – *mokhlon* in brackets, deleting the colon before *ekeinos*, and placing a comma after *mokhlon*.

**700**. 220,16: for kinêsoi an read kinêseien an (MSS SL).

**701**. 220,21-2: after toiouton delete the colon; place ou gar - proeisin in brackets.

**702**. This summarizes 256b3-13.

**703.** cf. Simpl. *in Phys.* 1223,25-30, where the source of this argument is identified as *Phys.* 7.1, 242b53-243a2, of which it is a simplified version. It carries the prohibition on an infinite series of agents of change (256a17-19 and 28-9) a stage further by arguing that the sum of an infinite series of changes in finite time will be an infinitely large magnitude. The series envisaged will result in an *actual* infinite (cf. 242b66-7), in which changers and changed are in spatial contact and form a discontinuous set; and by not being continuous this magnitude cannot be subject to infinite division in potentiality.

704. As Schenkl noted, Themistius at this point goes straight to the later part

of the chapter, picking up the text, in effect, at 257a27. This omission of **256b13-257a27** (though 256b13-24 resurfaces at 222,23-223,6 below, and 256b24-7 at 223,11-12) is not connected with the report at Simpl. *in Phys.* 1224,26-35 of Alexander saying that certain unnamed individuals (not Alexander himself, as Schenkl says *ad* 220,29) wanted to relocate this text before 258a5. The structure of the text is a different issue from the selective paraphrasing in which Themistius is engaged. See also Manuwald (2), 31 n. 88.

**705**. 221,2-3: for *kai dedeiktai*, *h*ôs read *kai*, *h*ôs *dedeiktai*; cf. 226,9, and analogously 195,2; 200,12-13; and 211,24, for similar parentheses.

**706.** This Aristotelian reference indicates the general source for 221,7-223,6, a selective and synthesizing paraphrase of those arguments that exclude all forms of self-change except self-change as the action of an unchanging part in producing change in another part. Passages on infinite divisibility (**257a33-257b1**), on the demonstration of the distinction between an agent and object of change (**258a9-27**), and on the argument that their divisibility is not consequential (**258a27-b4**) are passed over.

**707.** 221,8: for *dunasthai* read *dunatai* (MSS C, Laur. 85,14); Spengel adopted this reading in his text, as Schenkl failed to record.

**708**. 221,10-16: Eudemus, as Schenkl noted, had drawn the distinctions that follow; see F118 Wehrli (= Simpl. *in Phys.* 1233,36-1234,3). Themistius' borrowing is not in Baltussen's 'Addenda Eudemea' (= Baltussen [2]) and Schenkl's *index nominum*, 270, also omits it. It establishes a wider framework for the prohibition at 257b2, 'that which itself makes itself change cannot itself make itself change everywhere', which is maintained at 221,24-222,1. Cf. 182,23-7 above for another latent reference to Eudemus.

**709**. At 221,24-222,1 below.

**710**. If a whole changes a part of itself, it will change the whole of that part, and thus the change in a part will be that of a whole changing a whole.

711. This final sentence is based on 257b2-6.

712. See Phys. 8.4, 255a20-33 (Themist. 218,18-219,5) above.

**713**. 222,3-4: place *hoion – psukhron* in brackets; replace the colon after *psukhron* with a comma.

**714**. 222,5: this supplement (Schenkl's) after to gar (i.e. thermainon energeiâi thermon, hôs to) ensures that the text reflects Arist. 257b9-15 in referring to both the actual agent of change (the heater that is hot) and the potential changeable (the cold thing that is heatable). This is the groundwork for the absurdity that the same whole (the self-mover that is both changer and changeable) is simultaneously hot and not-hot (Arist. 257b10-11), i.e. both actual and potential.

**715**. 222,6: the text ought to correspond to the Aristotelian argument against self-changing being the action of a whole on a whole. *autokinêton ekineito heauto* must be the residue of a more explicit apodosis, which can be recreated in part from Philoponus' scholium on 257b6 (*in Phys.* 834,20-1), to which Schenkl pointed. With *ekineito heauto* deleted, I translate the following *ad hoc* text: *ei de tauth' houtôs ekhei <kai> to <holon> autokinêton <kinei, kai to holon kinei-tai>.* The angle-bracketed words are from Philoponus, with the first *kai* substituted for *ei* so that the Themistius' protasis can be retained, and the Philoponus' protasis grafted onto it.

**716**. 222,7: for *pros to auto* read *kata tauto* (Spengel); cf. 222,9 in a parallel clause. The potentiality and actuality of the whole must exist with respect to the same thing, namely itself, and not in relation to anything.

717. This sentence reflects the conclusion at 258a5-8.

718. Themistius' addition is to a chapter in which, as Solmsen (2), 179 noted,

there is no reference to 'living beings' but instead an abstract argument that excludes the question of 'where in the physical world self-movers might be found'. 214,10-26 (*ad*  $8.2\ 253a7-21$ ) above is a prelude to this insertion, with its identical contrast between self-motion and the changes that occur during sleep. But this topic could have been left until *Phys.* 8.6, where it has the platform of an Aristotelian text (259b6-20; Themist. 224,5-19).

**719**. To create this new paragraph I am detaching this opening sentence from the preceding sentence only for expository purposes; it is part of an ongoing argument.

**720**. To maintain the continuity of the argument the translation has not been varied to distinguish locomotion from other changes.

**721.** 222,20: for to men hen hoti sôma read to men sôma hoti hen <kai sunekhes>. The body has to be the subject here, and the reference to it being continuous is essential if the remark in the parenthesis is to apply. The reference back is to *Phys.* 6.4-6, and the arguments linking change with infinite divisibility. For the complementary doublet 'one and continuous' see 173,28 (cf. Arist. 227a16); 175,13; 176,10, and cf. 228,10.

**722**. 222,21-3: after *eti* (21) replace the comma with a stop; start the new paragraph with *alla touto men*, with the stop after *logou* replaced by a comma.

 $\mathbf{723}.$  See Manuwald (2), 31 n. 88 on this reversal to an earlier omitted passage.

**724.** cf. the discussion of animal motion in ch. 6 (224,5-19); also cf. DA 3.9-12 where there are references to the 'unmoved' aspect of such motion (433b15), and the role of the heart (432b31), the palpitation of which is mentioned here (222,19).

**725**. 222,26: before *kineisthai* supply *<tou>* to yield complementary articular infinitives.

**726**. 223,1: after *duoin* delete the colon and let *hôs* respond to the proleptic *touti*.

**727** 223,2: for *ginesthai* (coni. Schenkl) read *einai* (MS Laur. 85,14; cf. Simpl. *in Phys.* 1227,22). The mixture in question is a 'combination' (cf. *sunkeitai*, 223,1) in which constituents are juxtaposed while retaining their original (*per se*) identity. Thus they both 'exist *per se*'; one of them cannot 'come into being *per se*' (whatever that would mean), as Schenkl's text would have it. So just as the honey *qua* honey acts on the wine *qua* wine, so the agent of change retains its identity in acting on the passive recipient, change being analogized here to the sweetening of a fluid.

728. See 220,31-2 above.

**729.** cf. Arist. 258b5-7: 'either that which is changed, and changed by something, stops *euthus* at that which is the first unchanging thing, or at that which is changed but produces change in, and stops, itself'. In the paraphrase the adverb transliterated here modifies the process of externally caused change and thus means 'directly' or 'immediately' (cf. 220,20 above), in a sense sustained by the alternative of a self-changing principle, which is necessarily divided and therefore produces change 'indirectly' as result of its inner activity. Aristotle, by contrast, uses *euthus* to refer to the way that change stops at its source: it 'leads straight to the first unmoved' (Hardie/Gaye; used by Ross, 441), or is 'referred directly back to the first unmoved mover' (Graham), which respectively emphasize directionality literally and figuratively, or cf. 'ends in immediate contact with a first member of the series which is unchanged' (Waterfield), which highlights the final result. Themistian paraphrasing has avoided any of the uncertainty evident in these translations.

**730**. Themistius, drawing here on Arist. 256b24-7, substitutes 'unchanging' for Aristotle's 'unaffected and unmixed' at 256b25.

731. 223,18: add a comma after ei tis bouletai; cf. Arist. 258b16 Ross.

**732**. 223,20: place  $hoion - amphisb\hat{e}toi\hat{e}$  in brackets, followed by a comma rather than a colon.

**733.** 223,21: for *ge pasas* read *pasas ge*; for *ge* intensifying quantitative adjectives see Denniston, 120.

**734.** Simpl. *in Phys.* 1253,6-7 reports that Alexander and Themistius had this variant reading for Arist. 258b31, instead of 'eternal of necessity'. Ross *ad loc.* adopts 'and' between these epithets.

**735**. 223,26: transpose tôn to precede arkhôn; i.e. read [tôn] phtheiromenôn toutôn <tôn> arkhôn.

**736**. 223,28-9: place the question  $kai - h\hat{e}de$  in brackets followed by a stop; it explains the sources being 'not together', i.e. being spatially dissociated (see 224,5 below and *Phys.* 5.3, 222b21-2).

**737.** 224,1: corruption probably arose here with a repetition of the governed words in *par'hekastên toutôn*, and continued with an attempt to create a clause to follow. Delete *hotan kai toutôn hekastên* and emend *genêtikên* to *genêtikê* (cf. Arist. 258b32-259a6). This will take the 'uninterrupted source' to be the cause that is generative of successive sources. Spengel considered emending to *hotan kai toutôn hekastê <êi>* (subjunctive) *genêtikê tôn ephexês tinos*, 'when also each of these [secondary sources] <is> generative of any of those that succeed it'. But this seems irrelevant when the emphasis is on the primary source of change.

**738**. **259a6-13**, a further rationale for there being a single unchanging source of change, is passed over, and Themistius begins with a reference to the preceding part of the chapter of which he has offered only a summary.

**739.** Having started by stating that there is something primary and eternal (259a20-1), Themistius takes the next clause (259a21-2), which recapitulates the 'starting-points' (*arkhai*) of the discussion (the options broached at *Phys.* 8.3, 253a22-30 above) as being about the 'sources' for change (see next note). He then skips to 259b6, where he picks up the discussion of change in animals that Aristotle had started at **259b2-3**. 259b6-20 is a key text in the modern debate on self-motion; see, Furley (2), Morison, 71-5 and Nussbaum, 118-21.

**740.** Arist. 259a21-2 has 'having looked at the sources of the things that produce change' (*epi tas arkhas tôn kinountôn*). Ross (on 259a21) wanted to delete *tôn kinountôn* as a gloss and take *arkhai* to refer to the starting-points of the argument rather than try and interpret it as referring to the souls of animals as causes of change, as did Simpl. *in Phys.* 1256,35-6. But Themistius, whom Ross does not cite, also read the textus receptus as referring to the sources of change in animals, though he does not specifically mention souls (contrast 222,16 above).

**741.** 224,8-14: a fundamental generalization (malista men, 224,8), is balanced by a concession (all' oun, 224,12) that that generalization has an exception. To maintain this syntactical structure delete the colon after topon (224,9), place hautê gar – trophês (224,9-12) in brackets, replace the stop after trophês with a comma, place legô – topon (224,13) in brackets, and end the sentence at egeirôntai (224,14) by replacing the comma with a stop.

**742**. 224,10: Arist. 259b9 has *hoion* preceding this triad of vegetative functions; in the paraphrase it can perhaps be left as implied.

**743**. At 224,14 Themistius changes the Aristotelian present passive participle *diakrinomenês* (259b13) into an aorist passive participle *diakritheisês*, thus altering the description of the conditions for waking up from 'while the food is being distributed' (lit. 'separated') to 'after the food has been distributed', which more accurately reflects the aetiology of waking at Arist. *Somn.* 458a10-25 (cf.

*diakrithêi* at *Somn*. 458a22), where blood of different density is distributed into different locations in the body following nutritive intake. Simpl. *in Phys.* 1258,23-4 has 'after digestion' (*meta tên pepsin*) (cf. *Somn*. 458a21-2), and 'residues [from food] (*perittômata*) being thinned out' (cf. *Somn*. 458a12, where the 'very thin' blood in the head, which has to be fully reconstituted before a sleeper can awaken, is identified).

**744**. *trophê* ('food') (224,16), but also the process of nutrition; cf. Arist. *Somn*. 457b1-20, which explains sleep both in terms of the food itself and the balance created between hot and cold as digestion develops within an organism.

**745**. There is no comment on the texts at **259b20-4** and **28-31**, which deal with the issues of incidental change in relation to there being a primary cause of continuous change.

746. This is a quotation from Phys. 8.1, 250b13-14.

**747.** The phrase 'in respect of its whole place' is Themistius' parsing of 259b26-8, which characterizes the stable self-containment of the universe. Cf. the discussion of the sense in which the universe is in place in *Phys.* 4.5, discussed at length by Themistius *ad loc.*; see Todd (6), 32-5.

**748.** See 224,4-5 above where temporally successive causes are said to preclude continuous change.

**749.** The paraphrase converts the single 'changed thing' (260a5-6) that produces varied changes because of its varying relation to its object into a two part agent, the heavens and the Sun, but grammatically it stays as a singular collective noun, and hence Spengel's simple emendation at 225,3-4 by which the approach and withdrawal were expressed in participles in the neuter (*prosion/apion*) rather than the masculine gender (*prosiôn/apiôn*) was apposite. The action in question is that of the composite subject, not just the Sun, as the simplifying change to the masculine gender conveyed. Themistius works up 'in opposite places' (Arist. 260a8-9), a description of the varying relation of this agent to things, into a programmatic description of seasonal change caused by the Sun's motion in the ecliptic. Cf. Simpl. *in Phys.* 1263,18-24 for a more precise version of the same account.

**750**. Arist. 260a11-12 refers to a problem raised 'at the beginning', i.e. at *Phys.* 8.3, 253a22-4, recapitulated here at **259a22-b5**, which Themistius omits.

**751**. Arist. 260a23-4 refers only to 'primary' motion, and he does not mention circular motion until the next chapter (261a27-9).

**752.** 225,14: *toinun* is superfluous given the presence of *ara* ('therefore') in this clause; it should therefore be deleted.

753. 225,16: delete te and for lekteon read skepteon (Arist. 260a21).

**754**. The reference is Aristotle's; see *Phys.* 5, 225b7-9, 226a16-17 (Themist. 171,17-18), and 226b8-9 (Themist. 172,12-13), where locomotion is not prioritized, as it is here.

**755**. 225,19: for *ontôs* (MSS **SL**) read *houtôs* (MSS **MC**). The claim here is that 'in this way', i.e. in the sense of being first, motion is naturally a necessary condition for all the other changes, not that it is 'really' or 'truly' impossible for other changes to exist by nature without motion.

**756**. 225,21-2: place the question  $p\hat{o}s - alloi\hat{o}theis\hat{e}s$  in brackets, removing the colon before  $p\hat{o}s$ ; this allows the question at 225,22-4 to respond to the opening statement (cf. *auxêsis men ... alloiôthênai de*).

**757**. 226,1: before *hôs* supply *phaneron*.

**758**. Themistius introduces Democritus here, and Simpl. *in Phys.* 1266,34 adds Anaxagoras and Empedocles (cf. also 265b19-26); see McKirahan, 163 n. 145 and cf. Arist. *GC* 1.1, 315b6-9 (at DK 67A9).

759. 'Not without' is Aristotle's equivalent for 'necessary condition'; so his

point is that locomotion is a necessary but not sufficient condition of the other changes.

**760**. 226,10-11: since a reference to locomotion is needed to prepare the way for the reference to change of place in line 12, supply *metabainein* (cf. 226,12) after to (line 11) to create an articular infinitive, with *loipon* equivalent to *leipetai* (cf. 216,31) and this infinitive the subject of *huparkhein*. Comments from a reader pointed in this direction.

**761**. 226,11: before gar supply men to anticipate de at the start of the next clause.

762. See 225,30-226,1 (ad 260b11-12) above.

**763.** The reasoning is elliptical in Aristotle and Themistius. Missing is the denial of the major premise, i.e. 'not all the things that change are generated or can cease to be', or, in other words, 'some things that change are ungenerated and eternal', as shown above (*Phys.* 8.6, 259b32-260a11; Themist. 224,25-225,5). See Simpl. *in Phys.* 1271,1-9, drawn on here.

**764.** 226,19: Arist. 261a9 has 'capable of ceasing to be' (*phtharta*), and if Themistius were just quoting him, *phtharta* would have been read for *genêta* in the commentator's text. But Themistius probably paraphrased by explication and wrote *genêta kai phtharta*, the reading adopted here; cf. Simpl. *in Phys.* 1271,7 and Philop. *in Phys.* 900,9-10.

**765**. This term does service for an Aristotelian periphrasis at 261a17 ('many kinds of animals'); on *zôiophuta* ('animated plants') see Ross on *Phys.* 261a17.

**766**. The reference is Aristotle's (261a29), which Ross thinks may be to *Phys.* 8.3, 253a29, but it would seem to be a general reference to *Phys.* 8.1-2.

**767.** 227,8: after *ex antikeimenôn* ('from opposites') supply *eis antikeimena* ('to opposites') (cf. Arist. 261a33), so that this expression can be reflected in the series that follows.

**768**. cf. with this paragraph 8.8, 230,28-231,10 below (on Arist. 264b1-9); and 8.3, 215,18-22 (on 253b13-14) above.

769. 227,13: delete mallon (Spengel; cf. Simpl. in Phys. 1274,17).

**770.** 227,14: delete *anankêi* (Schenkl), which is based on *an* being in this place in two manuscripts; but that must be a mistaken intrusion and without it Themistius' text can be left identical to that of Simpl. *in Phys.* 1274,18.

**771.** Coming into being and ceasing to be are not changes in the sense of qualified change defined earlier (i.e. change between opposites); see *Phys.* 5.1 above.

**772.** 227,24: after *êremia* delete *metaxu*; it is a gratuitous addition to this adversative clause given its presence in the preparatory statement.

**773.** 227,29: for genomenon (MSS **MC**) read ginomenon (MSS **SL**); the imperfect *proêiei* describes a process that only a present participle can complement. The conclusion at **261b24-6**, which extends the point made about coming to be and ceasing to be to the other changes, is omitted.

**774.** Themistius omits **262a8-10** where Aristotle notes that motions can be contrary even in a circle where two motions in contrary directions can obstruct one another; see Ross *ad loc*.

775. cf. Phys. 3.5, 205b31-4 with Ross on 205b33-4.

776. 228,9: for têi (dative) read tês (Schenkl).

**777.** 228,9-10: delete the question mark after *dunaton* (228,9) and move it to follow *loipai* (228,10), while placing *diapherei* – *loipai* in brackets.

**778.** cf. *Phys.* 5.4 (especially Themist. 175,5-24 *ad* 227b23-228a6) on the unity of a change in general. Arist. 262a1 refers back to this discussion and specifies the three components (object, time and matrix, or 'that in which') that must all be one; Themistius focuses on the matrix as the species (cf. *eidos* at Arist. 262a4) *qua* directional impulse.

**779.** Themistius' response to this text involves rationalizing the contrast between continuous and discontinuous motion, and the actuality of a stopping point as defining the latter. He reorders the Aristotelian material, and omits demonstrations at **262a26-263a1**.

**780**. This is Themistius' insertion, in anticipation of the case of turning back in circular motion discussed at 232,1-9 (on 264b24-8) below.

781. cf. with this parenthesis Arist. 262b26-8.

**782.** 228,26-8: place ouden - duo in brackets; delete the colon preceding it and replace the stop following it with a comma.

**783.** 228,33-229,1: after *meson* delete the comma; place *toutestin* – *peras* in brackets.

784. cf. Arist. 262a28-31.

**785**. 229,8: for *ep'autou* read *ap'autou*.

**786.** 229,14-15: faced with the intractable *tou stênai ên ep' autou* at 229,15, I have replaced *tou stênai ên* with *histainto* and emended *ep' autou* to *ep' autôn* to allow it to refer to the points mentioned in this clause; I have also added *en* before *perati* at 229,14 (cf. 229,15-16). Thus a moving object is imagined as stopping before completing its traversal of a set of points, with this arbitrary stop nonetheless a genuine stop at an actual point. Cf. Simpl. *in Phys.* 1281,15-17 on Arist. 262a31-b7: 'if what undergoes locomotion comes to a stop at every point, ... it will not come to a stop at the point of turning back any more than anywhere else on the straight line, since there is a point everywhere' (tr. McKirahan). Simplicius sees stopping at any intermediary point as undermining the status of the designated point of reversal, whereas for Themistius a stop at an intervening point is envisaged as an actual stop.

**787**. **263a2-3** is omitted; its statement that rectilinear motion is not eternal is addressed fully in the next chapter, at 232,19-25 (265a16-24) below.

**788**. 229,19: after *sêmeiôi* supply, with Spengel, a proleptic clause that could have been omitted because of homoioteleuton: *to eph' hou khrêtai hôs energeiâi sêmeiôi*. It provides a reference for the clarification in the *mallon de* clause.

**789**. 229,20: before *stênai* supply *proteron*; cf. 228,16 and 230,26.

**790.** This argument is abbreviated since it served to refute Zeno at 6.2, 233a21-31 and 6.9, 239b11-14 above (see Themist. 187,7-17, 199,17-22 and 200,8-10), although Aristotle himself did not use the concept of the potential infinite in those earlier texts, as acknowledged at 263a11-22. [Alex.] *Quaest.* 1.22 restates this refutation without overt reference to Zeno; see Sharples (1), 75-7.

**791**. If the subdivisions of a line are rendered discontinuous by being actual, they cannot be counted as constituents of the line. Thus halving produces not two parts of a line but two lines, because the subdivisions are counted separately; see 229,27-8 below, and 263a23-263b3 for the full argument.

**792.** Themistius replaces the demonstration at **263b15-26** with the illustration of Socrates' death (cf. *Phys.* 6.5 above, at 194,12-17), and condenses the argument against indivisible time-periods at 263b26-264a1 into his final sentence (230,11-12).

793. See Phys. 6.3, 233b35-234a3 (Themist. 189,23-8).

**794.** Arist. 263b9-10 says that the point of division in a time period must always 'belong to the later time for the *pragma*', a term usually translated as 'thing' or 'object', but for it to refer to Socrates' death, it is perhaps best translated as 'reality' or 'fact'.

**795**. 230,5: for *holon* read *holôi*; cf. 230,2-3 (*en hôi prôtôi*) for this phrasing. See *Phys.* 6.5 (Themist. 194,10-20 *ad* 236a2-7) on the related claim that death occurs at the now.

**796.** Here (*i*) is derived from 263b9-12 (cf. also 194,12-14 and n. 340 above), and (*ii*) relies on the general principle that two nows cannot be contiguous to refute the claim that the transition from life to death is accomplished by successive states in successive nows.

797. See Phys. 6.3, 234a6-7 (Themist. 190,6-7).

**798.** Though he does not include the demonstrations at **264a14-21** and **264a24-b1**. Themistius can be seen as summarizing their core idea and illustrating it in the concrete terms of upward and downward motion.

799. 230,15: for apo read hupo (Arist. 264a10; Spengel).

**800**. 230,20: 'up' and 'down' (anô/katô) can modify verbs of motion and mean 'upwards' and 'downwards' or be used with the neuter of the definite article to identify upper and lower positions in a motion (*to anô, to katô*; here at 230,21-2, 24-5). At 230,20 genomenon anô cannot mean 'having come to be upwards' but has to mean 'having come to be in the upper position', and so, Simpl. *in Phys.* 1302,19 notwithstanding, I emend to *<en tôi> anô* to give this verb its usual prepositional complement when it is used in the sense of reaching a terminus. For analogous problems with these directional phrases see on 178,19 above.

**801**. On interrupted locomotion see *Phys.* 5.4, 226b31-4 (Themist. 173,1-9) above.

802. 230,28: before ho logos supply hode (Arist. 264b2).

**803**. cf. 227,12-21 above (*ad Phys.* 8.7, 261b7-22), where the issue is couched in terms of it being impossible for opposite changes to be one.

**804**. 231,2: for *hoti* read *en* (MS L).

**805**. 231,6: for the lacuna supply *proteron eipomen* (Schenkl); given the next sentence, the reference could be to *Phys.* 5.3, 226b34-227a17, which defines the difference between being successive and continuous; cf. also 227,12-21 (*ad* 8.7, 261b7-22) on opposite changes not being one.

**806**. 231,8: Schenkl's supplement *hen kai tauto* is based on Simpl. *in Phys.* 1307,5.

**807**. Themistius' use of *atopos* (231,12) ('out of place' = 'absurd') for 'impossible' (Arist. 264b10) must be intended as a pun, circular motion being in a sense always in the same place; cf. 232,33 and 233,4-6 below; cf. also Todd (6), 76 n. 25.

**808**. 231,20-1: this aside, which Schenkl describes as corrupt and as having lacunas, has to complement the claim at 231,18, that when something in rectilinear motion stops before reversing course, it uses the same stopping point twice: as terminus and beginning. The surviving Greek points to a description of the relation between such discontinuity and a period of rest that produces duplication. But (*i*) ou sunekhôs needs to modify a verb of motion to anticipate kineisthai sunekhôs at 231,21; and (*ii*) the unique verb anenduasei ('double') needs to have nun (emended to to nun, the now) as its object. Cf. 228,19-24 above, where the now is ruled out as the stopping point in discontinuous motion, and a time period of rest (identified here too) is said to be 'in between all the nows' (228,22), and a fortiori between any two nows of the 'doubled' kind mentioned here. The ad hoc text translated here will be: dioper <tinos> ou sunekhôs <kinoumenou>, anenduasei <to> nun kai ho metaxu khronos tês êremias.

**809.** 231,16-21 forms a unit, with ep' ekeinês (231,17) balanced by epi de tês peripherous (231,21). I refrain from supplying men before gar at 231,17, since the contrast is clear anyway. It is more important to place dioper – êremias (231,20-1) (emended in the preceding note) in brackets by deleting the stop after autou (20), and replacing the colon after êremias (21) with a comma.

**810**. 231,24: for *ap'autou eis auto* read *aph'hautou eis hauto* (Arist. 264b18-19; Spengel; cf. 203,15-16 above), so that these reflexives can describe circular

motion. In the description of rectilinear motion in the next clause (231,24-5) the Aristotelian text at 264b19 also requires *aph' hautou* (instead of *ap' autou*) *eis allo*.

**811**. 231,25: for *men epi* read *epi men* (as Schenkl suggested in the apparatus) to balance *epi de* in line 28.

812. 231,27: for eiê read an eiê; cf. Smyth, 1822.

**813.** See 201,25-8 above on *Phys.* 6.9, 240b1-7. Spengel wanted to delete 'and then another' (i.e. the second *kai allê* at 231,27), but wrongly, since the *mallon de* clause (231,28) clarifies the inherent meaning of the common idiom of 'allos *kai allos*', which always implies a permanent succession of discontinuous entities; see, for example, 180,15; 190,25; 201,25; 224,26-7; 225,2; 228,21-2.

**814**. This is the case of pseudo-circular motion, on a semi-circle or an arc (264b24-7), where something can turn back and the same motion can occur repeatedly.

**815**. 232,3-4: after anakamptêi delete the stop; place ou gar - dusi (3-4) in brackets.

**816**. 232,5-7; after *ephexês* (5) replace the colon with a comma; delete the stop after *pollakis* (6); place  $p\hat{o}s - peras$  (6-7) in brackets.

**817**. 232,7: for *protitheis* read *prostithês* (MS C; *-eis* ms Laur. 85,14). The idea here must be that of adding or imposing something inappropriately, rather than offering or providing it (the sense of *protithenai*).

**818**. The deictic suffix *todi* ('this here', 232,8) suggests that this argument was originally made either orally or in the text that had an accompanying diagram. An interactive situation would also explain the use of 'you' in this paragraph.

**819**. **264b28-265a2**, which extends the argument to other kinds of change (alteration, quantitative change, and coming to be and ceasing to be), is omitted.

**820.** These are primarily Heraclitus and the Heracliteans (clearer from Aristotle's use of the defining verb 'be in flux' [*rhein*] at. 265a6; cf. also Simpl. *in Phys.* 1313,8-12), but also Anaxagoras (see *Phys.* 187a30 and Themist. *in Phys.* 14,1 for his equation of coming to be and alteration).

**821**. This is the only way that change could be eternal, since 'change to contrary [states]' (232,13-14) is rectilinear and hence discontinuous, as is left implied.

**822.** cf. also *Phys.* 8.3, 253b28-30 (Themist. 216,11-12) above for this point made regarding alteration.

823. 232,16: after *pasa* supply *gar* (Arist. 265a14; MSS SL).

824. See 227,31-2 above (on 8.8, 261b28-9).

**825**. 232,18-19: after *hautai* delete the colon, place  $sunkeimen\hat{e} - tout\hat{o}n$  in brackets, and replace the stop after  $tout\hat{o}n$  with a comma.

**826**. 232,21-2: so that *men* (232,20) can correspond to *de* (232,22) and express the contrast between infinite and finite motion, delete the stop after *autês* and place *ou gar* – *diienai* (21-2) in brackets, within which *ginesthai* can, as Spengel proposed, be deleted in line 21 (cf. Arist. 265a19), leaving *to adunaton* as the subject of *ginetai*.

827. 232,23: for anakamptei read anakamptoi (MSS CL; cf. lines 23-4).

**828**. 232,26: for *monên* (influenced perhaps by *monên* at 232,27) read *monon*; the adverb is needed to modify the modality not its subject.

**829.** Arist. 265a25-7 says that 'circular motion can be eternal, but of the other motions neither *phora* nor any other [can be so]; for [in their case] there must be a stop (*stasis*), and if there is a stop, then their motion has ceased to be'. Themistius argues that if there were a non-circular eternal motion coexisting with a non-eternal circular motion, then the circular motion would still be prior,

presumably because it is 'simple', and does not stop and reverse itself as does every non-circular motion, whether rectilinear (which is what *phora* must refer to in the Aristotelian text, as Simpl. *in Phys.* 1314,39-1315,1 saw) or not.

**830**. 232,29: two indirect questions function here as substantives ('beginning' and 'end'), but the verb in the first is in the subjunctive while the second is in the indicative. Change the latter to the subjunctive (i.e. for *teleutêsei* read *teleutêsêi*), and take both as indefinite in the sense that they are in deliberative questions. Such semantics are unusual in this kind of exposition, and Schenkl commented 'malim *an arxêtai*', which would furnish an orthodox indefinite relative clause, though similar surgery would be needed on *teleutêsei*. But either way the statement comes out, as it must, as a generalization.

**831**. 232,29: before *tês de* replace the colon with a comma.

**832.** At 233,6 *perimenei to peras* might mean 'is awaiting its limit', but Themistius must be extending the sense of this verb to refer to the stability of the sphere 'around' its limit, which complements its motion around it (233,4); if the text were *menei peri to peras* that complementarity would be clearer.

**833**. cf. *Phys.* 4.14, 223b16-224a2 (Themist. 163,11-164,6); see Todd (6), 72-3. Themist. *in Phys.* 164,1 calls this saw a cliché (*eiôthos*); see, for example, Hdt. 1.207.2.

**834**. The last part of this chapter (**265b17-266a6**, and its formulaic conclusion at **266a6-9**) is quite reasonably omitted in a focused paraphrase; it essentially restates the thesis of *Phys.* 8.7 on the primacy of locomotion over other types of change, though with particular reference to the historical context.

**835.** cf. Ross, 720: 'the natural movement of bodies will accelerate as they recede from the alien influence of the "unnatural" region from which they start, and come more under the *congenial* influence of the "natural" region to which they are moving' (my italics, supplied in light of Themistius' use of *sungenês*, 'kindred', here). The distinction between natural and unnatural motions that Ross uses of locations is applied by Themistius to the actual motions involved.

**836**. As at 234,8-9 below, Themistius enlists Aristotle's later reference to the *proton kinoun* ('first producer of change') at **267b17-26** (omitted *ad loc.*).

**837**. Themistius is using Arist. 266a13-14, where the three elements of change (what produces change, what is changed, and the time period) are identified, to clarify the claim that nothing finite can produce change in infinite time.

**838**. 233,20: for *kinêsei an* read *kinêseien an* (Spengel, MS X [Par. gr. 1859], and Diels at Simpl. *in Phys.* 1321,10).

**839.** Themistius omits three demonstrations: (i) **266a15-23** (that a finite body cannot cause eternal change), (ii) **266a23-b6** (that a finite magnitude cannot have an infinite power), and (iii) **266b6-24** (that an infinite body cannot have a finite power), and refers in his synopsis only to (i) and (ii). Kouremenos (2) argues that (iii) is integral to the case for the first agent of change not being an infinite body, and that it is referred to 267b21-2 below. By neglecting 266b6-24 Themistius joins commentators both ancient and modern (see Kouremenos [2], 44-5) who have marginalized its status in this chapter.

840. 233,22: after *ontôn* place a comma.

**841**. 233,27: for *tês autês* read *tautês* (Schenkl); 'greater than it' rather than 'greater than the same [power]' is the sense needed here.

842. 234,2: for kinêsis read dunamis.

843. 234,3: for *tou* read *tôi* as a complement to *tauton*.

**844.** 234,5: after *amêkhanon* supply *einai* (Spengel, who also proposed *labein*); Schenkl implausibly thought that *labein* could be understood from 234,1.

845. 234,6: for *epei* ('when') read *ekei* ('there') for a correlation with the relative clause introduced by *hopou*.

**846.** This recapitulation of 234,14-15 (= 266a10-11), later recalled at 235,29-236,4 below, forms a transition to the discussion of forced motion, with a shift from the general thesis about the incorporeality of the first agent of change to the specific issue of projectile motion. *pheresthai* ('be in locomotion') at Arist. 267a27-8 indicates this.

**847**. The 'producer of change' can, of course, be self-changed; see *Phys.* 7.2, 243a11-12 (Themist. 204,2-3) above.

**848**. For pushing and pulling see 235,18-20 and 24-5 below (on *Phys.* 8.10, 267b10-12), and for the tetrad completed by rotating and carrying see *Phys.* 7.2, 243a15-18 (Themist. 204,6-8 and 12-13), where the various refinements catalogued at 243a18-244a3 are identified here by the phrase 'other procedures'.

**849**. 234,10: after the fifth  $\hat{e}$  reposition kata tina tôn allôn tropôn, peri de tôn from 234,11 (Schenkl).

**850**. 234,11: after *dokei gar kai* delete  $h\hat{e}$ , given the transposition (see preceding note).

**851**. 234,12-13: delete the stop after *blêthenta* (12), place *pheretai – aphentos* in brackets followed by a comma.

**852.** 234,17: for *auto* read *autou*. The archer *himself* allegedly moves the air after he has already released the arrow. The air is not moved by the archer after he has already released 'what is itself the projectile', as Schenkl's text requires.

853. See Ps.-Arist. *Mech.* 33 for a less sophisticated treatment of this general problem.

**854**. Though not a living thing (*zôion*, 234,19), it is, we learn below, '*like* a self-moved thing (*autokinêton*)' (see on 235,8 below).

**855.** 234,21-5: cf. Arist. 267a2, where there is a brief analogy with the loadstone. Ross compares Plat. *Tim.* 80E, but see also the analogy between transmitted magnetism and poetic inspiration at Plat. *Ion* 533D3-E2, where *sidêrion* ('piece of iron') is used (*Ion* 533E1) as here (234,21 and 23). Also, cf. Themist. *Or.* 15, 276,4 Downey, and *Or.* 23, 95,7 Downey-Norman. Alexander, ap. Simpl. *in Phys.* 1055,24-1056,7 (on *Phys.* 7.2, 244a11-14) discussed magnetism as a form of 'pulling' (*helxis*); see Hagen, 111 n. 147, to which add Sharples (3), 28-31.

**856.** 234,21: after *ou* supply *monon* to balance *alla kai*; cf. the description of motion transmitted from one thing to another at 234,16.

**857**. 234,24: for *to* read *tou*; cf. 234,28 and 235,2 and 12 below for the same dependency of an articular infinitive on *dunamis*.

**858.** 234,26: delete  $\hat{e}$  ballontos as a gloss on the preceding *rhipsantos*; it is suspect as a present participle in conjunction with an aorist participle. Also, *rhiptein* is used here not as the general verb for throwing, like *ballein*, but to describe the systematic release of a projectile, like *aphienai* (234,13 and 15).

**859.** 234,26: for *epelthontos* read *apelthontos* to preserve the parallel with *apelthêi* in 234,22.

**860.** 234,28: after *lambanei* replace the question mark with a comma; and after *endotheisês* (235,4) replace the stop with a question mark.

861. 234,29: transpose to to precede sidêrion; cf. 234,24 for the principle.

**862.** Themist. *in Phys.* 4.8, 129,15-27 (see Todd [6], 42-3 with nn. 286-91), on the void as incapable of explaining projectile motion, anticipates in general terms the present account, which is derived from Alexander (ap. Simpl. *in Phys.* 1346,29-1349,11; cf. *in Phys.* 1050,2-9 *ad.* 7.2, 243a20-243b2 and see Hagen, 109 n. 116). See also *Cael.* 3.2, 301b22-30 (see Themist. *in Cael.* 170,14-34 and Simpl. *in Cael.* 595,15-596,30). Sorabji (2), 144 sees

Aristotle and his commentators as collectively endorsing the theory that 'there is a series of pockets of air behind the projectile which acquire this power [*sc.* of being an unmoved mover] in turn, and they move the projectile on' (a 'knock on effect' that Ps.-Arist. *Mech.* 33, 858a18-22 crudely proposes). Hussey, 231, with n. 40, however, argues that Aristotle is not aiming to provide 'a substantive physical theory' but to state 'certain general constraints which any such theory will have to satisfy'; see Hussey, 235 for what such a theory might look like.

**863**. Arist. 267a14 refers to motion as being of things that are in succession or in contact in his explanation (*gar*, 267a14) of their motion not being, though appearing to be, continuous (267a13-14; cf. a19-20). Themistius emphasizes this discontinuity at 235,21-2 below, but without stressing that the continuity is only apparent.

**864**. 235,8: for *ex autôn* read *ex hautôn*. *pheresthai* preceding this phrase should be taken as passive, and as describing the disturbance initiated in air and water by a projectile entering these mediums: i.e. they 'are transported' in an outward direction by this action, as a wave fans out from an initially stable medium.

**865**. Here (235,7 and 10; cf. 224,14) *endosimos* ('endowment') identifies the quality of the process as the endowment of a *dunamis* ('power'); see Sorabji (2), 282 n. 134.

**866.** 235,8: *hoion* ('sort of', 'resembling') before 'self-moved' modifies the rejection at 234,19 of the idea that air can cause motion because it is a living thing. Alexander also qualifies the idea that the medium becomes a self-moved thing by saying that this happens 'in a sense' (*tropon tina*) (Simpl. *in Phys.* 1348,5.27 and 1349,9), since, as Simplicius notes (1348,15-26) in praising Alexander (1348,26-1349,10), these self-movers do not meet the Aristotelian definition of being divided between mover and moved.

**867.** 235,15-16: transpose  $hapl\hat{e} - top\hat{o}n$  from 235,16 to follow and complement *antiperistasis* (235,15) by furnishing synonyms (*metastasis*, *meta-khôrêsis*); cf. Simpl. *in Phys.* 1351,16-17. For other explications inserted with similar abruptness see 222,16-17 and 228,18 and 20-1 above.

868. 235,19: after *antiperistasin* place a stop.

**869.** 235,19-20: 'pushed away' (*apôtheitai*). 'Pushing away' (*apôsis*) is a process in which the agent does not 'follow up' (*epakolouthein*), i.e. maintain contact, and can be contrasted (see *Phys.* 7.2, 243a18-19) with *epôsis* ('pushing forward'), in which such contact is maintained. The latter process is identified here in the denial that air transmits force to a projectile by the verb *prosôthein* (235,18). Thus mutual replacement is 'pushing away', while the earlier account of projectile motion (234,27-235,12) can be seen as enlarging the concept of 'pushing forward'.

**870.** 235,22-3: as at 168,16-19, 216,20-2, 234,14-15 and 19-20, each alternative explained by a *gar* clause has to be bracketed; so delete the cola after *kinêsis* and *homalês* and place *oude* - allêlôn (22) and *ou* - arkhês (23) in brackets.

**871.** This paragraph draws on 267b10-13 (though otherwise **267b9-17** is omitted) as a prelude to his conclusion. Cf. 234,9-15 above for the source of this discussion.

**872.** This supplement is justified by the reference to power being imparted 'in succession' in the analogy at 235,3 above.

873. 235,29: for kinoun read kinein (Spengel).

**874.** This is 'pushing away' (see on 235, 19-20 above), with no follow-through on the original impulse and hence a constant effort to creating a new source or starting-point. Such motion is easiest when spherical objects become, in effect, self-movers; see *Phys.* 7.5 at 208,24-30 above.

**875**. This reverts to the main thesis, that 'the first producer of change' is incorporeal; cf. 233,14-15 and 234,8 above.

876. 235,30: for sumballei read summetaballei (Arist. 267b2; MS L).

**877.** cf. 'without effort' (*aponos*, 235,31; Arist. 267b3) with Arist. *Metaph*. *Lambda* 9, 1074b28-9, where it is said that if divine thinking were an actualized potentiality it would be 'effortful' (*epiponos*); see Brague, 146-7, and cf. Todd (3), 187 n. 20.

878. 235,31: before kinêsis supply hê (Arist. 267b4).

**879.** 235,31-2: after  $mon\hat{e}$  (31) delete the stop; place ou gar – oudemian in brackets, with a stop after oudemian.

880. 235,32: for oute read oude (Arist. 267b5).

**881.** Omitted are a final problem (**267b9-17**), and also the argument (**267b17-26**) for the first agent of change being indivisible and incorporeal, the terminology of which was used earlier (233,14; 234,8-9).

**882.** Themistius substitutes 'of the whole' (*tou holou*) for *tou kuklou* (Arist. 267b8-9), usually translated 'of the circumference', but it has to be equivalent to *tou holou kuklou* ('of the whole circumference'). Cf. Alex. ap. Simpl. *in Phys.* 1354,19-22, for whom the first mover was 'on the whole circumference'.

**883.** Unlike Simpl. *in Phys.* 1354-5, Themistius does not discuss the general problem of locating an incorporeal entity. On this issue see Judson, 167-9 and Lang, 85-94.

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### English-Greek Glossary

above: en tôi anô act: poiein acted on, be: paskhein activity: energeia actual, in actuality: energeiâi (dat.), kat' energeian actuality: energeia, entelekheia add: proslambanein, prostithenai added, be: prosginesthai affection: pathos affirmation: kataphasis aggregation: sunkrisis air: *aêr* alteration: alloiôisis altered, be: alloiousthai animal(s): zôion, zôia animate: empsukhos appetite: epithumia argument: logos arrow: oïstos assertion: kataphasis balance: zugon be: einai being: to einai; to on/not-being: to mê being, brought into: genêtos become: ginesthai beginning: arkhê belong to (be a property of): huparkhein (+ dat.) below: en tôi katô between, in: metaxu black: melas/become black: melainesthai boat: ploion body: sôma bodies, uncompounded (= elements): hapla sômata breathing: anapnoê brought into being: genêtos by (means of) another thing: hup' allou

by (means of) something: hupo tinos

cause: aitia, aition cease to be: phtheiresthai ceasing to be: phthora centre: kentron change: kinêsis change in respect of place (= locomotion): kata topon kinêsis change (trans. = cause change): kinein change (intrans. = undergo change): kineisthai change in respect of place (= locomotion): kata topon kineisthai changed, be: kineisthai changing thing (what changes/is changed): to kinoumenon chilled, be: psukhesthai circle: kuklos circular: kuklikos, kuklôi (dat.) circumference: periphereia clear: dêlos (unclear: adêlos) cold: psukhros coldness: psukhrotês colour: khrôma combination: sunthesis combined, be: suntithesthai come from: (ginesthai) ek come into being (v.): ginesthai come to be in (= reach): ginesthai en coming into being (n.): genesis comparable: sumblêtos complete: teleios complete (motion over a distance): anuein, dianuein completed change/motion: to kekinêsthai completed transformation: to metabeblêkenai composed of, be: sunkeisthai ek, suntithesthai consecutive: ephexês

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consequence, be a: sumbainein consider: skeptesthai consist of: ek [einai] constructed, be: sunistasthai contact: haphê contact, be in: haptesthai container: angeion contiguous: ekhomenon continuous: sunekhês continuously: sunekhôs contradiction: antiphasis contra-naturally: para phusin contrariety: enantiôsis contrary/contraries: enantios, enantia cover (a distance): diienai cut (into subdivisions): temnein cut (= division): tomê

darkness: melania decrease: phthisis deduction: sullogismos definition: horismos, logos demonstrate: apodeiknunai, epideiknunai demonstration: apodeixis denial: apophasis depart: apoginesthai diameter: diametros differ: diapherein difference: diaphora differentia: diaphora digit: daktulos diminished, be: meiousthai diminution: meiôsis disposed, be naturally: pephukenai distance: diastêma, megethos distinction: diaphora, diorismos distinguish: diairein divide: diairein divided. be: diairesthai divided into parts: memerismenos divisible: diairetos divisible into parts: meristos division: diairesis down, downwards: katô, eis to katô earlier, at an earlier time: proteron earth: gê educated: mousikos eliminate (through argument): anairein end (= termination): *teleutê*, *telos* endure (intrans.): hupomenein

environment: to periekhon eternal: aïdios exact: akribês exact sense, in a: akribôs excellence: aretê exist: einai, huparkhein explani: apodidonai explanation: aitia, aition extremes: akra extremity: eskhaton eye: ophthalmos

fast: takhus finite: *peperasmenos* fire: pur first: prôtos (adj.); prôton (adv.) first producer of change: to prôton kinoun follow (logically): akolouthein food: trophê force, by: biâi (dat.) force: biazesthai forced: biaios form: eidos foundations: themelia from above: anôthen from below: katôthen from outside: exôthen from which, from something (= beginning of change): ek tinos, ex hou future, the: to mellon

generated, be: *ginesthai* genus: *genos* goal: *telos* grey: *phaios* 

hard: *sklêros* health: *hugeia* health, be restored to: *hugiazesthai* heated, be: *thermainesthai* heavens: *ouranos* heaviness: *barutês* (see 'weight') heavy: *barus* hollow out: *koilainein* horse: *hippos* hot: *thermos* hotness: *thermotês* house: *oikia* 

identify: *lambanein* immobile: *akinêtos*  immortal: athanatos impossible: adunatos, amêkhanos impulse: hormê inanimate: apsukhos incidental, incidentally: kata sumbebêkos incomplete: atelês increase: auxêsis indicate: dêloun indivisible: adiairetos induction: epagôgê infinite: apeiros; to infinity (ad infinitum): ep'apeiron inhere: enuparkhein instantaneous: athroos instantaneously: athroôs intermediary: to meson interruption: dialeimma investigate: episkeptesthai, skeptesthai

learn: manthanein length: mêkos lever: mokhlos light: kouphos limit: peras limit (delimit): horizein limited: peperasmenos line: grammê line, straight: eutheia [grammê] locomotion, motion: phora locomotion, be in: pheresthai

magnitude: *megethos* magnitude, continuous: megethos sunekhes mass: onkos mathematician: mathêmatikos matter: hulê measure out (by submultiples): katametrein middle: to meson millstone: mulê moistness: hugrotês motion (= locomotion): kinêsis motion, circular: kuklôi phora motion, rectilinear: euthuphoria, eutheia kinêsis move (trans.): kinein what produces motion: to kinoun move (intrans.), be moved (pass.): kineisthai move, in reverse: antikineisthai

move, in respect of place: *kata topon kineisthai* move, (= be in locomotion), *pheresthai* moving thing, what is moved: *to kinoumenon* 

name (n.): onoma name (v.): kalein, onomazein natural: phusikos natural philosopher: phusikos nature: phusis nature, by: phusei naturally: kata phusin negation: apophasis now, the: to nun number: arithmos

obvious: phaneros occupy: katekhein opposite: antikeimenos opposites: antikeimena opposition: antithesis organic fusion: sumphusis overtake: katalambanein

parameters (of a magnitude): perata part: meros, morion part, in: kata meros partition: merizein partless (= indivisible): amerês past, the: to gegonos, to parelêluthos, to parelthon per se: kath' hauto perception, object of: aisthêton person: anthrôpos place: topos plant: phuton point: stigmê posit (v.): hupotithesthai, tithesthai posit (n.): thesis position: thesis possible: dunatos possible, be: dunasthai, endekhesthai potential, in potentiality: dunamei, kata dunamin primary: prôtos principle (first principle): arkhê prior: prôtos privation: sterêsis problem: aporia procedure: tropos (process of) change: to kineisthai

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(process of) transformation: to metaballein produce (a result): poiein produce change: kinein (that which produces change: to kinoun) projectile: to rhiphthen, to rhiptomenon property: huparkhon proposition: protasis proximate: prosekhês pulling: helxis pursue: diôkein pushing: ôsis

qualified: *poios* quality: *poiotês* quality (category): *to poion* 

reach (= come to be in): ginesthai en reasoning: logos red: eruthros relative: pros ti remain: menein rest, be at: êremein rest, state rest: êremia run (n.): dromos run (v.): trekhein

say: legein, phanai segregation: diakrisis self-changed: autokinêtos semi-circle: hêmikuklion sense (of a word): tropos separated: kekhôrismenos shape: skhêma shape (= impose shape): *skhêmatizein* show: deiknunai sickness: nosos signify: sêmainein simultaneously: hama size: megethos sleep: hupnos slow: bradus soft: malakos sorites: sôritês soul: psukhê source: arkhê source of change/motion: arkhê kinêseôs speak of: legein speed: takhos speed, at a constant: isotakhôs speed, with a constant: isotakhês

sphere: sphaira stability: monê stable, be: menein state: hexis state, be in: ekhein statement: axiôma, logos stop (= stopping point): stasis stop, be at a: *stênai* stop, come to a: *histasthai* strictly (in a strict sense): kuriôs substance: ousia substrate: hupokeimenon succession: to ephexês succession, in (successive): ephexês sun: hêlios suppose: hupotithesthai surface: epiphaneia

teach: didaskein throw: rhiptein throwing: *rhipsis* time: khronos time period: khronos time, at the same (simultaneously): hama together: hama tortoise: khelônê transformation: metabolê transformation in respect of place (= locomotion): kata topon metabolê transformed, be: metaballein transformed, have been: metabeblêkenai transition. be in/make a: metabainein travel: diaporeuesthai, poreuesthai traverse (a distance): diienai traverse (a distance) fully: diexienai turn back: anakamptein

unchanged: akinêtos uncompounded: haplous undergo change/motion: kinêsin kineisthai undivided: atomos uneducated: amousos uniform: homalês (non-uniform: anômalos) universal: katholou universe: to pan up, upwards: anô, eis to anô

vice: *kakia* virtue: *aretê* 

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void: *to kenon* volume: *onkos* 

walk: *badizein* walking: *badisis* water: *hudôr* way: *tropos*  weight: baros white: leukos/become white: leukainesthai without qualification: haplôs world: kosmos

yellow: xanthos

# Greek-English Index

This is a selective index. For a complementary index to Aristotle's Physics see B. Colin, Aristote: Physica, Index verborum; Listes de fréquence, Liège 1993. An asterisk indicates that an entry is the result of emendation. Page numbers in bold and hyphenated references indicate high frequency.

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- *antikinein*, (act.) put into reverse motion, 201,3; reciprocate change, 221,21.22; (med.) be in reverse motion, 201,3.7; (pass.) undergo reciprocal change, 221,13
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- antimethistasthai, to engage in mutual replacement, 235,14.18 antiperistasis, mutual
- replacement, 235,13.15.17.19
- antiperistasthai, to engage in mutual replacement, 235,20
- *antiphasis*, contradiction, 167,13;169,24.25.26; 172,22(bis); 193,19.24; 201,9.11.14.19; 203,10.14
- *antithesis*, opposition, 168,4.5; 177,18; 179,11; 180,5
- *antitithenai*, counter (a theory), 192,10; (pass.) be counterposed (of relatives), 170,23
- *anuein*, complete (a motion), 185,10.32.37; 190,33
- apartizein, make equal, 187,29
- *apaustos*, unceasing, 209,5; 224,20 (Arist. 250b14)
- *apeiros*, infinite, 167,9; 186,25.32(bis); **187**; **188**; 195,23.28; 196,13(bis); **199**; 200,9.11; 203,7.21.25.28; 209,8.16; 210,14; 212,18-29; 213,10; 216,8; 217,10; 220,25.26.27; 223,28; 229,23.24.26(bis).28; 232,19.20.22; 233,23-9; 234,1-5; *eis apeira*, into infinitely many things, 186,33; 195,23; *ep' apeiron*, to infinity,186,23.33; 187,6; 197,12; 199,18; *eis apeiron*, 196,4; 171,5; 216,10.12; 220,11.21; 223,8
- *apergazesthai*, achieve (a result), 173,31
- *aperkhesthai/apienai*, depart, 184,8(bis).9; 205,9\*; 216,2\*.8(bis); 234,26\*; withdraw (of celestial bodies), 225,4
- *aphairein*, subtract, 197,15; 208,21; 221,19; remove (fig.), 215,14; be removed (phys.), 230,25; 234,25
- aphairesis, removal, 205,14
- aphanizesthai, disappear, 212,14
- *aphienai*, dismiss (a subject), 167,11; 169,9; 171,17; 215,8; release (a projectile), 234,13.15; remove (matter), 215,29; 219,29
- *aphistasthai*, be distant from, 211,8; 233,12; 234,15
- *aphorizein*, separately define, 173,4.8
- *aphthartos*, unable to cease to be, 212,10
- *apoballein*, discard (a quality), 230,30
- *apodeiknunai*, demonstrate, 170,5; 182,24; 183,17; 187,18.27; 189,22; 190,33; 191,3; 195,2.15; 198,12; 201,29; 203,13.16; 211,24; 213,18; 215,6; 220,7; 223,13; 224,2; 225,11; 233,15; 234,7

apodeixis, demonstration, 188,10.13

*apodidonai*, explain (= supply an account), 175,30.34; 207,31; 212,23; 218,3; *logon apodidonai*, supply a rationale, 212,33

*apoginesthai*, leave (opp. *ginesthai en*, reach), 170,28; 228,17.20.24.25; 229,3.8; 231,19

*apolambanein*, adopt (a state), 206,6; 216,25; 218,29; 219,4

*apolauein*, partake of (properties), 224,23

*apoleipein*, abandon, 193,16.17.20.23; (med.) be wanting (i.e., be deficient in establishing equality), 207,18

*apollattesthai*, be settled (as an established fact), 166,8

- *apollunai*, do away with (facts), 185,18
- aponos, without effort, 235,29.31
- *apophasis*, negation, 168,1.3.5; 169,2.3-4
- *aporein*, raise a problem, 192,1; 210,32; 215,6; 234,13; be at a loss, 194,12
- *aporia*, problem, 182,3; 189,2; 229,22; 234,18
- apostasis, distance, 233,2
- apôthein, push away, 255,19-20
- *apothnêiskein*, die,194,12-16; 230,3-10
- *apsukhos*, non-living, 172,4; 205,9; 213,14.17.33; 214,4.27; 217,13; 218,2
- araiotês, state of rarity, 225,28
- *aretê*, excellence, 206,4-10
- arithmein, count, 232,6
- *arithmos*, number, 173,17; 174,4; 175,3.8.11.25; 182,5; 188,19; 213,28; 229,27
- arkein, be sufficient, 227,30; 234,7
- *arkhê*, beginning (of a temporal process; syn. *ex hou*, from which), 188,9; 189,23.29.30.31; **190;** 191,5.8; 192,10; **194; 195; 210**; 212,2.3.**228-31**; 232,3.7.9; see *to nun*; beginning (of a spatial extent), 201,25; beginning (of a new discussion), 217,4; 221,6; 225,16; first principle, 212,34; 213,3; 236,2; source (of a process of change or motion: usu. *arkhê*

- *tês kinêseôs*; often c. *aitia*, cause, q.v.), 214,14; 217,12.19; **218**; **220**; **223**; 224,6.7.8.11; 225,9; 226,26; source (of physical properties), 225,27; *akinêtos arkhê*, unchanging source, 224,29.32; 225,12; *prôtê arkhê*, primary source (of change), 224,22; source (of transmitted motion in kinematics), 235,7.23.28; source (of an inquiry), 214,7
- *arkhesthai*, (absol.), begin; (c. gen.), make a beginning of, 168,2; 172,16(bis); 177,21.22; 177,23; 188,6; 194,22.26; 201,27; 202,11; 209,16.20; 210,2.34; 211,1.4.15; 212,28; 213,9.12.13.14.35; 215,11; 217,5; 223,19.26; 228,31; 232,29
- asômatos, incorporeal, 233,15
- *asumblêtos*, not comparable (in a ratio), 207,18
- *asummetros*, in disproportion, 206,11
- ataktos, without order, 212,26
- *atelês*, incomplete, 176,21; 222,8.9; 226,13.22
- *ateleutêtos*, non-terminable (of time), 186,26
- athanatos, immortal, 209,4; 224,21
- *athroismos*, collectivization (of a group), 208,22
- *athroizesthai*, be collected (of universals from particulars), 206,15
- *athroos*, instantaneous, 192,3.4.9; 216,10; collective (*sc.* power), 208,5; *to athroon*, the collective (power of a group), 208,16; *hoi athrooi*, the collectivity, 208,24
- *athroôs*, instantaneously, 192,14.15.19.20; 197,1.2.7.19
- *atomos*, undivided, 174, 20.22.29; 189, 4(bis). 5.13.19; 194, 10.11.20
- atopia (plu.), absurdity, 184,14
- *atopos*, absurd, 175,19.32; 181,23; 190,19; 191,11; 206,8; 211,2; 221,15.21.24; 222,1.2.27; 229,25; 230,11; 231,12
- *autokinêtos*, self-changed, 218,17; 220,32; **221-2**; 223,10(bis); 226,25.26; 229,31; 230,18; 233,29; 234,14.17; 235,8.11

- *autothen*, inherently, self-evidently, 191,29; 210,35; 221,15; 226,1
- *auxanein/auxanesthai*, increase, be increased, 177,6; 192,16; 193,12; 205,7(bis).8; 215,18.21; 216,25; 222,19; 226,5.12.25; 227,2.15; 232,11
- *auxêsis*, increase, 171,11.24(bis); 176,25; 178,20-5; 179,2; 191,30; 203,9.11.26; 206,31; 215,19.21; 216,23; 224,10; 225,21(bis).25; 226,21; 227,9
- *axiôma*, statement, 170,25; axiom, 195,18
- *badisis*, (act of) walking, 176,9; 206,31
- *badizein*, walk, 165,5.6(bis); 171,5; 175,12.17.20; 177,26; 183,15.24.26; 184,7(bis).8.20(bis); 195,11; 218,11; 235,15.16
- *bainein*, *bebêkos*, stationary (on a surface), 208,27
- *ballein*, throw (a projectile), 234,12.15.26; 235,9
- *baros*, weight, 207,5.16.24; 208,13.15.20
- *barus*, heavy, 167,23; 177,7; 217,14.17.20; 218,16; 219,9; 225,27
- *barutês*, heaviness, 166,20.22; 177,8; 205,1; 235,6
- *bebaiousthai*, strengthen (a conclusion), 167,14
- *belos*, projectile, 234,13.16; cf. *rhiptein*
- biâi (dat.), by force, 217,11.15; 218,25; 219,22; 220,1; 233,11.17; to biâi, what is forced, 178,30
- *biaios*, forced, 178,31; 179,1.2.4
- *biazesthai*, force, 183,12; 217,16.21; 235,18
- *boêtheia*, support (for an argument), 192,13
- *bradus*, slow, 172,16(bis); 177,2.6.8; **185-6**; 189,6-16; 190,30.31; 198,8; 199,25.29; 200,13.14.27; 206,28; 212,25
- bradutês, slowness, 177,5
- *daktulos*, digit (smallest measurement of length = a finger's breath, approx. 7/10ths of an inch), unit of the *palaistês*

('palm's length') (4), *spithamê* ('hand-span') (12), *pêkhus* ('finger-tips to elbows') (24) and *orguia* ('outstretched arms') (72); for measurements (given as multiples of digits) see 190,31; 193,12; 202,23-4; 207,25-30; 215,22-3

- *deiknunai*, demonstrate, show, 168,31;189,16;192,8;194,17.19;195,3 2; 200,13; 214,1; 216,31; 217,4; 221,2; 222,9.20; 227,5; 228,2; 232,13.19.25
- *deisthai*, need, 211,16; 215,10
- deixis, demonstration, 192,11
- *dektikos*, capable of receiving, 178,23
- *dêloun*, indicate (the reference of a term), 167,30;168,6.32; 169,27

*diadokhê*, relay (*sc.* race), 176,12; transmission (of physical power) 235,4; succession (of changes), 223,23

*diagramma* (plu.), (geometrical) construction, 208,23

- *diairein*, divide, 176,24; 181,15; 182,17.26.30; 184,31; 186,8.27; 187,6.28; 188,15; 189,5.19; 190,13.20.33; 193,5; 195,23.31; 199,2.19; 200,19.32; 208,19; 216,8; 217,31; 218,7; 229,27
- *diairesis*, division, 169,10; 186,12,13.18; 187,2.10.13; 190,18; 197,13.14; 199,18; 229,6; dichotomy, 217,11; *hê ep'apeiron diairesis*, infinite division, 200,9.11.18
- *diairetos*, divisible, 176,2; 182,19-26; 183,12.13.30; 184,4.6.33; 186,19.33; 190,17; 191,22.28; 192,14-24; 193,3-17; 194,8.23; 195,8.19.28.33; 196,16.19; 203,4; 214,30; 215,30; 221,7
- *diakrinein*, discriminate (in judgment), 215,9; (pass.) be distributed (of digested nutriment), 224,14; be segregated (physically), 225,30
- *diakrisis*, segregation, 225,29; 226,2.3
- *dialambanesthai*, to be interrupted, 230,27

dialeimma, intermission, 175,24

*dialeipein*, cause an interruption, 172,27.29; 173,5.6; 175,11; 223,29.30; 231,22

*dialimpanein*, cause an interruption, 173,2

diamakhesthai, contend (argumentatively), 211,27

- *diamenein*, endure (temporally), 212,16
- *diametros*, diameter, 182,31(bis); 203,19
- *dianistasthai*, rise up (from sleep), 214,25
- *dianoia*, thought, 214,19.23; reasoning, 215,9

*dianuein*, complete (a motion), 185,15; 189,17; 198,27

*diapherein*, differ, 168,15; 175,1; 176,7.16; 177,9.14; 187,25; 198,3; 200,10; 202,3; 205,1; 228,9; 230,10

*diaphora*, difference,166,12; 168,8.24.26; 171,20; 175,2; 202,4; 208,24; 212,30; 227,22

- *diaphtheirein*, do away with (by argument), 185,4.18; 229,27
- diaphtheiresthai, cease to be, 170,7

*diaphthora* (plu.), (moral and physical) corruption, 206,7

- *diaporein*, pursue (work through) a problem, 175,27; 178,28; 185,13; 186,9; 189,11; 197,5
- diasaleuesthai, be displaced, 216,3
- *diastêma*, distance, extension, 173,2; 181,17; 183,13; 184,33; 185,12.28-37; 186,24.26; 188,14-28; 189,9.15; 190,31.33; 196,23; 198,21-8; 199,5-28; 200,2.6.17.24.31; 201,4; 202,23-30; 203,3; 206,26; 207,4; 231,25-30; 233,19; 234,3
- diatelein, continue, 224,21
- *diatithenai*, put in a disposition, 224,19
- didaskein, teach, 173, 10; 221, 30
- *didonai*, grant (= concede), 170,12; 195,21; 210,24; give (= pass on), 235,2
- *diegeiresthai*, to be awakened, 214,26
- *diêkein*, traverse, 184,26; 185,2.30\*; 186,15; 187,23.26
- dielenkhesthai, be refuted, 211,21

- *dierkhesthai/diienai*, traverse, 184,19.20; 185,9.12; 186,5.21.32; 187,9.12.15.23; 188,7.8.23.26; 196,1.2; 199,19.28; 201,3.6; 202,22; 229,27; 232,21.22
- diexarkein, be sufficient, 225,11
- *diexerkhesthai/diexienai*, fully traverse, 184,15.26; 185,2; 186,6.7.8; 187,23.26; 188,3-28; 189,7; 198,27; 199,14.16; 200,12; 202,28; 225,11
- diistanai, displace, 215,25.27
- *dinein*, rotate (trans.), 204,7.13; 234,10
- diorismos, distinction, 201,19
- *diorizein*, define, distinguish, 166,25; 167,15.25; 168,16; 176,20; 177,18; 178,5; 179,17; 182,5; 183,6; 195,32; 196,24; 210,2; 215,16; 222,15; 234,8
- *dokein*, seem, be thought, 168,15; 177,24; 178,22; 192,4; 195,17; 211,28.32; 214,11; 217,24; 224,12; 225,28; 234,11
- *doxa*, opinion, 211,29
- drastikos, capable of acting, 235,17
- *dromos*, run (*sc.* a distance run) 171,8.15(bis).16; (process of) running 177,17; the stage run (in a relay),176,14(bis)
- *dunamei*, potential, in potentiality, 169,5; 187,11.14.15(bis); 199,1.18; 200,10; 207,4; 218,19-22; 219,4-21; 222,3-9; 229,9-26; *kata dunamin*, 211,6
- *dunamis*, potentiality, 206,22; 219,15.19.23; 220,5; capacity, 204,4; power, 207,5.17.23; 208,5-28; 216,6; 220,5; 233,18.26.27.31; 234,2-28; 235,2-12
- *dunasthai*, be able, be capable of, 167,7.8; 169,13; 172,18; 174,8.27 176,5.15.17; 181,6.17; 184,31; 189,27; 190,4.17(bis); 191,10; 193,26; 200,12; 207,13; 208,11.20; 210,5.7.23.25; 216,7; 218,9; 219,9.10; 220,17; 221,8.14; 226,9; 232,27; 233,18; 235,31
- *dunatos*, possible, usu. *dunaton esti*, *passim*, 174,12; 182,5.13.18.25; 183,3; 185,20.22(bis).23; 186,16.31; 187,9.18; 190,34;

191,28; 195,23; 196,8; 199,16; 203,6.17.20.21.22.25; 207,7; 210,32.33; 212,4; 213,11.13.21; 214,12; 225,15.23; 228,9; 232,26

- *duoin thateron* (cf. Plat. *Apol.* 40C5), an exclusive disjunction (lit. one of two), 182,16; 184,5; 220,31; 223,9
- *duskinêtos*, resistant to change, 172,15
- duskolia, discomfort, 199,13
- *dusôpein*, put to shame, 211,32
- *ê*, used to introduce answers to self-imposed questions, 168,16; 172,7; 198,27; 220,4
- $\hat{e}d\hat{e}$ , already (= earlier than the present), 179,12; 196,1; 199,15; 200,30; 207,19; 210,2; 216,20; 219,12.22; 226,17; 230,25; 231,29; 234,17; already (with perfect tense emphasizing completion), 193,26; 194,15; 196,14; right now, 232,16; 233,15 (= nun, Arist. 266a11); opp. *oupô* (not yet), 195,4-5; 222,10.11; (log.) (see Todd [4], 217-18), thereby, duly, ipso facto (usu. in a main clause drawing an inference), 173,19; 174,8; 200,20; 207,22; 208,7; 219,10; 229,17; 232,7; redundantly coupled for emphasis with energeiâi, in actuality, 222,5.9-10; 231,23; 229,10; with kat' energeian, 229,16; already qua actual, 216,14; 222,10-1
- egeiresthai, be woken up, 224,14
- eidenai, know, 185,6.12; 212,1; 217,8
- *eidos*, form, 166,6.10.19.20; 167,5; 170,1; species, 173,15; 174,20-9; 175,8; 176,19; 177,3.4.5.14; 203,24; 227,28; 228,11; *kat' eidos*, in species, 174,27; 175,1; 177,10; 203,24; 228,9
- *einai*, be, *passim*: *einai en*, be in (a place or state) as the completion of motion (= the perfect tense), 183,24.26; 193,20; to on, being, 166,4\*(bis); 170,2; 177,30; 178,1; 193,19.20; 227,8-9; to mê on, not-being, 166,3.4; 168,20-3;169,7.8(bis).9(bis).11.16 (plu.).19(plu.).20; 178,1(bis);

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- *ekhein*, have, possess, *passim*; be able, 172,3; be in a state, 170,25; 183,19(bis); 191,19; 198,16; 202,26; 206,6; 211,7; 212,31.33; 215,10; 217,1; 222,6; 224,18; 225,2.10; 230,8; comprise (a fraction), 200,7; *biscin (metabolic) ablain acquire* 
  - kinêsin/metabolên ekhein, acquire (sc. undergo) a
  - change/transformation, 166,19; 213,12.15; *kinêsin ekhein*, undergo motion, 184,27; *logon*
- *ekhein*, maintain a ratio, 233,30 *ekhesthai*, be contiguous,
- 173,9(bis).22.26.29; 174,2(bis).4.5 *ekkrouesthai*, be deflected, 230,15
- *ekpheugein*, escape (someone's notice), 168,24
- ekstasis, removal, 203,12
- *elakhistos*, smallest (= minimal), 172,25; 185,1.2.18.19.32; 198,17; 208,27
- *emperiekhesthai*, be enclosed, 189,28
- empodizein, impede, 219,6; 228,1
- *empsukhos*, animate, 205,10.11; 213,16.19; 217,25; 218,5
- enantios, contrary, to enantion/ta enantia, contrary, contraries, 167; 168,5.6.34(bis); 169; 170,2-16; 172,7-28; 177,19-22; 178,3-30; 179,6-24; 180,4; 201,5; 203,10.14.16; 213,25; 213,7.25.31.32; 216,12; 227,9.21.22; 228,4-14; 231,16.17; 232,13; ex enantias, in opposite directions, 201,5; enantiôs ekhein, be in conflict, 213,7
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- *endidonai*, impart, 192,7; 214,16; 235,4
- *endosimos*, endowment, 224,14; 235,7.10
- enduesthai, merge, 181,13
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- *energein*, be active, 211,6.8; 219,2.4.18.27
- to enestos, the present, 184,21
- *enginesthai*, come to be in, 205,21; 214,18
- *enistasthai*, object (v.), 213,17
- enkentrizesthai, to be grafted (of plants), 173,32
- ennoein, reflect, 191,18
- ennoia, conception, 195,9
- enstasis, objection, 213,19
- *entelekheia*, actuality, 166,9; 199,3.9; 210,3
- *enuparkhhein*, inhere in, 172,11.12; 201,31; 202,2.8; 204,3
- *epagôgê*, induction, 167,14; 177,24; 191,30; 197,19
- *eperkhesthai*, strike (i.e. occur to the mind) (*LSJ*, I.3), 192,12; (physically), 234,26(del.)
- ephaptesthai, lay claim to, 211,20
- *epharmottein*, fit onto (coincide with) (intrans.), 177,1.16
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- *ephexês*, in succession, 173,10(ter)-28; 174,2-15; 181,24; 182,1-17; 190,6; 209,2; 211,2;

223,26; 224,1.3.5; 230,11; 231,6; 232,5; 234,21; 235,3

- *epiblepein*, look at, 224,7
- epiolepein, look at, 224, l
- epideiknunai, demonstrate,166,7; 168,34; 170,4; 172,21; 183,5; 188,18.19; 212,9; 213,29; 221,16; display, 211,29; show up (i.e. expose negatively; implicit at *LSJ*, II.1; cf. Plat. *Charm.* 158D3), 211,21
- epiginesthai, supervene, 208,18; fall (of night 'supervening'), 170,26
- epinoein, conceive, 199,1; 212,9
- kat' epinoian, in conception, 187,16
- epipedon, a plane, 189,3
- epiphaneia, surface, 182,11
- *episkeptesthai*, investigate, 166,9; 169,29; 172,4; 175,4; 189,24; 191,24; 204,5; 213,24; 209,2
- epispasthai, to be drawn (magnetically), 234,24
- epistêmê, knowledge, 175,32; 219,11; (plu.) body of knowledge, 206,15
- epitasis, (psychological) stress, 208,18
- epitêdeios, suitable, 210,10
- epitêdeiôs, suitably (i.e., with the right potentiality), 210,27
- epitêdeiotês, suitability (= dunamis, potentiality), 220,5
- epithumia, appetite, 214,20.21
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- *êremein*, be at rest, 169,20; 171,5; 172,18; 184,3-25;190,34; 191,2-21; 195,1; 198,5-29; 199,4; 201,21; 202,11; 211,5; 212,18.24.28; 213,16; 214,7.9.12.29.30; 215,1-8; 216,14-32; 217,2; 224,16; 225,4.5.6.17; 227,2.20.25; 228,23; 229,17; 230,21; 232,32; 233,13.23; 234,11,13
- *êremia*, state of rest, 169,22.23; 172,19; 178,9.12.15; 180,5; 184,28; 194,28.29.31; 195,3.4; 198,19; 209,18.19; 211,4; 212,21.22; 213,16; 215,14.20; 227,24; 231,21
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- erkhesthai (ienai), come, go, 193,11.14.15; 197,1; 199,26; 217,11; 228,18.20; 233,9; erkhesthai eis, enter into (a

process or state), 177,29.30; 197,1.1\*198,4; 210,16.27; retreat (to a source), 220,21 (Arist. 256b2-3); enter into (a classification), 217,10-11

- eskhaton, extremity, 172,24;176,5-18; 178,10; 181,2-10; 182,3; 186,27; 187,7; 189,25; 190,1.5(bis).9.21; 196,7; 204,15; (adj.), eskhatê kinêsis, last change, 195,25
- ethelein, wish, 185,29
- eukinêtos, easily moved, 208,26
- *eulogos*, logical, reasonable, 191,17; 208,15; 221,4; 222,25
- eulogôs, logically, 232,27; 233,7
- eupathês (superl.), easily-affected, 192,7
- eutheia (grammê), straight line, 174,28; 182,23; 186,2-15; 228,3.4.15.25; 229,7.21(bis).29.30; 230,14; 231,28; 232,2; 233,3; eutheia/kat' eutheian (sc. kinêsis), rectilinear motion (opp. circular), 206,26.27; 228,15; 231,17.24; 232,17.18.19.28; 233,10; keklasmenê eutheia, deflected straight line, 177,12
- *euthuphoria*, rectilinear motion, 174,26
- *euthus*, (temp.) immediately, 176,11; 193,28; 194,27; 219,4.19.22.26; 220,20; 227,27; 230,18; 234,25.27; (log.) directly, at once (= self-evidently), 177,4; 219,24; 222,1; 223,9; 228,33
- *exarkein*, be sufficient, 166,8; 185,34; 188,18; 211,29
- exêgêtês, commentator, 192,2
- *exergazesthai*, elaborate (an argument), 183,2
- *existasthai*, be displaced from, 193,16; 226,23
- *exôthen*, from outside, 189,1; 213,22; 214,2.15.16; 217,26; 218,4.17; 219,15.19; 220,9.31; 224,10.14; 233,17
- *gar*, for (minimal and default translation of a generic explanatory conjunction used to introduce sentences and clauses in different senses, which may

overlap, and so cannot be consistently translated according to the categories exemplified below):

- (i) explanation of a preceding statement (= 'this is because'; equivalent to *dio*, or a causal conjunction), e.g., 204,4.7.15; 205,4.6.8; 205,10; 233,1 (= *hoti*, 233,2);
- (ii) author's identification of an explanation (cf. Denniston, 67-8), (= 'I mean', 'that is to say', 'i.e.', 'after all'; similar to the explicatory kai (= i.e.) [e.g., 184,15; 186,32; 202,18], kai gar, 'in fact', or toutestin [179,19; 228,33], 'that is', or to explanatory clauses with legein [e.g., 171,20; 222,26]); cf. 233,7 (gar reinforced by oimai, 'I think', 233,8); notable after rhetorical questions (170,5.17; 193,22.26; 206,25), and causal conjunctions, epei, 167,17; 179,16; 182,9; 188,8; 189,6; 196,2; 202,14-15; 203,17; 220,32-220,1, and epeidê, 185,35-6; 201,9; 210,28; 221,8; 223,3.7; 225,7;
- (iii) introducing supporting examples in an argument (cf. Denniston, 66-7); (= 'for [example]'; equivalent to *hoion*), e.g., 165,8; 166,22; 167,9.13.21; 168,18; 170,21.25; 173,21; 176,5; 176,11 [cf. *hoion* at 176,12]; 178,27; 187,1; 208,26; 211,30; 213,1; 219,19; 222,17; 223,3; 233,20;
- (iv) redundantly introducing a statement or argument after a proleptic marker; it can be left untranslated or represented by a colon: e.g., 177,24; 182,20; 185,19; 190,19; 197,20; 199,4.13.24; 201,2.9; 212.17; 222,14; 223,14; 227,31; 228,17; 230,15.23; cf. 169,23, 199,13 and 229,18 where gar is omitted.
- $g\hat{e}$ , earth, 178,17; 179,16.17.22; 205,32; 212,32; 213,15; 216,17; 219,25.26; 223,20
- geêros, made of earth, 217,14.17
- to gegonos, the past, 189,8(bis) (Arist. 233b35-7); 190,9-10.13.23;

*ho gegonôs khronos*, past time, 190,14.15.23

- *geloios*, ridiculous, 171,2(bis).10; 192,20; 215,8; 230,23
- *genesis*, coming to be (opp. *phthora*, ceasing to be); 166,4; 168,15.16.17.18.19; 169,4(bis).21(bis).22; 170,4; 177,29.30(bis); 178,25.26.27.31; 179,7(bis).8; 181,7; 203,8.9.27; 205,23.28.29.30; 206,14.16.21; 209,7.10; 210,15.17.26.27.33; 212,5; 223,16.29; 224,28; 225,30; 226,1.14.18.20.21; 227,8.21.27; 231,4; 232,12(bis); two kinds of *genesis* distinguished, 168,15-19
- *genêtikos*, capable of generating, 224,1; 226,17
- *genêtos*, brought into being, generated, 210,31(bis); 211,31; 213,18; 226,9.19
- genikos, like a genus, 207,1
- *gennân*, generate (time), 211,28 (Arist. 251b18 ex Plat. *Tim.* 38B6)
- *genos*, genus, 174,4.18.22; 175,1; 176,11; 194,7
- geusis, organ of taste, 205,6
- *ginesthai* (or *gignesthai*), (i) come into being (absol.; of substances of any kind), be generated, e.g., 168,10.18(bis).21.27.30; 169,30; 170,3.6; 193,28(bis); 194,1.11; 197,22; 203,18-19; 205,25.27.29; 209,9; 210,19(sec.).23.25; 211,33.35; 212,27; 219,16; 220,27;
- (ii) come into being, come about, occur (of change in general, or specific changes or events), e.g., 165,20; 166,16; 167,19.26; 168,6.9.20; 169,30; 170,9.20; 172,6; 174,29(bis); 175,3.18; 176,26.28; 179,17; 192,4; 193,3; 203,24; 205,13.15; 206,22; 209,2.4; 210,19.20; 212,17; 214,25; 220,25; 235,13.26;
- (iii) come into being (in respect of place), i.e., reach; ginesthai (en), opp. apoginesthai (leave), 183,26-7; 201,24; 216,19; 218,30; 228,17.20.23.25; 229,3.7.14; 230,20.26; 231,3.19;
- (iv) become (something), 168,10.13.14.25; 169,27;

173,23-33; 175,2; 176,3.5.13.17; 177,9.15; 181,22; 182,25; 183,7; 185,34; 186,21; 194,13.14.18; 197,20(ter).21; 203,20(bis);28; 204,10; 208,3; 209,22; 211,9; 214,28; 219,25; 222,13; 225,5; 227,11.12; 228,9.29.31; 230,31; 231,1; 235,8.19; see also gegonos. gnôrimos, evident, recognizable, 185,5; 186,21; 189,29; 191,30; 194,18; 195,23; 196,22 gônia, angle: duo orthai (gôniai), two right angles, 194,5; 213,1 grammê, line, 173,13(ter).15.32; 174,13; 175,1.9; 176,4.8.27; 181,3.20; 182,12(bis).13.25.26; 188,26; 190,10.11; 191,24; 195,17; 197,14; 202,28.29; 229,9; 231,11; 232,4.31; eutheia (grammê), straight line, see euthus hairesis, special condition, 205,30 *hama*, at the same time, simultaneously, *passim*; together (of extremities), (adv. and prep.), 173,23.25; 181,3.7.9.13; 204,15; 205,6*haphê*, contact, 173,31;174,7.8; 181,11; 197,18 *haplôs*, without qualification, 168,9-22; 169,3.4(bis).7.15; 172,9.10; 173,3; 174,25; 176,3.19; 212,31; 214,1.27; 219,13(bis); 224,28; 226,16; 227,3; comp. 170,1 *haplous*, simple (= unidirectional), of motion: 218,12; 232,23.24; 235,16; hapla sômata, uncompounded bodies (= elements), 218,24 haptesthai, to be in contact, 165,11; 173,25(bis).30; 174,6-15; 181,2.6.12.22; 182,2.8.16.17; 186,32; 187,9.12.15; 190,4.6.7; 204,12; 205,2; 206,18.20(bis).21; 208,27; 220,28(bis).29; 234,19.22 hebdomê, seventh day (of month), 175, 17

- *heimarmenos*, fated, 179,1(bis) (Arist. 230a32)
- hêkein, come, 200,25; 231,13
- hêlios, sun, 185,29.31; 225,2
- helkein, pull, 204,7.12; 222,1;

234,10; 235,25.27.28; (= attract magnetically), 234,21

- *helxis*, pulling, 235,28 (opp. ôsis, pushing)
- hêmikuklion, semi-circle, 182,33
- *hêmionos*, mule, 174,9(bis); 233,20
- hêmistadion, a half-stade, 200,2.3.4
- henousthai, be unified, 205,8; 218,8
- *hepesthai*, to follow (be entailed by inference), 209,10; 231,11; to be next, 209,2; 219,19
- *hêsukhazein*, be inactive, 230,21; 234,15
- hêsukhia, inactivity, 213,21
- *heurein*, find, discover, 178,17; 207,29; 226,14
- *hexis*, state, 175,26-33; 176,1(bis); 186,26; 188,9; 206,3.13.14; 211,20; 219,4.13.17; 227,21; 233,26
- *hippos*, horse, 165,10; 171,8; 173,4; 185,6.10.36; 195,12; 208,17
- *histanai*, bring to a stop, 218,9; 228,13
- *histasthai*, come to a stop, 172,3; 198,3-12; 199,2; 201,2.4.7; 216,25; 218,9; 220,12.32; 228,7.13.18; 229,11.16.30; 230,14.27; 231,30.31(bis); 232,8
- hodos, journey, 185,14
- *holoklêros*, in totality, 168,17; 190,23
- holos, whole, total, passim; hola di' holôn khôrein, go as wholes through wholes, 181,13
- *holôs*, in general, 166, 10; 167,13.14.31; 169,13; 170,16; 172,14; 181,5; 182,28; 184,1.20.26; 187,6; 192,21; 194,25; 195,10; 201,23; 203,18; 206,14.16; 208,28; 214,6; 216,11; 218,7; 221,27; 223,29; 224,2; 225,23; 228,8; 229,14; 231,22; 232,12; 234,5.8; (prefixed by a negation) not at all, 171,12; 182,31; 189,3.26; 198,18; 199,8.10; 201,23; 206,14.16; 213,8; 218,7; 228,26; 229,13
- *homalês*, uniform, 176,28; 177,15.16; 235,23.25.31; *homalos*, 176,23,25.27; 177,10.13.14; 233,10
- *homoeidês*, of the same species, 173,12.18.20; 176,13
- *homogenês*, of the same genus, 173,11.19

- *homoios*, like, similar, 206,25; 208,22; 215,23; 236,1
- *homoiôs*, in the same way, identically, 169,6; 178,22.25; 183,11; 184,23.24; 191,13.19; 193,4; 195,16; 196,5.20.23; 197,25; 198,16; 199,20.22; 200,25; 201,21; 202,2; 203,11; 205,7.19; 206,20.29; 209,11; 210,30; 211,2.7; 215,3.12.18; 216,9.22; 224,18(bis); 227,21; 228,8; 229,6; 232,31; 235,23
- *homologein*, agree 184,32; 189,25; 209,6
- *homônumos*, homonymous, 176,8.9; 207,2
- *hôra*, hour, 185,9.
- *horân*, see, 168,8; 190,19; 194,4; 214,16
- horismos, definition, 166, 8; 210, 6.24
- horizein, set limits, 200,19
- horizesthai, be bounded, be within fixed boundaries, 188,5; 203,7; 207,29; 213,8; 231,26.29; 232,28; hôrismenos, bounded, fixed, delimited,187,10; 188,18; 200,16.24; 217,10; en hôrismenois, within fixed limits, 167,6.12
- *hormê*, impulse (= direction of motion), 230,19.21; 231,13; 232,6; *kath' hormên*, in accordance with an impulse (of the motion of animals), 224,10
- hudôr, water, 168,7-23; 169,3.16; 170,9-17; 197,20; 205,32; 213,15; 214,21; 219,30; 225,23; 235,5.11
- *hugeia*, health, 175,15.27.32; 177,22.24; 206,4; 216,13.14; 222,1
- *hugiazein*, (act.) be healthy, 175,28; 193,13; 221,1; (med./pass.) become healthy, be restored to health, 165,8.12; 171,14.15; 175,15; 177,14.24; 178,22; 179,4.6; 193,13(bis); 222,1; 227,14
- hugros, damp (of wood), 205,19
- hugrotês, moistness, 170,12
- *hulê*, matter; 169,6; 205,28; *hupokeimenê hulê*, underlying matter,168,13; 205,31
- huparkein, exist (as a property or state), 167,31; 183,27; 184,1.26.27; 194,19; 199,9; 209,5; 210,8; 211,5; 223,20; 226,4;

- 227,19; 228,12; *huparkhein* c. dat., belong to (= be a property of), 184,19; 194,4.7(bis).8; 195,31; 220,30; 225,19; 226,11; *to huparkhon/ta huparkhonta*, property/properties, 167,31; 168,29-30
- hupenantios, contrary, 226,13
- *huperballein*, exceed (in distance), 187,25.27
- *huperekhein*, exceed (in power), 207,22
- huperokhê, excess, 207,17; 233,31
- *huphistasthai*, subsist (i.e. sustain) (a change), 210,30; resist (motion), 219,28
- *hupnos*, sleep, 214,21; 244,15
- *hupodeiknunai*, demonstrate, 186,11
- hupokeimenon, entity (qua terminus of a change), 167,27(bis). 28(ter).29(ter).31; 168,1.7.8; 169,1(bis); subject, 171,6.12; 175,13.16.25.26; 182,32; 201,26; (adj.), underlying, 168,12; 205,31 (of matter); 205,24 (of a nature); 205,16.23 (of substance); hupokeimenôi (opp. logôi), in substrate (opp. in definition), 228,28
- *hupokeisthai*, be supposed, 175,17; 183,8.14; 185,37; 199,29; 202,8; 211,11
- *hupolambanein*, believe, 179,11; 205,15; 213,6
- *hupomenein*, remain (in an unchanged state), 168,24.25; 170,7; 205,20; 234,26; remain (sc. valid), 211,16; undergo (a change), 171,11, (a consequence), 175,19
- huponoein, guess, 221,29
- *hupothesis*, supposition,170,14; 171,3; 185,33; 188,14; 209,13; 211,1.34; 229,27
- *hupotithesthai*, suppose (as a posit, for the sake of argument, falsely), 177,16; 181,5.23; 182,5; 183,28; 184,30; 185,3.4.19.25; 188,11.13.20.24.28; 193,25; 209,11; 210,11; 211,10; 223,12; 227,5; 231,10

- *hustatos*, final, last, 192,5, 207,28; 221,17; 226,1; 212,12
- *idikos*, unique, 193,1
- *idios*, specific (of a name), 171,25; proper (of a natural place), 216,26; unique (c. gen.), 205,11
- isazein, be at equality, 207,19
- *isorrhopos*, equally balanced (of scales), 207,23
- isoskelês, isosceles (triangle), 194,5
- *isotakhês*, at a constant speed, 186,20; 188,13; 202,5; at a (relatively) equal speed, 184,32; 185,31(bis)
- kakia, vice, 206, 4.7.10
- *kalein*, call (= apply a name or term), 172,1.19; 181,13; 203,18; 205,16.18; *kaloumenos*, so called, 199,23
- *kalkhos*, bronze, 205,17.19; a coin, 207,23
- *kamptein*, turn back (intrans.), 228,15; see *anakamptein*
- *kataballesthai*, be laid down (of foundations), 197,21
- *katalambanein*, dismiss, 167,6; overtake (in a race), 199,24.27; 200,13.15.22.28
- *katamanthanein*, learn, 205,13; 221,25; 223,1
- *katametrein*, measure out (i.e., achieve equivalency as a sub-multiple), 187,24.26; 188,2.4; 202,29
- *katanaliskein*, expend (physical mass ), 181,11
- *kataphasis* (opp. *apophasis*), affirmation, 167,28.30.31; 168,3.5.8.29.32; 169,2.3
- *katapheresthai*, move downward, 234,27; have recourse to (cf. Alex. *in Metaph.* 23,1-2), 170,4
- *kataskeuazein*, establish (a conclusion), 213,3; 214,11
- katêgorein, predicate, 176,23
- katêgorêma, predication, 211,35
- *katêgoria*, category, 169,29; 171,17; 172,13; 174,18.20
- *katekhein*, occupy (a place; an extension), 198,26.29; 200,31; restrain, 219,23

- *kathelkein*, launch (a ship), 215,28; 216,5
- *kath' hauto/hauta*, *per se* (of change), in itself:165,2.7.9.12.16.17; 166,5.26; 167,3(bis); 181,16; 217,7
- *hoi kath' hekasta*, individuals, 208,13-14
- katholou (adv.), totally, 189,11;
  197,3; totally (opp. kata meros),
  213,13; ta katholou (opp. ta kata meros, individuals), universals,
  206,15(bis); hoi katholou logoi,
  general definitions, 230,12
- kathorân, grasp, 187,5
- *keisthai*, be posited (in an argument) 184,17.24; 193,23; 201,9; 210,2; 221,8; 228,23; 233,15; be placed (in succession), 182,7
- *kekinêsthai*, to have moved/change, to have completed motion/change, 169,11; 170,18; 183,23.30; 184,2.13.15.17.18; 186,4; 196,1.3(bis).5(ter).6.7.9.15; 200,6.14; 202,15(bis).16.20; 233,13; 234,4
- *to kenon*, the void, 182,10; 190,12
- *khalkos*, bronze, 205,17.19; (small copper) coin, 207,23
- *khelônê*, tortoise, 185,6.25.26.31.36; 200,1-8
- khôra, area, 216,21
- *khôris*, separately, 210,5; 211,7; 221,17; 221,17; 223,4(bis); 225,20.21.26; 226,5
- *khôrizesthai*, to be separated, 181,19.21; 190,2.4.8
- *khrêsthai*, use, 167,16; 184,10; 186,12; 188,12; 209,14; 212,10; 219,12.14; 228,19; 229,18.19; 232.4
- *khrôma*, colour, 166,28; 167,1(bis).3.7; 175,14; 193,4; 195,29; 205,5; 230,30; 231,1
- *khronos*, time period, *passim*; infinite time, 233,23; specific time, 213,14; see *to nun*
- khumos, flavour, 205,6
- kinein/kineisthai, change (intrans.), be changed, undergo change; move (trans.), move (intrans.); be moved, passim; move over (i.e. traverse a

distance; syn. dierkhesthai), w. dir. obj., 186,1.3; 188,14.21; 202,21.27; 232,22; w. epi + gen., 232,20; kinein kata topon, to produce change in respect of place, 172,3; kineisthai kata topon, to change in respect of place, 202,20.26; 216,16; 225,24; 227,1; kineisthai kata phoran, to change in respect of locomotion, 226,16-17; kuklôi kineisthai, move in a circle, 227,31-2; 232,3.5.11; kineisthai kinêsin, move in a motion, 183,9; 199,20; undergo change(s), 176,12; 215,16-17; 221,25-6; 224,9; 226,8; 227,12-13.18.20-1; 228,4; 233,23-4; see kekinêsthai

- kinêma (plu.), completed change, syn. limit of change (peras kinêseôs), 202,18
- kinêsis, change, motion (= locomotion), passim; hê kata topon kinêsis, change in respect of place (= locomotion), 171,25; 196,22; 204,5\*; 204,7-8(plu.); 214,14; 224,9.13; 225,17-18; 228,5; kinêsis kat' ousian, change in respect of substance, 170,9-10; hê kuklôi (kinêsis), circular motion, 231,11.24; 232,2.24; hê eis ta plagia (kinêsis), motion to the side, 228,14
- *kinêtikos*, capable of producing change, 211,14.17; 212,18; 218,14.17.18.21; 220,22; 223,19; 235,17; *hê kinêtikê dunamis*, the capacity to produce motion, 204,4
- *kinêtos*, changeable/moveable, capable of being changed/moved, 165,12;166,9; 207,18.22; 210,3(bis); 211,15.18; 212,18; 218,22
- *to (prôton) kinoun*, the (first) producer of change, 220,32; 223,6.13.16; 224,20; 225,14; 233,14; 234,8.9; 235,29-30.32; 236,3
- *klasthai*, be deflected, 176,27; 177,12
- *koilainein*, erode, hollow out, 215,24.25.30; 216,1
- koinos, common, 171,25; 172,1;

176,8; 206,24.30; 207,2; general, 173,9

*kôluein*, prevent, 173,12; 179,7; 181,24; 182,9; 211,9; 213,21.22; 214,2.17; 219,5.20.27.28; 228,14

kosmos, world, 209,11.14.16.21.22; apeiroi kosmoi, infinite worlds, 209,8; smikros kosmos, microcosm, 213,23

- *kouphos*, light, 177,8; 217,14; 219,2.8.9.18.20.22; 225,27
- *kouphotês*, lightness, 177,8; 205,1; 235,6
- krasis, blending, 167,18
- *kratein*, have the power (to move an object), 207,19.21(bis)

*kratunein* (absol.), prevail (in argument), 197,8

- *krisimos*, critical (medical; of days), 179,5,6
- *kuklophoria*, circular motion, 174,26 ; 233,9
- *kuklos*, circle, 182,29.31.34; 201,21; 228,15; 231,14.25.26.27;233,2.9; circumference, 236,2; *megistos kuklos*, greatest circle (of the celestial sphere), 202,6; *kuklôi*, circular; see *kinêsis*, *phora* and *pheresthai*
- *kuriôs*, in a strict sense, 168,18; 172,2; 173,19.31; 174,1; 175,3; 177,10; 180,4; 189,21; 224,8; 227,1; 232,34(bis)
- lambanein, identify (a point or distance on a continuum; or a quantity),182,13.14; 194,20; 195,5.7.14.26.29; 196,3.7.8; 197,12; 198,2.11.13.19; 199,15.16; 201,25; 203,1.2; 210,18.21.22.32; 212,4.12; 217,29; 220,23; 232,7.8; 233,31; 234,1.6; take on, acquire (cf. apolambanein, proslambanein), 170,22; 176,22; 219,17; 231,1; 234,24.28; 235,2.7; arkhên lambanein, begin, 221,6
- *legein*, say, state, *passim*; *dikhôs legesthai*, be spoken of in two senses, 187,5-6; *pollakhôs/pleonakhôs legesthai*, be spoken of in many senses, 174,17

- *légein*, leave off, cease, 172,22.23; 197,14
- *leipesthai*, to be left (for discussion or decision, or as the only alternative; cf. *perileipesthai*), 166,4; 178,13; 202,12; 221,3; 222,11.26; 233,25; be
- (numerically) deficient, 200,26-7
- *lêpsis* (plu.), (cognitive) apprehensions, 206,13
- *leptos*, light, 195,15-25
- *léptos*, identifiable, 195,21.25(bis)
- *leukanesthai*, become white, 166,2.27; 175,12; 178,21; 205,21; 214,16; 227,14.16.17; 231,7.8.9
- *leukansis*, (the process of) becoming white, 166,18; 174,21(bis); 177,17
- *leukos*, white, 165,21; 166,2; **167-8**; 169,8.12.14; **172**; 192,1; 193,6; 201,12.15.16.17; 230,29.30.31; 231,3.4(bis).5
- *leukotês*, whiteness, 166,13.18; 167,9; 171,22; 174,21
- *lithousthai*, be turned to stone, 166,22
- *logikos*, rational, 171,21; (comp. adv.), more logically (= in more general terms), 230,14
- logos, account, discussion, 175,30; 189,2; 222,22; 225,16; 232,13; 234,10; argument, 168,26; 182,10; 184,11; 185,25.34; 190,6.32; 192,13.14; 193,15; 195,24; 199,12.23; 200,9.21.29; 201,1.8; 210,19; 211,2.16.32; 212,10.20; 213,32; 214,11; 215,8-13; 221,20; 229,18; 230,28; claim (= assertion of a conclusion), 175,19; 178,26; 182,4; definition, 174,3; 230,13; ratio, 200,11; 212,30.34; 233,30; *kata logon*, in accordance with a ratio, 212,28; reason, reasoning, 207,30; 228,17; 234,14; logon apodidonai, supply a rationale, 212.33: logon poieisthai. formulate an argument, 192,21; pros logon, relevant (to a discussion), 223,18; logôi opp. hupokeimenôi, in definition/in substrate, 228,28
- *loipos*, remaining, (plu.) the rest, 168,4; 189,1; 193,21; 200,4;

205,14; 215,4; 221,17.19; 224,7; 227,7; 228,8.10

- *luein*, solve (a problem), 180,1; 199,13; 200,30; 213,6; 214,10; 234,18
- *lusis*, solution (of a problem), 215,6
- *makhesthai*, to be in conflict (fig.), 211,34
- makros, long, 190,20
- malakos, soft, 216,15; 225,27
- *mallon de*, rather (i.e., more [to the point]), specifically, in fact (introducing specifications or clarifications of a preceding statement), 182,12.31; 187,17; 199,7-8; 214,17; 217,2; 221,27; 230,23; 231,28
- manôsis, rarefaction, 225,27.29
- *manthanein*, learn, 168,26; 214,28; 219,5.7.11.14; 221,30
- *martur*, witness, 211,32
- *mathêmatikos*, mathematician, 191,23
- medimnos, bushel, 208,7
- *megethos*, magnitude (qua divisible continuous extension; syn. diastêma, mêkos) e.g., 181-7; 189,10; 192,14; 195,26.33; 196,3.6; 197,13.17; 198,17; 199,21; 200,6.20; 201,30; megethos sunekhes, continuous magnitude, 181,18.23; 182,4.20; 221,9; *homales megethos*, uniform magnitude, 176,28; 177,3; magnitude *qua* size (of an object; esp. in increase), 171,24; 203,12; 216,25; 225,17; 227,10; magnitude qua physical object, 167,8; 202,9(bis); 207,25.29.30(bis); 208,10; 215,30; 216,1.11; 233,29; apeiron megethos, infinite magnitude, 220,25.27; *peperasmenon megethos*, finite magnitude, 234,6
- *meiôsis*, diminution, 178,24; 215,20.21; 216,24
- *meiousthai*, be diminished, 215,19.22; 216,7.8; 227,15.23; 232,12; 235,3
- *mêkos*, length, 185,13; 186,3.27.28.33; 187,6.14;

188,11.12; 189,7.8.12.13.24; 201,2; 225,26; 229,9; 235,14 melainesthai, become black, 165,21; 166,1; 178,21; 192,6; 214,16; 227,17; 231,7-18 melania, blackness, 166,13; 167,13; 168,28; 171,22; 172,8.9; 230,29 *melas*, black, 166,2; 167,8.24(bis).30; 168,19.31.34; 172,12; 192,1; 193,6 to mellon, the future, 173,24; 189,24.26.31; 190,1.10.14.19.20.22; 191,4.6.8.14; 230,1.5.8; see nun (= arkhê tou mellontos, beginning of the future), 189,23-4; 191,8; 229,32; 230,7 memnêsthai, recall, remember, 166,12; 210,24; 217,8 *menein*, remain, be stable (locally and temporally), 175,29; 180,2; 201,5.7.20.22.23; 205,22.26.31; 212,13; 216,18.21; 218,30; 224,22(bis); 227,28; 233,4 *meristos*, divisible into parts, 202,13.27; 216,9 merizesthai, be divided into parts, 196,4; 208,5.21 *meros*, part, 177,1; 181,10.12.15; 182,34; 184,25; 185,1.2; **187**; **188**; **192**; 193,1; 194,7.9.15; 195,7; 198,11.22.25; 200,16.18.24; 202,1.2.6; 203,10; 215,25.27.30; 217,2; 221; 222,12; en merei, in alternation (of Empedoclean cosmic phases), 209,17.21; 212,21.23; kata meros, in part (of change), 165,15; 166,26; 167,1.2; partially (opp. katholou, totally), 213,13; para meros, in turn (in a recursive sequence), 214,3; ta kata meros (opp. ta katholou), individuals, 206,15 mesêmbria, midday, 233,21 mesos, intermediary (adj. and neuter noun), 167,22; 172,23; 173,12; 220,18; 221,23; 224,29; 228,24; 229,1; middle, 228,27.29.31.33; 232,28.31; 233,1; en mesôi, at the mid-point, 215,20 *mesotês*, mean, 212,2 *metabainein*, change place, 165,6\*.13; 167,10; 177,6; 186,25; 226, 12

*metaballein*, be transformed,

165,2.4.7.10.18; 166,1.2.28; 167,17.19.20.26.27; 170.9.15.22; 172,5.24.25.29; 173,7; 174,24; 177,27.28.29; 191,22-6; 192,5.12.14.22; 193,9.16.22; 194,22.27; 195,6.13; **196**; **197**; 201,10.15; 202,10.11; 206,22; 212,15; 216,13.14; 219,1.10.15.16.21; 220,5.6; 224,33; 225,8; 226,24; 230,29; 231,2; 232,33; *kata topon*, in respect of place, 225,30

metabeblêkenai, to have been transformed, to have undergone/to have completed transformation, 166,15.16; 191,25; 193,10(bis).19.25.26.27(bis); 194,1.8.9; 195,7; 196,10.12.13.15.16.17.20.21.25; 197,1.3.9.10.11.22; 202,12; 211,17; 219,22; 227,20

metabolé, passim, transformation, 165,20; 166,6.22.27; 167,6.12.15.20.25; 168,2; 169,24; 170,3.6.17.21.27; 171,3(bis).15; 191,31; 192,4.9.17.24; 193,18.21; 194,18.19.26.30.32; 195,5.6.10; 196,24; 197,2.5.6; 198,2; 201,9.11; 203,11; 205,15.23; 210,29; 211,5.19; 216,23.28; 223,16.25; 224,32; 227,8; 230,1.31; 231,4; 235,32; 236,1; hê kata topon metabolê, transformation in respect of place (= locomotion), 173,1; 178,16-17; 191,29; 192,11(plu.)

- metakhôrêsis, relocation, 235,16
- *metalambanein*, inter-substitute (in a regressive argument), 186,11; share in, 215,5
- *metalêpsis*, inter-substitution, 186,12.16
- *metapiptein*, be transformed, 170,20.24
- metastasis, repositioning, 235,16
- *metaxu* (prep. c. gen.), (in) between, 173,11; 174,13;
  - 182, 6.7. 11. 12. 14. 15;
  - 190,8.10.11.13; 193,20; 194,32;
  - 201,14; 204,5.14; 205,8; 227,26;
  - 228,22; (adj./adv.), in between,
  - intermediary (often with an article or indefinite pronoun),

- 167,16.17.19; 172,23.25.26;
- 173, 13.17.18; 182, 9.15; 184, 4;
- 193,24.25.26; 196,18; 205,7; 211,9; 224,30; 227,20.23.24; 229,13; *ho metaxu khronos*, the intervening time, 190,19; 209,19(plu.); 212,22(plu.); 228,23; 231,20; *ta metaxu sêmeia*, the intervening points, 229,9.14.21
- *metekhein*, share in, 167,19.21; 172,8; 210,26; 222,24.26; 235,6
- *meterkhesthai*, make a transition, 203,3
- *methistasthai*, undergo transformation, 170,22; 206,1
- *methodos*, (investigative and demonstrative) procedure, 188,12; 210,1; 215,13; 227,7
- *methorion*, border area (Platonic metaphor; cf. Todd [3], 229), 219,12
- *metrein*, measure, 188,1; 233,7.8
- *metron*, measure (of time), 206,24.30
- *migma*, mixture, 212,24; 223,2
- mignusthai, to be mixed, 209,16
- *mikros*, small, 207,32
- mikrotês, smallness, 227,10
- *miktos*, mixed, 227,32; 232,17.18
- *mixis*, mixture, 167,18; 172,7; 177,12
- *mokhlos*, lever, 218,15; 220,10-17 *mokhthêria*, faultiness (of an
- argument; e.g., Arist. Top. 175a21, 175b12), 184,11
- *monas*, unit, 173,16(bis); 174,11.12(bis).14(bis); 176,6;
- 179,12 *monê*, stability,
  - 178,7(bis).8.9.14.18(bis);
- 179,16(bis).19.24; 180,4; 215,14
- *morion*, part (= *meros*), *passim*; 177,16.17; 181,14.18.19.21; 183,11; 184,16; 185,21; 188,18; 192,3.7.19; 193,2(bis); 194,25; 197,3; 199,10.11; 201,23; 206,20; 215,23; 216,1; 217,10; *kata morion* (= *kata meros*), in part, 165,3.8.10.12; 167,4; 217,7
- morphê, figure, 205,14(plu.)
- *mousikos*, educated, 165,4.5(bis).6; 167,8; 168,9-22; 201,16; 219,11.14
- neikos, Strife (Empedoclean cause), 209,19; 212,22

- *neôlkia*, beaching (of a ship), 207,31; 216,2
- *noein*, think, think of, 167,1; 171,2; 186,10; 191,5; 206,18; 219,3; *to nooumenon*, what is thought, 166,28
- *noêtikos*, able to think (of a part of the soul), 206,13
- *nous*, intellect, 206,16; Mind (Anaxagorean cause), 209,16; 212,25; 223,11
- *nukhthêmeron*, full day (i.e. day and night), 185,16
- *to nun*, the now, 182,1(bis); **189-91**; **194**; 195,20; **196**; 198,28.29; 199,10; 200,16.30.32; 202,14-18; 203,5; 205,20; 210,17; **211-12**; 213,12; 223,18; 224,5; 227,5.18.19.31; 228,20.22(bis); 229,4.5.31; 230,8.11(bis; plu.); 231,2; time not composed of nows, 190,6-7; 199,8-9; 200,31; 230,12; see *to mellon* and *to parelthon*
- *oiesthai*, believe, think,170,3.14; 186,30; 189,25; 192,13; 197,4; 201,4.21; 208,2.7; 226,2; 232,8; 233,8; 235,1
- *oikeios*, (its) own, proprietary, 176,14.22; 178,11; 203,12; 206,7; 216,19.21; 218,26; 234,23.29; 235,2.10; relevant (to subject under discussion), 175,30; 230,13.28
- oikeiousthai, to be assimilated, 175,23
- oikhesthai, to be done away with (by argument), 182,30
- okhein, carry, 204,7.13; 234,10
- okhlos, confusion, 192,2
- onkos, mass, 181,11; 193,4; 195,27; 208,11.20 (= weight); 233,19.28; lump (of mobile matter), 201,2.3.5
- onoma, name (n.), 171,23; 176,8; 205,16; (Homeric) epithet, 199,24
- onomazein, name (v.), 165,21; 166,3; 171,19
- ophthalmia, inflammation of the eye, 175,15
- *ophthalmos*, eye, 165,9.11.14; 185,5.17
- opsis, organ of sight, 205,5
- orexis, desire, 214,19

- orophousthai, to be covered with a roof, 206,8.9
- ôsis, pushing, 204,9(bis); 235,28
- ôthein, push, 204,7(bis).12; 234,10; 235,25.27.29(bis)
- *ouketi*, (temp.) no longer, 175,11; 184,3; 185,32; 186,10; 188,17; 189,27; 194,25; 197,2; 199,19; 200,20; 205,16.22; 212,19; 213,32; 218,30; 220,23; 221,26; 224,5; 235,9; (log.) no further (i.e., emphasizing the limit of a claim), 173,27; 178,20; 209,8; 214,5; 220,14; 222,16
- *ta ourania* [*sômata*], the heavenly [bodies], 185,25; 211,28; 225,1.2
- *ouranos*, the heavens, 185,25; 211,28; 225,1.2
- *ousia*, substance, 168,17.35(bis); 169,31; 170,3.4.10.19; 171,20; 175,29; 205,17.23; 226,23
- *to pan*, the universe, 203,15; 209,13.18(bis); 213,22; 224,21
- ta panta, the totality of things, 210,1
- pantôs (adv.), at all events, certainly, 175,25; 176,1; 185,24.27; 187,29; 188,3; 200,13; 210,7.17.26; 211,9; 215,25; 218,25; 219,15; 222,12; 223,10; 227,11.23(bis)
- *paradekhesthai*, admit (a consequence), 182,33; 188,23
- *paradoxos*, paradoxical, 190,28; 207,15(del.)
- *parakeisthai*, be associated (in an argument), 175,29
- *paralambanein*, introduce (into an argument), 167,16
- paralogismos, fallacy, 200,17
- *paralogizesthai*, argue fallaciously, 199,4; 201,22
- paralogos, paradoxical, 201,7
- pareinai, be present, 183,28; 214,7
- parekhein, provide, 192,2; 199,13
- *to pareléluthos /to parelthon*, the past, 189,30\*; 190,18.20.24; 230,7.8; (adj. without article), past, 189,31; 190,16.22; *ho parelthôn / parelêluthôs (khronos)*, 173,24; 190,16; 191,4.5.12; 230,3;
  - peras/teleutê/eskahton tou
  - *parelthontos*, the

limit/terminus/extremity of the past, 190,1.2; 191,7.13; 212,3-4; 229,32; 230,6; see also to gegonos, to parôikhêmenon, to nun

- parenkeisthai, be inserted, 182,8
- *parerkhesthai*, pass over (in discussion), 175,31; pass by (in motion), 189,16
- to parôikhêmenon, the past, 184,21
- *parônumiazein*, use paronymously, 205,17
- *parorân*, fail to see, 212,20
- parormêtikos, exhortative, 208,16
- parousia, presence, 183,18
- paskhein, be acted on, 206,32

*to paskhein*, what is acted on (the category), 166,17; 170,30.31; 218,6.23

- pathêma, affection, 225,27
- *pathêtikos*, affective (quality), 171,21
- *pathos*, (qualitative) affection, 166,6.10.13.17.19; 175,7; 195,30; 205,21; 206,25; 227,9
- pauesthai, cease, 177,23; 194,24; 196,1.10; 198,4; 214,1; 216,28; 229,25; 232,23; 234,20.22.26; 235,3; pauein, make to cease, 228,13
- paula, cessation, 196,15; 198,4
- *pêgnusthai*, solidify, 166,22; freeze, 192,5
- *peperanthai*, to be limited,187,13; 188,9; 233,5
- peperasmenos, finite, 186,31; 187-8; 189,1; 195,10; 199,16.22; 200,12.25; 203,22; 233,28.30; 234,3; 228,3.24; 229,23; 230,14; 232,19; 233,24-6; 234,1.6
- pephukenai, be naturally, be naturally disposed, 172,18(bis).20(bis).24; 173,30; 184,22(bis); 191,1.2.9.11.13; 198,14(bis).15.29; 215,3.19; 217,13.15; 218,26.27
- peras, limit (usu. terminal limit of a continuum; opp. arkhê; syn. teleutê, telos, eis ho),
  173,23(bis).26.28; 176,8.14.22;
  181,12; 184,15; 187,7; 188,6.10;
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228,19.27; 229-32; 233,1-6 peratousthai, be limited, 213,25 periagein, achieve a revolution (of a millstone), 233,21 periekhein, enclose, 190,15 to periekhon, the environment, 214,15.18.24;224,12*perileipesthai*, be left (as the only option in a disjunction), 191,26; 220,31; 223,9 *perimenein*, be stable around (a centre), 233,6 periphereia, circumference, 201,25; 231,26; 232,1; 233,3 *peripherês*, circular, 174,28; 175,1; 206,26; 231,11.21; 232,29 *periphora*, circular motion, 203,15.16 peripiptein, collapse (into unacceptable consequences), 184.6.13*peritteuein*, leave a surplus, 181,10 *perittos*, surplus (adj.), 181,15; 182,28.29 pettesthai, be concocted (of nutriment), 214,23 *phainesthai*, appear, be manifest, 173,7; 175,26; 207,12.17; 210,35; 213,4;214,8*phaios*, grey, 167,24; 168,31; 230,30 phalakrotês, baldness, 208,1 phaneros, obvious (usu. c. ek tôn eiremenôn, 'from what was said'), 167,5; 170,16; 171,17; 172,13.23; 174,1; 183,18; 185,35; 188,24; 192,12; 193,28; 194,10; 195,33; 197,16; 213,13; 214,28; 216,7;217,25; 221,24; 223,6; 225,5.12; 226,5; 227,4; 233,22; 235,21 phantazesthai, form images, 214,23 pherein, carry, 208,20; produce locomotion, 221,29; (pass.) be carried (in a relay), 176,12; be transported (of a medium), 235,8 pheresthai, be in (loco)motion,

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- *philia*, Love (Empedoclean causal force), 209,18; 212,22
- philotimeisthai, be ambitious, 183,2
- *phora*, (loco)motion, 171,10; 172,1;
  174,18.19; 177,7; 179,14; 191,24;
  202,1; 203,13.21.26; 204,12;
  206,25.31; 210,7; 218,21.27.30;
  225,18.20.26; 226.1.3.4.14.20.;
  227,1.4.5.31; 230,16; 232,16; *hê kuklôi* (phora), circular
  (loco)motion, 203,29; 206,25;
  225,13; 227,31; 232,14.17.19.28;
  233,6.8.10; *kineisthai kata phoran*, change in respect of
  locomotion, 226,17.24.27; *phora kata topon*, locomotion, 210,7
- *phthartos*, able to cease to be, 223,30(bis); 232,24
- phtheirein, destroy, 228,14
- phtheiresthai, cease to be, 170,17; 175,20.22; 193,29; 194,1.11; 196,10; 197,25.26; 198,1; 209,3.4.9; 212,13(bis); 216,28.29; 223,26; 226,6; 227,24.28; 228,14; 230,31
- *phthinein*, decrease (v.), 205,9(bis); 227,2
- *phthisis*, decrease (n.), 171,24.25; 179,2; 203,9.12; 224,10; 225,25; 227,10
- *phthora*, ceasing to be, 166,3; 169,6.21.22; 176,26; 177,28.29; 178,1.26-30; 179,6-9; 203,8.9; 209,7.10; 212,16; 216,29; 223,17; 224,28.30; 226,1.2; 227,8.21.26; 231,3; 232,12
- *phulattein*, safeguard, maintain, protect (a supposition in an argument), 175,12; 184,6; 185,32; 200,20; 229,29; 230,8; guard against (a consequence), 212,20; maintain (an acquired power), 235,12
- *phusikos*, natural (change), 224,10; *ho phusikos*, the natural philosopher, 211,29; 212,33; 215,10; *ta phusika (sômata)*, natural bodies, 212,31; 216,18; 220,4

*phusiologoi*, natural philosophers, 232,9

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- *ploion*, boat, 201,30; 202,1; 207,16; 217,30
- podiaios, one-foot long, 186,33
- podôkês, 'swift-footed' (Homeric
- epithet for Achilles), 199,24; 200,1 *poiein*, make, produce (a specific
- result in reasoning or theorizing), 168,17; 175,31; 178,9; 181,14.21(bis); 182,4; 183,1.13.16.23; 184,6; 188,1; 190,19; 191,23; 193,25; 194,32;
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  - 208,16; 210,33; 218,29; 219,8;
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  - 219,1.7; 225,4; make, produce (a
  - general theory), 209,14.17;
  - 211,28; 223,11; *dêlon poiein*,
  - 214,21, make clear; *gnôrimon poiein*, make known,195,23; *to poiein* (opp. *to paskhein*), acting (the category), 170,30(bis); 218,23;

(= arkhesthai), make a beginning, 225,16; deixin poieisthai (= deiknunai), make a demonstration, 192,10; kalôs *poiein* (absol.), perform effectively (of the void), 190,12 *poiêtikos*, capable of producing (motion), 177,10 to poion, Quality (the category), 171,18.19 *poios*, qualified, 171,20(bis) *poiotês*, quality, 170,11(bis).13; 171,22; 174,19; 202,9(bis); 225,17; 226,25pollaplasios, multiplied, 207,5(bis); 208.4pollostêmorios, fractionally smaller, 186,22(bis); 207,6(bis) polos, (celestial) pole, 202,6 poreuesthai, travel, 183,23.24.25.30(bis); 185,11 to poson, Quantity (the category), 171,18to pou, Where (the category), 171,18 pragma, object (in existence), 210,5.10.12.13(bis),25.34; 211,11; 212,13; context, i.e., subject-matter (of a change), 172,27.29; 173,6; 175,3; fact, reality, 170,24; 185,5; 190,28; 229,32; 230,4; a thing to do, 171,4; situations (in the sublunary world) 225,3; anthrôpeia pragmata, human activities, 233,9 pragmateia, systematic treatment (of a subject), 215,7 *pragmateuesthai*, systematically treat (a subject), 209,7 proagein, carry forward (an argument), 211,2 proairesis, preference, 219,6 *proapodeiknunai*, demonstrate in advance, 165,19 proapoleipein, abandon in advance, 208,10 problêma, problem, 229,28 prodiaireisthai, distinguish in advance, 165,3

to poioun, what acts (opp. to paskhon), 218,6; arkhên poieisthai

- proêgeisthai, to have primacy, 226,3
- *proêgoumenôs*, in a primary way, 213,3; (opp. incidentally) 219,30

- *proêkein*, proceed (in an argument), 210,31
- *proekhein*, be ahead (in a race), 200,21.22.23(ter)
- proepideiknunai, demonstrate previously, 184,11
- proienai, go forward, 202,25; (to a form in the process of coming into being), 227,28; progress (through a series, usu. infinite), 220,11.21.22.32; 223,8; advance (in a change), 166,1; 177,30; 235,3; proceed (in an argument or discussion), 195,23; 200,32; 213,29; proienai pro ophthalmôn, to advance before the eyes (= 'stare in the face') (of self-evident facts), 185,18 (cf. 185,5)
- proiesthai, propose, 184,31
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