

G. E. L. OWEN

OXFORD

Τιθέναι τὰ φαινόμενα

The first part of this paper tries to account for an apparent discrepancy between Aristotle's preaching and his practice on a point of method. The second part reinforces the first by suggesting a common source for many of the problems and methods found in the *Physics*.

I

There seems to be a sharp discrepancy between the methods of scientific reasoning recommended in the *Analytics* and those actually followed in the *Physics*. The difference is sometimes taken to lie in the fact that the *Posterior Analytics* pictures a science as a formal deductive system based on necessary truths whereas the *Physics* is more tentative and hospitable both in its premisses and in its methods. But this is too simple a contrast. It is true that for much of the *Physics* Aristotle is not arguing from the definitions of his basic terms but constructing those definitions. He sets out to clarify and harden such common ideas as change and motion, place and time, infinity and continuity, and in doing so he claims to be defining his subject matter¹. But after all the *Analytics* shows interest not only in the finished state of a science but in its essential preliminaries; it describes not only the rigorous de-

¹ *Phys.* III 1, 200 b 12-21.

duction of theorems but the setting up of the ἀρχαί, the set of special hypotheses and definitions, from which the deductions proceed. And the *Physics*, for its part, not only establishes the definitions of its basic concepts but uses them to deduce further theorems, notably in books VI and VIII. The discrepancy between the two works lies rather in the fact that, whereas the *Analytics* tries (though not without confusion and inconsistency) to distinguish the two processes of finding and then applying the principles, the *Physics* takes no pains to hold them apart. But there seems to be a more striking disagreement than this. It concerns the means by which the principles of the science are reached.

In the *Prior Analytics* Aristotle says: «It falls to experience to provide the principles of any subject. In astronomy, for instance, it was astronomical experience that provided the principles of the science, for it was only when the *phainomena* were adequately grasped that the proofs in astronomy were discovered. And the same is true of any art or science whatever»². Elsewhere he draws the same Baconian picture: the *phainomena* must be collected as a prelude to finding the theory which explains them. The method is expressly associated with φυσική and the φυσικός³, and from the stock example in these contexts — astronomy — it seems clear that the *phainomena* in question are empirical observations⁴. Now such a method is plainly at home in the biological works and the meteorology⁵; equally plainly it is not at home in the *Physics*, where as Mgr Mansion observes «tout s'y réduit en général à des

² *An. Pr.* I 30, 46 a 17-22: διὸ τὰς μὲν ἀρχὰς περὶ ἑκαστον εὑρετικὰς ἔστι παραδιδόναι, λέγω δ' ὅλον τὴν ἀστρολογικὴν μὲν εὑρετικὴν τῆς ἀστρολογικῆς ἐπιστήμης (ληφθέντων γὰρ ἡκανῶς τῶν φαινομένων ὅτως εἰσέθησαν αἱ ἀστρολογικαὶ ἀποδείξεις), ὅποιας δὲ καὶ περὶ ἄλλων ὁρμισαυῶν ἔχει τέχνην τε καὶ ἐπιστήμην.

³ *De Part. Anim.* I 1, 639 b 5-10 with 640 a 13-15: *De Caelo* III 7, 306 a 5-17.

⁴ Cf. further *An. Post.* I 13, 78 b 39 with 79 a 2-6; *De Caelo* II 13, 293 a 23-30; 14, 297 a 2-6; *Metaph.* A 8, 1073 b 32-38; BONITZ, *Index* 809 a 34 ff.

⁵ *De Part. Anim.* II 1, 646 a 8-12, referring to *Hist. Anim.* I 7, 491 a 7-14; *Meteor.* III 2, 371 b 18-22 with Olympiodorus' scholium (217.23-27 Snueve. Olympiodorus' reference to *De Gen. et Corr.* is to I 5, not II 8 as Snueve and Ideler think).

analyses plus ou moins poussées de concepts, — analyses guidées souvent et illustrées par des données de l'expérience, plutôt qu'appuyées sur celle-ci»⁶. In this sense of «*phainomena*» it would be grossly misleading for Aristotle to claim that he is establishing the principles of his physics upon a survey of the *phainomena*. And there his critics are often content to leave the matter.

But in other contexts similarly concerned with methods of enquiry «*phainomena*» has another sense⁷. In the *Nicomachean Ethics* Aristotle prefaces his discussion of incontinence with the words: «Here as in other cases we must set down the *phainomena* and begin by considering the difficulties, and so go on to vindicate if possible all the common conceptions about these states of mind, or at any rate most of them and the most important»⁸. Here Sir David Ross translates φαινόμενα by «observed facts», a translation evidently designed to bring Aristotle's programme into conformity with such passages as those already cited. But this can hardly be its sense here. For, in the first place, what Aristotle proceeds to set out are not the observed facts but the ἔνδοξα, the common conceptions on the subject (as the collocation of φαινόμενα and ἔνδοξα in his preface would lead us to expect). He concludes his survey with the words τὰ μὲν οὖν λεγόμενα ταῦτ' ἐστίν⁹, and the λεγόμενα turn out as so often to be partly matters of linguistic usage or, if you prefer, of the conceptual structure revealed by language¹⁰. And, secondly, after this preliminary survey Aristotle turns to Socrates' claim that those who act against their own conviction

⁶ *Introduction à la Physique Aristotélicienne*², p. 211.

⁷ There is a temptation to distinguish this sense as what φαίμενα εἶναι by contrast with what φαίμεθα ὄν. But this overstates the difference; see pp. 89-91 below. Aristotle is ready to use φαίμεθα with the infinitive even of empirical observations, *De An.* I 5, 411 b 19-22.

⁸ *Eth. Nic.* VII 1, 1145 b 2-6: δεῖ δ' ὅσοντες ἐπὶ τῶν ἁλλῶν, τῶν τε τὰ φαίμενα καὶ πᾶσιν διακορησάντας ὅτιον δεῖνόναι μάλα καὶ μὲν πάντα τὰ ἔνδοξα περὶ ταῦτα τὰ πάθη, εἰ δὲ μή, τὰ πλεονεκα καὶ κενότατα.

⁹ *Ibid.* 2, 1145 b 8-20.

¹⁰ Esp. *Ibid.* 1145 b 10-15, 19-20.

of what is best do so in ignorance, and says that this is plainly in conflict with the *phainomena*¹¹. But he does not mean that, as Ross translates it, «the view plainly contradicts the observed facts». For he remarks later that his own conclusion about incontinence seems to coincide with what Socrates wanted to maintain¹², and in reaching it he takes care to answer the question that he had named as a difficulty for Socrates, namely what kind of ignorance must be ascribed to the incontinent man¹³. So Socrates' claim conflicts not with the facts but with what would commonly be said on the subject, and Aristotle does not undertake to save everything that is commonly said. He is anxious, unlike Socrates, to leave a use for the expression «knowing what is right but doing what is wrong», but he is ready to show *a priori* that there is no use for the expression «doing what is wrong in the full knowledge of what is right in the given circumstances»¹⁴. It is in the same sense of the word that all dialectical argument can be said to start from the *phainomena*¹⁵.

This ambiguity in *φανόμενα*, which was seen by Alexander¹⁶, carries with it a corresponding distinction in the use of various connected expressions. *Ἐπαγωγὴ* can be said to establish the principles of science by starting from the data of perception¹⁷.

¹¹ *Eth. Nic.* VII 3, 1145 b 27-28.

¹² *Ibid.* 5, 1147 b 14-15.

¹³ *Ibid.* 3, 1145 b 28-29; 5, 1147 b 15-17.

¹⁴ *Ibid.* 5, 1146 b 35-1147 a 10, 1147 a 24-b 14. But Ross's translation of *φανόμενα* in the two passages 1, 1145 b 3 and 3, 1145 b 28 is at any rate consistent and so superior to that adopted by most scholars from Heliodorus to Gauthier-Jolif, who see that at its first occurrence the word must mean *ἐνδοξα* (τοὺς δοκοῦντας περὶ αὐτῶν λόγους, Heliodorus *Paraphr.* 131.16 Heylbut) but suppose that at its occurrence 25 lines later it means the unquestionable facts (τοὺς πάρεργος, *ibid.* 137.29-30).

¹⁵ *An. Pr.* I 1, 24 b 10-12; *Top.* VIII 5, 159 b 17-23. Cf. *Phys.* IV 1, 208 a 32-34, where the *phainomenon* is the theory as contrasted with the facts (τὰ ὑπόχρητα). At *De Caelo* II 5, 288 a 1-2; 12, 291 b 25; IV 1, 308 a 6; *De Part. Anim.* I 5, 645 a 5, it is the speaker's own view.

¹⁶ *Meteor.* 33.6-9 Stueve.

¹⁷ *An. Post.* II 19, 100 b 3-5; I 18, 81 a 38-b 9.

Yet *ἐπαγωγὴ* is named as one of the two cardinal methods of dialectic¹⁸ and as such must begin from the *ἐνδοξα*, what is accepted by all or most men or by the wise¹⁹, and in this form too it can be used to find the principles of the sciences²⁰. Similarly with the *ἀποδεία*. When the *φανόμενα* are empirical data such as those collected in the biology and meteorology, the *ἀποδεία* associated with them will tend to be questions of empirical fact²¹ or of the explanation of such facts²², or the problem of squaring a recalcitrant fact with an empirical hypothesis²³. In the discussion of incontinence, on the other hand, where the *φανόμενα* are things that men are inclined or accustomed to say on the subject, the *ἀποδεία* that Aristotle sets out are not unexplained or recalcitrant data of observation but logical or philosophical puzzles generated, as such puzzles have been at all times, by exploiting some of the things commonly said. Two of the paradoxes are veterans, due to Socrates and the sophists²⁴. The first of the set ends with the words «If so, we shall have to say that the man of practical wisdom is incontinent, *but no one would say this*» (not that it happens to be false, but that given the established use of the words it is absurd)²⁵. The last ends «But we say (i.e. it is a common form of words) that some men are incontinent, without further qualification»²⁶.

Now if the *Physics* is to be described as setting out from a survey of the *φανόμενα* it is plainly this second sense of the word that is more appropriate. Take as an example the analysis of place. It opens with four arguments for the existence of place of which the first states what *δοκεῖ* (it appeals to established

¹⁸ *Top.* I 12, 105 a 10-19.

¹⁹ *Top.* I 1, 100 b 21-23.

²⁰ *Top.* I 2, 101 a 36-b 4.

²¹ *Meteor.* II 3, 357 b 26-30.

²² *Meteor.* I 13, 349 a 12-14 with a 31-b 2; II 5, 362 a 11-13; *De long. et brev. vitae* 1, 464 b 21-30; *De Gen. Anim.* IV 4, 770 b 28-30 with 771 a 14-17; *Hist. Anim.* VI 37, 580 b 14-17.

²³ *Meteor.* II 2, 355 b 20-32.

²⁴ *Eth. Nic.* VII 3, 1145 b 23-27, 1146 a 21-31.

²⁵ *Ibid.* 1146 a 5-7.

²⁶ *Ibid.* 1146 b 4-5.

ways of talking about physical replacement)²⁷, the third states what certain theorists λέγουσι²⁸, the fourth quotes what Hesiod and the majority νομίζουσι²⁹, and the remaining one relies on the doctrine of natural places which is later taken as an ἐνδοξον³⁰. Of the ἀποδείξεις which follow, one is due to Zeno, one is due to an equally rich source of logical paradoxes of which I shall say more in a later section, and all ultimately depend on the convictions or usage of the many or the wise. Nor are these arguments merely accessory to the main analysis: those of the δοκούντα which survive the preliminary difficulties are taken over as premisses for what follows³¹. «For if the difficulties are resolved and the ἐνδοξα are left standing», as Aristotle says in both the *Physics* and the *Ethics*, «this in itself is a sufficient proof»³². As for ἐπαγωγὴ, when it is used in the argument it proves to be not a review of observed cases but a dialectical survey of the senses of the word «in»³³.

By such arguments the *Physics* ranks itself not with physics, in our sense of the word, but with philosophy. Its data are for the most part the materials not of natural history but of dialectic, and its problems are accordingly not questions of empirical fact but conceptual puzzles. Now this reading of the work is strikingly reinforced, as it seems to me, when we recognize the influence of one other work in particular on the argument of the *Physics*. In a following section of this paper I shall try to show that in the *Physics* Aristotle over and again takes his start, not from his own or others' observations, but from a

²⁷ *Phys.* IV 1, 208 b 1, 5.

²⁸ *Ibid.* 208 b 26.

²⁹ *Ibid.* 208 b 32-33.

³⁰ *Phys.* IV 1, 208 b 8-25; 4, 211 a 4-6 with Ross's note on 5, 212 b 29-34 (*Aristotle's Physics*, p. 580).

³¹ *Phys.* IV 4, 210 b 32-211 a 7. Thus for instance the common conception of place as a container which is not part of what it contains (1, 208 b 1-8; 2, 209 b 28-30) must be rescued from Zeno's puzzle (1, 209 a 23-26; 3, 210 b 22-27) by a survey of the senses of «this is in that» (3, 210 a 14 ff.), and can then be taken as secure (4, 210 b 34-211 a 1).

³² *Eth. Nic.* VII 1, 1145 b 6-7, *Phys.* IV 4, 211 a 7-11. The verb for proof in each case is δεικνύναι.

³³ *Phys.* IV 3, 210 b 8-9 (ἐπαγωγῶς σκοροῦσιν) with 210 a 14-24.

celebrated set of logical paradoxes that may well have appeared during his own early years in the Academy. Far more than that over-mined quarry the *Timaeus*, it is the *Parmenides* which supplies Aristotle in the *Physics* not only with many and perhaps most of his central problems but with the terminology and methods of analysis that he uses to resolve them. But before turning to this evidence let us see whether we are yet in a position to explain the discrepancy from which we set out.

Can we appeal to this ambiguity in Aristotle's terminology in order to explain how such a generalization as that quoted from the *Prior Analytics* could be taken to cover the methods of the *Physics*? By now the ambiguity seems too radical for our purpose. Even within the second sense of φανώμενα, the sense in which it is equated with ἐνδοξα and λεγόμενα, some essential distinctions lie concealed. For an appeal to a λεγόμενον may be an appeal either to common belief about matters of fact³⁴ or to established forms of language³⁵ or to a philosophical thesis claiming the factual virtues of the first and the analytic certainty of the second³⁶. And the broader ambiguity between the two senses of the word was one which Aristotle himself had the means to expose. For when he wishes to restrict φανώμενον to its first sense he calls it expressly a *perceptual* φανώμενον and distinguishes it from an ἐνδοξον³⁷. And in the *De Caelo* it is this more precise form of words that he uses to describe the criterion by which the correctness of our principles in physics must ultimately be assessed³⁸.

I think such considerations show that it is a mistake to ask, in the hope of some quite general answer, what function Aristotle assigns to φανώμενα, or to ἀποδείξεις, or to ἐπαγωγὴ; for they show how the function can vary with the context and style of enquiry. But we have pressed them too hard if they prevent

³⁴ E.g. *Eth. Nic.* I 11, 1101 a 22-24.

³⁵ E.g. *Ibid.* VII 2, 1145 b 19-20; 3, 1146 b 4-5.

³⁶ E.g. *Ibid.* I 8, 1098 b 12-18.

³⁷ τῶν φανωμένων κατὰ τὴν αἰσθησιν, *De Caelo* III 4, 303 a 22-23.

³⁸ *Ibid.* 7, 306 a 16-17.

us from understanding how Aristotle could have taken the formula in the *Analytics* to apply to the *Physics* as well as to the *Historia Animalium*. If there is more than one use for the expression $\kappa\alpha\iota\nu\acute{o}\mu\epsilon\nu\alpha$, the uses have a great deal in common. Thus for example it is not a peculiarity of $\kappa\alpha\iota\nu\acute{o}\mu\epsilon\nu\alpha$ in the second sense that they may fail to stand up to examination; for so may the $\kappa\alpha\iota\nu\acute{o}\mu\epsilon\nu\alpha$ of perception³⁹, and within this latter class Aristotle is careful to specify only the reliable members as a touchstone for the correctness of physical principles⁴⁰. As for his favourite example, astronomy, Aristotle knew (or came to realize) how inadequate were the observations of the astronomers⁴¹. And of the biological «observations» many were bound to be hearsay, $\lambda\epsilon\gamma\acute{o}\mu\epsilon\nu\alpha$, to be treated with caution⁴². Such $\kappa\alpha\iota\nu\acute{o}\mu\epsilon\nu\alpha$ must be «properly established», ascertained to be «true data»⁴³. In the same fashion the $\epsilon\psi\theta\omicron\epsilon\alpha$ must pass the appropriate scrutiny, but in doing so they too become firm data⁴⁴. Nor, if Aristotle associates the $\kappa\alpha\iota\nu\acute{o}\mu\epsilon\nu\alpha$ with $\epsilon\lambda\tau\epsilon\iota\sigma\iota\alpha$, as he does in the text from the *Analytics*, must it be supposed that his words are meant to apply only to $\kappa\alpha\iota\nu\acute{o}\mu\epsilon\nu\alpha$ in the first sense. $\epsilon\psi\theta\omicron\epsilon\alpha$ also rest on experience, even if they misrepresent it⁴⁵. If they did not Aristotle could find no place for them in his epistemology; as it is, an $\epsilon\psi\theta\omicron\epsilon\sigma\iota\nu$ that is shared by all men is *ipso facto* beyond challenge⁴⁶.

Nor is it in the least surprising if Aristotle, writing in the tradition of Parmenides and Protagoras, tended to assimilate these different senses of $\kappa\alpha\iota\nu\acute{o}\mu\epsilon\nu\alpha$. For Parmenides, the $\delta\delta\epsilon\alpha$

³⁹ *De Caelo* II 8, 290 a 13-24 and esp. *Metaph.* I 5, 1010 b 1-11. (On Protagoras cf. p. 91 below.)

⁴⁰ *De Caelo* III 7, 306 a 16-17: $\tau\acute{o}$ $\kappa\alpha\iota\nu\acute{o}\mu\epsilon\nu\omicron\nu$ $\delta\epsilon\iota$ $\kappa\upsilon\lambda\acute{o}\varsigma$ $\kappa\alpha\tau\grave{\alpha}$ $\tau\eta\nu$ $\alpha\iota\sigma\theta\eta\sigma\iota\nu$, «the perceptual *phenomenon* that is reliable when it occurs», *not*, as Tricot translates, «l'évidence toujours souveraine de la perception sensible»: for $\kappa\upsilon\lambda\acute{o}\varsigma$ here cf. *Metaph.* I 5, 1010 b 14-19.

⁴¹ *De Part. Anim.* I 5, 644 b 24-28.

⁴² E.g. *Hist. Anim.* II 1, 501 a 25-b 1.

⁴³ *An. Pr.* I 30, 46 a 20, 25.

⁴⁴ *Phys.* IV 4, 210 b 32-34, 211 a 7-11, *Eth. Nic.* VII 1, 1145 b 6-7.

⁴⁵ E.g. *De Dico. per Som.* 1, 462 b 14-18.

⁴⁶ *Eth. Nic.* X 2, 1172 b 36-1173 a 1, cf. VII 14, 1153 b 27-28, *Eth. Eud.* I 6, 1216 b 26-35.

$\beta\omicron\epsilon\omicron\tau\epsilon\iota\alpha$ include not only the supposed evidence of the senses but the common assumptions (and specifically the common uses of language) which form men's picture of the physical world⁴⁷. As for Protagoras, both Plato and Aristotle represent his theory as applying indifferently to perceptual phenomena and $\epsilon\psi\theta\omicron\epsilon\alpha$, and use $\kappa\alpha\iota\nu\acute{o}\mu\epsilon\nu\alpha$ in describing both these applications⁴⁸. It is the same broad use of the word that is to be found in the formula from the *Prior Analytics*. In the *De Caelo*, it is true, Aristotle observes that it is the $\kappa\alpha\iota\nu\acute{o}\mu\epsilon\nu\alpha$ of perception by which we must ultimately test the adequacy of our principles in physics⁴⁹; but this is said of $\kappa\upsilon\lambda\acute{o}\varsigma$ as a whole, a body of science in which the analyses of the *Physics* proper are preliminary to other more empirical enquiries and consequently must be justified, in the last resort, by their success in making sense of the observations to which they are applied. But this is not to say (and it does not commit Aristotle to supposing) that in the *Physics* proper the analyses either start from or are closely controlled by our inspections of the world. Nor in fact is he liable to consider his analyses endangered by such inspections: if his account of motion shows that any unnatural movement requires an agent of motion in constant touch with the moving body, the movement of a thrown ball can be explained by inventing a set of unseen agents to fill the gap⁵⁰. The *phenomena* to which the *Physics* pays most attention are the familiar data of dialectic, and from the context in the *Prior Analytics* it seems clear that Aristotle's words there are meant to cover the use of such data. For in concluding the passage and the discussion in which it occurs Aristotle observes that he has been talking at large about the ways in which the premisses of deductive argument are to be chosen; and he refers for a more detailed treatment of the same matter to the «treatise on dialectic»⁵¹. He

⁴⁷ A conflation helped by talking as though data of perception were themselves arbitrary assumptions (B 8, 38-41 Diels-Kranz). On the «common uses of language» see B 8, 53; B 9; B 8, 38.

⁴⁸ *Crat.* 386 a 1; *Metaph.* I 5, 1010 b 1, 1009 a 38-b 2.

⁴⁹ *De Caelo* III 7, 306 a 16-17.

⁵⁰ *Phys.* VIII 10, 266 b 27-267 a 20.

⁵¹ *An. Pr.* I 30, 46 a 28-30.

evidently has in mind the claim made in the *Topics* that the first premisses of scientific argument can be established by methods which start from the ἐνδοξα.⁵²

II

I turn to the part played by the *Parmenides*, and specifically by the arguments in which «Aristotle» is the interlocutor, in shaping the *Physics*. Perhaps it is by misreading the *Physics* as a confused and cross-bred attempt at empirical science that critics have been led to look for its antecedents elsewhere and so to make excessive claims for its originality. So it is worth dwelling on this particular Platonic influence, partly for the light that it throws on the methods and interests of Aristotle's work, partly to call in question the claim that «the discussions in books III-VI... attack a series of problems for which there was little in Plato's teaching to prepare the way»⁵³, and partly to establish, if this needs establishing, that the *Parmenides* was not read by the Academy either as a joke or as a primer of fallacies.⁵⁴ What the positive aims of the dialogue may have been does not concern us; the present enquiry is a necessary preliminary to settling such questions.

Consider the celebrated account of the point. It is Plato in the *Parmenides* who argues first that what is indivisible (viz. the One, which cannot be plural and so has no parts) cannot have a location. For to have a location is to have surroundings, i.e. to be contained in something; and this is to be contained either in something other than oneself or in oneself. But to be contained in something other than oneself is to have a circum-

⁵² *Top.* I 2, 101 a 36-b 4. Ross seems to mistake the sense of the *An. Pr.* text (46 a 28-30) when he writes: «It is of course only the selection of premisses of *dialectical* reasoning that is discussed in the *Topics*; the nature of the premisses of scientific reasoning is discussed in the *Posterior Analytics*» (*Aristotle's Prior and Posterior Analytics*, p. 396). But in this passage Aristotle is concerned with finding the principles of scientific reasoning, and must be thinking of the claim made in the *Topics* to find such principles dialectically.

⁵³ Ross, *Aristotle's Physics*, p. 9.

⁵⁴ In this respect what follows can be read as complementary to Prof.

ference and to be in contact with that other thing at various points, and an indivisible thing cannot have various points or a circumference distinct from its centre. Nor can a thing without parts be contained in itself, for this would entail dividing it into container and contained, and no such division of it is possible. «Hence it is not anywhere, since it is neither in itself nor in another»⁵⁵. This concept of place as surroundings is normal in Greek philosophy, as the arguments of Zeno and Gorgias show (and in ordinary conversation, which has small use for plotting objects by Cartesian co-ordinates, it still is so). Aristotle took it over as an ἐνδοξον and made a more sophisticated version of it in the fourth book of the *Physics*. And one problem that he raises at the start of his argument depends on the assumption that if a point has any location it must be its own location, an assumption that flatly conflicts with the received view that place is a container distinct from the thing contained.⁵⁶ Aristotle does not argue the assumption; plainly he is drawing on Plato's argument that an indivisible cannot be contained in something else, nor yet can there be any distinction within it between container and contained. And he concludes that a point cannot be said to have a location.⁵⁷

On the way to this conclusion, and as a preface to his general account of place, he lists the different senses in which one thing can be said to be in another⁵⁸, and follows this with an argument to show that a thing cannot be said to be in itself except in the loose sense that it may be a whole having parts present in it⁵⁹. This sense is sharply distinguished from the «strictest sense of all», that in which a thing is said to be in a place⁶⁰. Why does he spend so much time on this? Because

D. J. ALAN's essay in *Aristotle and Plato in the Mid-fourth Century* (*Aristotle and the Parmenides*).

⁵⁵ *Parm.* 138 a 2-b 6 (Burnet's lineation). The lack of shape and circumference is proved in 137 d 8-138 a 1.

⁵⁶ *Phys.* IV 1, 209 a 7-13.

⁵⁷ *Phys.* IV 5, 212 b 24-25.

⁵⁸ *Phys.* IV 3, 210 a 14-24.

⁵⁹ *Ibid.* 210 a 25-b 22.

⁶⁰ *Ibid.* 210 a 24.

of further arguments in the *Parmenides*. Having maintained, in the first arm of his argument about the One, that an indivisible cannot be contained in itself, Plato goes on in the second arm to reduce his subject to a whole of parts and so, by dubious steps, to reimport the notion of place. For (a) since the subject is in itself in the sense that all its parts are contained in it⁶¹, it is always «in the same thing», i.e. in the same place and hence at rest⁶²; and (b) since the subject is not in itself, in the sense that as a whole it is not contained in any or all of its parts, it must be always in something else⁶³ and so never at rest⁶⁴. Among other eccentricities, the argument clearly relies on (and I think is clearly out to expose) an ambiguity in the form of expression «being in so-and-so»: it shows that any sense of the phrase in which a thing can be said to be in itself cannot be the appropriate sense for talking of location, otherwise paradoxes result. Anaxagoras had traded on this ambiguity⁶⁵, and no doubt Plato wrote with Anaxagoras in mind; but that Aristotle's arguments are framed primarily with a view to those of the *Parmenides* is shown by the fact that he mentions Anaxagoras' thesis not in this context but elsewhere and by the clear echoes of Plato's language in his own⁶⁶.

Points, then, cannot have location. And it is Plato who first proves the corollary, that something without parts cannot be said to move. But his reason is not just that what has no location cannot be said to change location. It is that to move to a certain place is a process, and there must be some intermediate stage of the process at which the moving body has ar-

⁶¹ *Parm.*, 145 b 6-c 7.

⁶² *Parm.*, 145 e 7-146 a 3.

⁶³ *Parm.*, 145 c 7-e 3.

⁶⁴ *Parm.*, 146 a 3-6.

⁶⁵ *Phys.*, III 5, 205 b 1-5.

⁶⁶ E.g. *Phys.*, IV 3, 210 a 25-26 = *Parm.*, 145 d 7-e 1; *Phys.*, IV 3, 210 a 27-29 = *Parm.*, 145 c 4-7. Notice too that by μέν here Plato means attributes of the subject, i.e. its being and unity and their derivatives (cf. 142 d 1-5); and that in the corresponding context of the *Physics* Aristotle corrects this use of the word by pointing out that attributes may be contained κατὰ μέν in the subject not as being μέν themselves (which he rejects, *Cat.* 2, 1 a 24-25) but as being attributes of μέν (*Phys.*, IV 3, 210 a 29-30).

rived partly but not altogether⁶⁷. And it is just this argument that Aristotle in the *Physics* takes over and generalizes, so that it applies to other forms of change besides locomotion⁶⁸. Again, Plato prefaces his proof that an indivisible thing cannot change place by showing that it cannot even rotate in one place, since rotation entails a distinction between a centre and other parts⁶⁹; and with this in mind Aristotle prefaces *his* argument by noticing the case in which a point might be said to move if it were part of a rotating body, but only because the whole body, which has a distinct centre and circumference, can be said to move in the strict sense⁷⁰. Since it is often mistakenly said that Aristotle accepted the definition of a line as the path of a moving point⁷¹, it is worth stressing how thoroughly he accepts Plato's reduction of this idea to absurdity — a *reductio* which no doubt counted as part of Plato's «war against the whole class of points»⁷².

Again, consider the account of a connected concept, continuity. In the *Parmenides* Plato defines «contact» (ἄρτεσθαι) in terms of «succession» (ἐφεξής) and «neighbouring position» (ἐχόμενῃ γόρῳ)⁷³. These terms Aristotle takes up in the fifth book of the *Physics*. «Contact» he defines as holding between terms whose extremities are together, i.e. in one and the same place⁷⁴; an unhappy suggestion, since in themselves extremities can have no magnitude and so no position. And then,

⁶⁷ *Parm.*, 138 d 2-e 7.

⁶⁸ *Phys.*, VI 10, 240 b 8-241 a 6.

⁶⁹ *Parm.*, 138 c 7-d 2.

⁷⁰ *Phys.*, VI 10, 240 b 15-20.

⁷¹ E.g. by HEATH, *Mathematics in Aristotle*, p. 117; he cites *De An.*, I 4, 409 a 4-5, where Aristotle is reporting someone else's theory. Of other passages which seem to imply this view *Phys.*, IV 11, 219 b 16-20 can be read otherwise and *Phys.*, V 4, 227 b 16-17 may represent an objector's view. But Aristotle does inconsistently credit points with location at *An. Post.* I 27, 87 a 36; 32, 88 a 33-34; *Metaph.*, Δ 6, 1016 b 25-26, 30-31, and perhaps with the possibility of being in contact at *Phys.*, V 3, 227 a 27-30 (but this seems to depend on the unaristotelian thesis in lines 27-28).

⁷² *Metaph.*, A 9, 992 a 19-22.

⁷³ *Parm.*, 148 e 7-10.

⁷⁴ *Phys.*, V 3, 226 b 23. «Together» (ἵνα) is defined in 226 b 21-22.

changing Plato's order of definition, he defines «neighbouring» (ἐχόμενον) in terms of «contact» and «succession».⁷⁵ From both accounts, it is clear, the same implication can be derived: Plato, by defining contact in terms of neighbouring *position*, and Aristotle, by defining it in terms of things having *extremities*, preclude the attempt to talk of a series of points as having contact with each other and so making up a line or any other magnitude. But this result only follows from Plato's definition if it is coupled with the argument that an indivisible thing cannot have position; and no doubt it was this that determined Aristotle to reform the definition so that the conclusion would follow directly from the simple premiss that a point has no parts or extremities. This reordering of the definition would not have served Plato's purpose, for in this particular chain of reasoning in the *Parmenides* he reserves the right to treat his subject as indivisible⁷⁶ without committing himself to the conclusion that it can therefore have no location. His definition allows him to talk of an indivisible thing as having contact with something else, and when he proves that it cannot have contact with itself it is on other grounds than the mere lack of location⁷⁷. As a result his proof is valid for all things and not merely for indivisibles. But it is plain that his definition of contact, taken together with his denial of location to indivisibles, produces exactly the conclusions which Aristotle draws from his own definitions at the beginning of the sixth book of the *Physics*⁷⁸, namely that there is no sense in saying that lines are collections of points in contact. It was in the *Parmenides* that Aristotle found not only the general approach to his problem but the special ideas in terms of which he treats it⁷⁹.

⁷⁵ *Phys.* V 3, 227 a 6-7.

⁷⁶ *Parm.* 147 a 8-b 2; but earlier in the same movement he has treated it as divisible into parts and continues to do so later.

⁷⁷ *Parm.* 148 e 10-149 a 3.

⁷⁸ *Phys.* VI 1, 231 a 21-b 10.

⁷⁹ Another such term in the same context is χωρίς (*Parm.* 149 a 5), taken over and defined by Aristotle. And there are other reminiscences of Plato's treatment of these ideas. One is the comment at *Phys.* I 2, 185 b 11-16, which

There is another point in these contexts at which Aristotle corrects Plato. For Plato, contact requires *immediate* (εὐθύς) succession in the contiguous terms, and this immediacy he explains by saying that they must occupy neighbouring positions⁸⁰. But a little later he explains this requirement in turn by saying that there must be no third thing between the two terms⁸¹, and Aristotle is anxious to find room for this condition too in his definitions. He cannot use it to define «neighbouring», since he has another definition of that concept in view; so he uses it to define «successive»⁸², and in doing so he adds an important qualification: there must be nothing between the terms of *the same kind as themselves*⁸³. If A B C are consecutive sections of a straight line, C cannot follow ἐπεὶ ἔστιν after A, but it evidently can do so if B is merely a point. In correcting Plato here Aristotle may have in mind the treatment of limits in one passage of the *Parmenides* as parts of a thing; logically comparable with what lies between them⁸⁴; but this is a treatment that Plato's own argument enables Aristotle to reject.

There is an embarrassing wealth of examples of this influence in the *Physics*, and I shall not bore you with them all. But one group is too important to omit. We saw earlier that, in arguing that an indivisible thing cannot move, Plato (and Aristotle after him) treated movement as a process taking time and having intermediate stages. As Aristotle would say, it is a continuous change, divisible into parts which are themselves changes taking time. But later in the *Parmenides* Plato argues that if a change is construed as the passage from not-A to A the change must be instantaneous; for there is no time

Aristotle admits to be irrelevant to the argument in hand. Why does he introduce it? Because he has just mentioned continuity, and this reminds him to Plato's argument in this connexion that, since the parts can be distinguished from the whole, the whole can have contact with itself (*Parm.* 148 d 6-7, 148 e 1-3).

⁸⁰ *Parm.* 148 e 7-10.

⁸¹ *Parm.* 149 a 6.

⁸² *Phys.* V 3, 226 b 34-227 a 4.

⁸³ *Phys.* V 3, 227 a 1, cf. VI 1, 231 b 8-9.

⁸⁴ *Parm.* 137 d 4-5.

in which a thing can be neither A nor not-A, neither at rest (for instance) nor in motion⁸⁵. And this introduction of changes which are not processes is carefully prepared by some earlier arguments. Twice — once in each of the first two chains of argument about the One — Plato discusses the logic of growing older. In the first argument⁸⁶ he considers it as a special case of becoming different; and he argues that if X is becoming different from Y it cannot be the case that Y already is different from X, since otherwise X would already be different from Y and not merely becoming so. All that follows from «X is becoming different from Y» is another proposition about becoming, «Y is becoming different from X». The conclusion is applied forthwith to the particular case, to show that if X is becoming older than itself it is at the same time becoming younger. But on a later page the same example is taken up again⁸⁷. Now Plato argues that at any moment during the process of growing older the subject must *be* older; at any stage of becoming different, the thing must already be different. For to say that it is becoming different is to say something about its future as well as its present; but so far as the bare present is concerned, it must already be something that it was becoming, given that the process of change is under way at all. Thus the argument relies heavily on the law of excluded middle: either the changing thing is already different, or it is not. If it is not, the process of change is not yet under way. And if it is, then the old conclusion, that from «X is becoming different from Y» we can infer only what X and Y are becoming and not what they are, breaks down. The old conclusion relied on inserting a *tertium quid* between «X is different» and «X is not different», namely «X is becoming different», something temporally intermediate between the first two; but such a *tertium quid* is ruled out by the law of excluded middle. Yet it is just this law that leads to the problem of instantaneous change with which we began; for Plato goes on to argue that,

⁸⁵ *Parm.* 156 c 6-7: the whole context is 155 e 4-157 b 5.

⁸⁶ *Parm.* 141 a 6-c 4.

⁸⁷ *Parm.* 152 a 5-e 3.

if there is no time in which a thing can be neither A nor not-A, neither still nor moving, it baffles us to say when it makes the change from the one to the other⁸⁸. When it changes from rest to motion it cannot be either at rest (for then the change would be still to come) or moving (for then the change would be past). Yet the change is not to be talked away: «if a thing changes, it *changes*»⁸⁹.

Here then is the problem, and the whole context of argument, taken over by Aristotle. It is generally held that Plato's purpose was to show that there can be no *period* of time during which a thing is neither A nor not-A, and consequently that the change from one to the other must occur at a moment of time⁹⁰. But Aristotle evidently thought the puzzle more radical, and I think he was right. For by the same law of excluded middle not only is there no period but there is no point of time at which a thing can be neither A nor not-A. At any rate, whether Aristotle is enlarging or merely preserving Plato's problem, he gives it considerable space in the *Physics*. He agrees that some changes take no time at all⁹¹. Among other instances he cites the recovery of health, which is «a change to health and to nothing else»⁹²; in other words, although the process towards recovery may take time, the actual recovery is simply the change from not-A to A⁹³. In any process of change to a given state there will be a similar completion of

⁸⁸ *Parm.* 156 c 1-7.

⁸⁹ *Parm.* 156 c 7-8: «Ἄλλ' οὐδὲ μὴν μεταβάλλει ὄνεν τοῦ μεταβάλλειν. CORNFORD (*Plato and Parmenides*, p. 200, n. 2) mistakes the sense, insisting that the statement is «intelligible only if we suppose that Plato shifts here from the common use of μεταβάλλειν for 'change' in general to the stricter sense of 'transition' or passing from one state to another». What Plato means is like our truism «business is business» — sc. it musn't be taken for anything else or explained away. He would probably regard Aristotle as explaining such changes away.

⁹⁰ Cornford goes so far as to call it a «businesslike account of the instant» (*Ibid.*, p. 203).

⁹¹ *Phys.* VIII 3, 253 b 21-30, cf. I 3, 186 a 13-16.

⁹² *Phys.* VIII 3, 253 b 26-28.

⁹³ Ross explains is otherwise; but for the treatment of ὅτι ὡς ὡς as the limit of a μέγιστος cf. *Metaph.* Θ 6, 1048 b 18-23.

the change, and this will take no time⁹⁴: the argument at once recalls Plato's discussion of the transition from movement to stillness. Later, in the eighth book, Aristotle faces the problem squarely. It will not help, he argues, to postulate a time-atom between the period in which something is not white and the subsequent period in which it is white, with a view simply to providing a time for the change to occur from not-white to white. For one thing, time-atoms cannot be consecutive to periods of time or to other time-atoms, just as points cannot have contact either with lines or with other points. Moreover the suggestion would set a regress on foot. For when we have postulated one time-atom to house the change from not-white to white, there will be another change to be accommodated in the same way: the change from changing to being white⁹⁵. In brief, Aristotle takes the puzzle to show that it is a mistake to look for a special time-reference such that the subject is then neither white nor not-white. The primary moment at which the subject becomes (or, as Aristotle prefers to say, has become) white is the first moment at which it is white⁹⁶. And, given this moment, it becomes improper to talk of the last moment at which the subject was *not* white, for the two moments would have to be consecutive⁹⁷. Equally, given a last moment of stability there cannot be a first moment of change⁹⁸. And Aristotle, having thus saved the situation and the law of excluded middle, can take over without qualms the moral of Plato's second analysis of growing older: namely that at any time

⁹⁴ *Phys.* VI 5, 235 b 32-236 a 7.

⁹⁵ *Phys.* VIII 8, 263 b 26-264 a 1.

⁹⁶ *Ibid.* 263 b 9-26, 264 a 2-4, cf. the earlier argument in VI 5, 235 b 32-236 a 7. The solution of Plato's puzzle given in *Physics* VIII 8 is more trenchant

than the earlier reply in VI 9 (240 a 19-29): there Aristotle suggested that even between not-A and A a *tertium quid* could be inserted, viz. when the subject is neither *wholly* not-A nor *wholly* A; but this is easily defeated by reformulating the contradictions as "wholly A" and "not wholly A". Just as the reply to Zeno which is given in VI 9 is admitted to be inadequate in VIII 8 (263 a 15-18), so the reply to Plato's puzzle given in VI 9 is superseded in the same later chapter.

⁹⁷ *Phys.* VIII 8, 264 a 3-4.

⁹⁸ *Phys.* VI 5, 236 a 7-27.

during the period in which a thing is becoming different, it has already completed a change and to that extent is different from what it was⁹⁹.

His reply to Plato's puzzle has side-effects on other discussions. To underline the paradox, Plato had called all change from not-A to A «sudden» change (ἐξαίφνης)¹⁰⁰. Aristotle restores the word to its proper use: it is used of what departs from its previous condition in an imperceptibly short time¹⁰¹. But all change, he adds, involves departing from a previous condition; and his motive for adding this is clear. He has in mind that because of this characteristic Plato had tried to reduce all change to sudden change, and he implies that this was a misleading extension of the word's use. There is nothing physically startling in most changes and nothing logically startling in any of them.

There is no need to go on. It might indeed be objected that the evidence does not necessarily show that Aristotle was indebted to the *Parmenides*; both Plato and Aristotle may have been drawing on a lost source. These problems were surely discussed in the Academy¹⁰², and the Academy in turn must surely have drawn on earlier arguments, in particular those of Zeno and Gorgias. The general purposes of this paper would be as well served by such a theory, but it cannot account for the intricate correspondence that we have seen in our two texts. Gorgias' part in the matter is guesswork: the evidence for his sole adventure into abstract thought has been contaminated, probably beyond cure, by traditions to which both the *Parmenides* and the *Physics* contributed. Of Zeno luckily we know more; we know that Plato does echo some arguments of Zeno,

⁹⁹ *Phys.* VI 6, 236 b 32-237 a 17.

¹⁰⁰ *Parm.* 156 d 1-e3.

¹⁰¹ *Phys.* IV 13, 222 b 14-16.

¹⁰² We know for instance that others had tried to define continuity (*Phys.* III 1, 200 b 18-20), though they did not make use of the nexus of ideas common to Plato's and Aristotle's treatments of the subject; hence Aristotle can take over their definition at the start of the *Physics* (I 2, 185 b 10-11) before producing his own revision of Plato's account.

but that he transforms them radically for his own ends.¹⁰⁸ The *Parmenides* was not an historical anthology, and when Aristotle's words and ideas coincide closely with those of the dialogue he is under the spell of a work of astonishing brilliance and originality. A work, moreover, of logic or dialectic, not in the least a piece of empirical science; and the *Physics* is in great parts its successor.

This is not to say, of course, that Aristotle would call his methods in the *Physics* wholly dialectical. He, and his commentators on his behalf, have insisted on the distinction between «physical» and «dialectical», or «logical», or «universal», arguments; and no doubt some of the reasoning in the *Physics* falls within the first class. Yet even if the distinction were (as it seldom is) sharp and fundamental in sciences where a knowledge of particular empirical fact is in question¹⁰⁹, we need not expect it to be so in such an enquiry as the *Physics*. This is clear from the one major example of the contrast that is offered in the work, the dialectical and physical proofs that there can be no infinite physical body¹⁰⁶. The dialectical proof is evidently distinguished by the fact that it proves too much:

¹⁰⁸ The *Arrow* underlies *Parm.* 152 b 2-d 2, and the argument of B 1 and 2 in Diels-Kranz (the resolution of a thing into its fractions without ever reaching ultimate units) underlies *Parm.* 164 c 8-d 4 and 165 a 5-b 6. I have not been convinced by Hermann Fraenkel's interpretation of B 3, nor therefore by his claim that it underlies the last-mentioned passages of the dialogue (*Zeno of Elea's attacks on plurality*, Am. Journ. Philol. LXIII (1942), pp. 6, 198-9 = *Wege und Formen* pp. 203, 227-8). Fraenkel is also inclined to see the *Arrow* behind *Parm.* 145-146 (*art. cit.*, p. 13 n. 33 = *Wege und Formen* p. 210 n. 1), where others will more readily detect Anaxagoras (cf. p. 94 above); and he sees B 4 behind *Parm.* 156 c-d (*ibid.* pp. 11-13 = pp. 207-209). He says all that is necessary for my purpose when he observes that in such echoes "Plato modifies the argument and...transfers it, as it were, to a higher order".

¹⁰⁹ E.g. *De Gen. Anim.* II 8, 747 b 27-748 a 16.

¹⁰⁶ *Phys.* III 5, 204 b 4-206 a 8. There is a second use of the same distinction (unnoticed by Bonitz s.v. λογικῶς) at VIII 8, 264 a 7-9, and here too it proves elusive. The "logical" arguments can hardly be marked by their generality (the λόγος μᾶλλον οἰκείος at 264 b 1-2 itself applies to kinds of change other than movement) nor the «physical» by their reliance on the special theorems of physics (the «logical» also may do this, 264 a 24).

starting from a definition that applies to mathematical as well as to physical solids, it reaches conclusions that apply to both sciences¹⁰⁶. Yet immediately after his promise to turn to physical arguments Aristotle produces a proof that no complex body can be infinite, and this proof shares the characteristics of its predecessor. It relies partly on quite general definitions of «body» and «infinite»¹⁰⁷, partly on a treatment of the ratio between finite and infinite terms which could be formulated quite generally¹⁰⁸ and which in fact is later given a different application to speed and resistance¹⁰⁹; and partly, perhaps, on the argument against an infinite number of elements which occurs in the first book and relies largely on quite general premises¹¹⁰. Certainly there are other arguments in the context which seem to depend on special empirical claims, such as the unfortunate hypothesis of natural places¹¹¹. But the impulse throughout the work is logical, and the restriction of its subject-matter to movable bodies and their characteristics does not entail a radical difference of method from other logical enquiries. It makes for better understanding to recall that in Aristotle's classification of the sciences the discussions of time and movement in the *Parmenides* are also physics.

¹⁰⁶ *Phys.* III 5, 204 b 4-7, cf. Ross's notes on 204 b 4, 204 b 6.

¹⁰⁷ *Ibid.* 204 b 20-21.

¹⁰⁸ *Ibid.* 204 b 11-19: a particularly clear case of the artificial restriction of a general theorem of proportion so as to bring it within «physics».

¹⁰⁹ *Phys.* IV 8, 215 b 10-216 a 11.

¹¹⁰ *Phys.* III 5, 204 b 12-13; I 6, 189 a 12-20.

¹¹¹ *Phys.* III 5, 205 a 10-12; but for the treatment of this too as an ἐνδοθεῖον see n. 30 above.