

17. 431d-32a, cf. 442c10 ff. and 586e4-87a1, but compare 442a where education seems confined to the two upper classes.
18. It is implied though that the producers are despised by the more fortunate because of their weak reason and consequent inability to control themselves (590c).
19. 433d, cf. 431c; 469c4-5.
20. 431b9-d2, cf. 442a4-b3 and 589a6-b6.

CHAPTER 7

Plato's Ideal of Science

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- I. Existing only in the mind; *broadly* lacking in practicality.
- II. A standard of perfection, beauty, or excellence.

The focal point of this paper is a passage from the *Republic* of Plato, more precisely 530b6-c1.¹ There Socrates argues for an alternative way of doing astronomy by leaving the things in the heavens alone. This passage has been at the centre of discussions about Plato's view on science and the sciences.² I am not going to give a detailed analysis of this passage nor am I going to give a comprehensive account of 'Plato's philosophy of science'.³ What follows are some general observations on this much discussed passage.

Histories of early Greek science usually include all the characters treated in histories of early Greek philosophy, plus some more. The most notable addition is the Hippocratics. According to Benjamin Farrington, in his history of Greek science,⁴ the best of the Hippocratic doctors 'advanced fully to the idea of positive science', but only to the idea as they were constrained by the material conditions of their time. By positive he means *empirical* and *inductive* as we recognise the terms today. The heroes, in this kind of history, are those who practised *historia*, usually translated as 'inquiry'. In Farrington's book, as well as other histories of science, Plato is allowed considerable space, but it is mostly reserved for a negative account. Farrington asks if Plato deserves the same place of eminence in the history of science as he undoubtedly does in the history of philosophy, and answers that he did more damage to science than good. What he damaged, according to Farrington, was the march of positive science or Ionian *historia*. The heavenly bodies had been de-divinised by the Presocratics and inductive science had been developed and practised by the Hippocratics when Plato came on to the scene and re-divinised the stars and a-priorised scientific knowledge. What makes this particularly outrageous is the fact that Plato became an authority and thus halted the progress of science. So even though we can blame the Pythagoreans for corrupting Plato, we must blame Plato for

halting the history of science.⁵ The first casualty of Plato's authority was his pupil Aristotle. But Aristotle was not completely ruined by Plato, as part of his activity was dedicated to *historia*, i.e. his inquiries into the world of animals. On Jaeger's developmental thesis Aristotle developed from being a Platonist to an empirical scientist and ended his career with his biological works, i.e. the *Historia Animalium*.⁶

The opposition between Plato and the practitioners of *historia*, the ancient pendant to modern empiricism, is not entirely a construction of historians of philosophy and science. Socrates' autobiographical account in the *Phaedo* is well known. In it he describes how, as a young man, he was fascinated by the knowledge (*sophia*) called 'inquiry into nature' (*peri phuseōs historia*) (96a7-8), but soon became dissatisfied as this kind of inquiry only produced, and only tried to produce, descriptions of the material conditions without which something could not be what or how it is, and not an explanation as to why it is or has to be so. Socrates thus argues against *historia* in the *Phaedo* and for another form of inquiry and explanation. This new science is teleological and the fundamental question it tries to answer is why it is best for the things of nature to be what they are and as they are, rather than of what, or from what, they are made. Socrates wanted to know what was the best for each individual thing and what was the good common to all (98a-b). He therefore turned his attention away from perception (*aisthēsis*) and towards theories or accounts (*logoi*) (99e).⁷

With this in mind I turn to the *Republic*. In it we find the passage that has done most to discredit Plato in the eyes of empirically minded historians of science. As a part of their primary mathematical education the guardians are to study astronomy and harmonics, after having studied arithmetic, geometry and stereometry (i.e. the study of three dimensional figures). But they are not to do it in the traditional way, i.e. by gazing at the stars and listening to sounds, but as pure mathematics. About astronomy Socrates says (530b):

It is by means of problems, then, that we shall proceed in astronomy, in the same way as we do in geometry, and we shall let the things in the heavens alone if, by doing real astronomy, we are to turn from disuse to use that part of our soul whose nature it is to be wise (*to phusei phronimon en tēi psychēi*) (tr. Vlastos 1980).

There is no consensus on how to understand this passage. In an attempt to save Plato it might be claimed that the things in the heavens are to be left alone while proposed explanatory theories are analysed. Then we return to the stars. But this is manifestly not what Plato says, and the analogy with geometry should make that clear.⁸ The geometrician when studying figures, even admirably drawn figures, is not studying the figures for their own

sake, but in order to find the truth about equals, doubles or any other ratio (*symmetria*). As geometry is not about the perceptible figures it uses, so astronomy is not about the visible heavens but the underlying reality. When Socrates proposes the study of astronomy for the guardians, the ever practical Glaucon is immediately pleased, as knowledge of astronomy is good for the making of calendars and for agriculture and navigation, as well as warfare (527d). But Socrates does not approve of this answer. If astronomy wants to have any claim to *knowledge* it must be about being and not becoming, and as the heavenly bodies are not only sensible but also behave in an irregular manner, they cannot be objects of knowledge.

One thing that makes this passage of Plato's difficult to swallow is that to us geometry and astronomy are fundamentally different, geometry being pure mathematics while astronomy — even though it utilizes the language of mathematics — actually inquires into and tries to explain the heavenly bodies. Plato, on the other hand, claims that geometry and astronomy are fundamentally the same. But it is possible, and even probable, that to the Greeks, at least to the educated free intellectuals among them, this distinction was not obvious. The oldest non-fragmentary piece of evidence of Greek mathematics is Socrates' dealings with the slave boy in the *Meno*. There Socrates argues the whole time from a figure he draws in the sand. According to D.H. Fowler 1987, this was the Greek way of doing mathematics. It was not arithmetical (or algebraic) but geometrical. The Greek mathematicians argued from geometrical figures (cf. the *Meno*), which means that mathematics was to a significant degree visual. And Socrates, in the *Republic*, criticizes the practitioners of geometry for the clumsy vocabulary they use (527a). But, as Plato insists, geometry was not about the figures it used, arithmetic was not about the things counted, but about that which the figures represent. The perceptible figures were only stepping stones or aids to real mathematics or mathematical. On the other hand, Ian Mueller 1980, has shown that Greek astronomy and harmonics were often practised as pure deductive geometry. He cites as an example Euclid's *Phenomena*. So the common sense distinction between geometry and astronomy may not have been so common-sensical to Plato and his readers after all. But we have to be on our guard here. Even though Euclid in the *Phenomena* proceeds deductively from geometrical starting points, he prefaces his discussions by relating the deductions that are to follow to the observable realities of the heavens. This at least shows that he recognized as a principle that astronomy is about, and should explain, the movements of the heavenly bodies. There is a fundamental difference between explicitly discarding the heavenly bodies as irrelevant to the study of astronomy, as Plato seems to do, and intending (or pretending) your study, be it ever so abstract, to explain or save

the phenomena. This is the crux of the matter. How can Socrates argue that real astronomy can and ought to let the things in the heavens alone?

In *Metaphysics* III 2, 997b34-98a6 Aristotle describes the following problem:

But on the other hand astronomy cannot be dealing with perceptible magnitudes nor with this heaven above us. For neither are perceptible lines such lines as the geometer speaks of (for no perceptible thing is straight or round in the way in which he defines 'straight' and 'round'; for a hoop touches a straight edge not at a point, but as Protagoras used to say it did, in his refutation of the geometers), nor are the movements and spiral orbits in the heavens like those of which astronomy treats, nor have geometrical points the same nature as the heavenly bodies.⁹

This is a Platonic argument for leaving the things in the heaven alone. Aristotle, of course, does not agree with the Platonic solution to the problem. But he admits it is a problem. In the *Metaphysics*, XII 8, he struggles to fit the latest astronomical theories, i.e. Eudoxus', to the phenomena. It would have been easier to reject the astronomical theories, but it would have left the heavens unexplained. The motions of the heavenly bodies are notoriously irregular and the history of astronomy has been driven by efforts to save the phenomena, i.e. to explain these irregularities by bringing them under a general law or by means of a general model. This is what Aristotle tries to do. But the method proposed in the *Republic* is different. There it is suggested that the heavenly bodies should be left out all together.

But what is the status of the phenomena? Are they completely irrelevant to astronomy? In the *Philebus* (55c-59c) the arts and sciences are divided according to the degree of knowledge they can claim. And the principle is: the more mathematics involved, the more claim to knowledge they have. The mathematical sciences, i.e. metrics, arithmetic, and weighing as well as computation (*logistikē*) are called leaders among the arts, and even stronger, leaders of all the arts (55d-56e). The arts (*technai*) are divided into those that make maximum use of mathematics, such as counting, measuring and weighing, and those that make little or no use of it and rely on the method of trial and error. The first group includes architecture and the building arts, but the second group includes music performance, medicine, agriculture, navigation and warfare. The first group has more to do with knowledge (*epistēmēs ... mallon echomenon*) (55d), and is more clear (*saphes*) (56a), and exact (*akribeia*) (56c). At least in the *Philebus* the possibility of knowledge (*epistēmē*) of the perceptible phenomena is very much present. Or is it? It seems that it is only the mathematical aspects of them that are knowable, i.e. they are not known as perceptible but only in so far as they are countable or weighable, and then only as numerically expressed. It is therefore not so much the phenomena that are knowable but only the mathematical account

that is. The mathematical sciences are also divided into two, on the one hand as they are employed in the professions and deal with unequal units and approximate relations, and on the other hand as they study constant relations and equal units (56d-e). The latter is studied by the philosophers (*tōn philosophountōn*).

Let us return to the passage in the *Republic*. Why should we let the things in the heaven alone? As far as the heavenly bodies show some sign of being countable, measurable or in some way being describable in mathematical terms, they should be potential objects of knowledge. If this is so, we have to ask: what are the real objects of knowledge in this case? The heavenly bodies or the perfect world of mathematics? Just as the figures of the geometers can be described mathematically without the mathematical description really describing the figures (as they are never perfectly triangular etc.), so the heavenly bodies can be described with the language of mathematics without being the real objects of description. They are only stepping stones to problems in the geometry of motion. But are the problems then still problems in astronomy? Or are they only problems in 'idealized Kinematics'?¹⁰ There is a danger involved in taking the passage in the *Republic* as expressing the core of Plato's philosophy of science. Let us look at the last part of it again: 'we shall let the things in the heavens alone if, by doing astronomy, we are to turn from disuse to use that part of our soul whose nature it is to be wise (*to phusei phronimon en tēi psychēi*).' As this passage makes clear, this is not a theory of astronomy as science aimed at improving our knowledge of the stars, but a theory of astronomy studied in so far as it can improve the best part of our souls. The ten-year mathematical curriculum is intended to turn the guardians' minds away from the world of perception and towards the world of abstract reasoning, or, to put it another way, from the world of becoming to the world of being, or to put it still another way, from the world of approximate units and relations to the world of clear and exact units and relations. And the mathematical studies are only preliminary and second best to the highest form of intellectual activity, dialectics, and belong as such to the second best part of the Line, i.e. thought (*dianoia*) and not to the best part, understanding or knowledge (*noesis* or *epistēmē*). It can therefore with some justification be said that Socrates is not talking about science as such but only about how some of the sciences can be used as tools to improve our souls and prepare them for their ultimate *telos*. This reminds us of the fact that this part of the *Republic* is not a treatise on 'Plato's philosophy of science'.

But there are some fundamental epistemological and ontological issues at stake here. Even though this passage should not be taken to be Plato's last word on science it nevertheless expresses something fundamental about his

epistemology. As the world of perception is derived from the world of ideas, it is only real and knowable as far as it has a part in the world of ideas. Plato and Aristotle agree that knowledge can only be of ideas, but whereas Plato claims that the ideas have a separate and independent existence Aristotle claims that they are immanent in the things of perception. Aristotle therefore has to stick to the perceptible world, at least in principle. But Plato, as his ideas are not immanent in the things of perception but exist separately and perfectly in their own world, has to let go of the things of perception. But the things of perception imitate the ideas and are therefore good stepping stones to the real world of ideas. And because they imitate the ideal world the only way to really know them is by knowing the ideal world they imitate.¹¹

Notes

1. An earlier version of this paper was read at a conference on Plato's *Republic* in Aarhus, Denmark, April 4th 1997. The organizer of the conference asked me to give a short introduction to the problem of astronomy in the seventh book of the *Republic*. And this I did.
2. A collection of articles called *Science and the Sciences in Plato*, Anton 1980, is almost entirely devoted to this passage of the *Republic*.
3. For a detailed analysis of the passage I refer to Mourelatos 1980, and to Lloyd for a general account of Plato's views on science, Lloyd 1991.
4. Farrington I 1949, orig. 1944.
5. Olaf Pedersen 1996, even argues that Plato was a step backwards from the Pythagoreans. 'The point is that Plato did not take over the original empirical approach to nature from the Pythagoreans, but only the later numerological speculations or number mysticism.' p. 32. But, as Mersenne (*Questions harmonique* Paris 1734) already found out, the experiments ascribed to Pythagoras himself are in fact impossible. See Burkert 1962, 354.
6. 'In der dritten Periode erscheint nun etwas gänzlich Neues und Eigenes. Er wendet sich der empirischen Einzelforschung zu, wo er durch die folgerichtige Durchführung seines Formgedankens zum Schöpfer eines neuen Typus der Wissenschaft wird.' Jaeger 1955, 347.
7. Lloyd 1991, and Sedley 1991, stress that the teleological theory is meant seriously as an alternative way of studying nature and should not be brushed aside as nothing more than *a priori* science or as something else than a theory of how to study nature.
8. For the details of this analogy see Mourelatos 1980.
9. Translation D. Ross 1928. Last words modified.
10. As J. Adams called it. Adams 1926, 131.
11. I would like to thank Lesley Brown, Eyjólfur Kjalar Emilsson and Erik Ostenfeld for critical comments on the paper. They have been of much help.

CHAPTER 8

The Katabasis of Er

Plato's use of myths, exemplified by the myth of Er

Lars Albinus

If we think of *depth* as metaphorically referring to *truth*, then we may not find it too surprising if the ancient Greek custom of 'descending' was a metaphor for achieving truth. Indeed there seem to be arguments in support of such an interpretation, and it is along this line of thought that the present essay relates the theme of 'descent' (*katabasis*), on a mythical and a ritual level, to the vision of Er in Plato's *Republic*. It shall be argued that a traditional structure of 'descending', followed by 'ascending', provides the philosophical problem of justice, among other issues, with an important model of representation. If we are even allowed to regard the whole dialogue, from Book 1 to Book 10, as a kind of *katabasis* itself, it seems to follow that the work is embedded in the religious tradition by way of a metaphorical strategy.

It may be a truism to say that Plato's work is not only interesting for its philosophical content, but for its traditional, religious and mythical content as well. The kind of interest that has been taken in Platonic myth has nevertheless changed. Often there has been a tendency to appreciate the myths for their own aesthetic or theological value while at the same time regarding them as of minor importance in relation to the exact philosophical content and purpose of Platonic writing and teaching.¹ In the last ten to twenty years, however, it has been claimed that myth has a more active and pervading role in Platonic dialogue. The major argument has been that it is far more difficult to distinguish *myth* from *argument* than previously assumed.² The discourse of Plato (or rather of his characters) is, of course, acknowledged to be philosophical; *philosophia* ('the love of wisdom') is, after all, the concept with which Plato characterizes his own writings.³ Although this 'longing' (*eros*) for truth is not to be understood in any solipsistic or spiritualistic sense but in a dialogical and practical sense, Platonic philosophy implies the seemingly religious or theological question: How do we come as close as possible to divine truth?⁴