

LLOYD (G.E.R.) *Aristotelian explorations*. Cambridge UP, 1996. Pp. ix + 242. £35. 0521554225.

No scholar is better qualified than Geoffrey Lloyd to pronounce on developments in Aristotelian studies over the last thirty years, for Aristotle has continued to play a central role throughout his far-reaching elucidations of ancient thought and science. As L. points out in his Introduction, Aristotelian scholarship has generally moved away from the developmentalist thesis to a more unified view of Aristotle's work. The main point of this thought-provoking new book, however, is to show that this view should not make us ignore the open-endedness of much of Aristotle's work and the genuine tensions within it. L.'s central thesis is that Aristotle's methodology is 'far more pluralist than is often allowed, and in particular that it is responsive to the need for adaptation in the light of the demands and circumstances of different problem areas' (5). L. demonstrates his thesis in ten densely but lucidly argued chapters exploring issues in Aristotle ranging as widely as the theory of science, psychology, zoology, politics and rhetoric.

The question of the applicability of Aristotle's theory of demonstration to his scientific practice is a useful starting point for L. (ch.1). L. argues that Aristotle has not one but several notions of demonstration, not all of which comply with the strict criteria laid down in the *Posterior Analytics*. It may be possible, therefore, to see Aristotle's zoology as demonstrative in a looser sense. The chapter introduces an important (and very Aristotelian) argumentative strategy for L., viz. the attempt to show the polyvalence of some of Aristotle's key explanatory terms. Ch.2 shows the great extent to which Aristotle's description of the parts of animals is determined by his views as to their psychological functions. In consequence, the form/matter distinction is in danger of collapsing for living beings, which creates difficulties for those of Aristotle's statements that suggest that definition is of form rather than matter. One reason for saying that definition is of form is that form is determinate, but what do we make then of the areas of nature where there seem to be no clear distinctions between types of species? In Ch. 3 L. suggests that such fuzziness cannot always just be seen as epistemic (i.e. reflecting our relative ignorance); rather, it sometimes seems inherent to nature, as in the case of the famous 'dualisers' and living beings on the border between plants and animals. In his willingness to accept exceptions to the standard classificatory schema we see evidence of Aristotle's open-mindedness as a working biologist. Ch.4 problematises the notion of 'concoction' (*pepsis*), central to so much of Aristotle's biology, by showing, again, its polyvalence and context-dependence. In Ch.5 L. demonstrates the difficulties that Aristotle's acknowledgement of spontaneous generation presents for his standard account of reproduction (if no separate formal principle corresponding to the male parent is required in spontaneous generation why is it ever needed?). L. also draws an interesting contrast with Chinese thought which lacks the concept of unchanging species and therefore finds metamorphosis much less problematic than Aristotle. Ch.6 questions the generalisability of Aristotle's account of perception. Perception defines animal life (though as ch.3 pointed out there may be exceptions even to this rule). The most basic

form of perception is touch; however, Aristotle's description of hard-shelled animals makes it difficult to see how they could have this sense. In Ch.7 L. finds variety in Aristotle's uses of analogy and a corresponding open-endedness in key metaphysical notions which are introduced by analogy (form/matter again, for example). Ch.8 takes a critical view of Aristotle as an astronomer. His interest in heavenly motions is primarily teleological and his knowledge too patchy for his lack of dogmatism in this case to be a virtue. L.'s admiration for Aristotle the biologist thus contrasts with his disparagement of Aristotle the astronomer. In Ch.9 L. turns to Aristotle's use of 'nature' to support his political arguments. Whilst acknowledging the importance of sociobiological arguments in Aristotle and their danger, L. also defends Aristotle against the charge of naively ignoring the distinction between value and fact. Aristotle does, however, see important connections between ethics and science which we may also need to explore today. In the final chapter, L. seeks explanations for the surprising use of metaphors in Aristotle's formulation of his theory of 'metaphor'. Aristotle is critical of the use of metaphor outside poetry, yet, he also uses metaphors widely in other contexts such as the *Rhetoric*. We find here another example of Aristotle's flexible approach in practice to his own theory.

The picture of Aristotle that emerges from L.'s study is far from the monolithic dogmatist who is sometimes contrasted with Plato. L.'s Aristotle is an open-minded inquirer who acknowledges the difficulties presented by his material. However, there are two constraints (both well-known from L.'s work) on this picture. Firstly, one would expect that the interest of Aristotle the *polemicist* in looking for difficulties to his own theory was limited, unless he thought they could be overcome. Secondly, it is noticeable how many of L.'s problem cases (grubs, testacea, jellyfish and so on) come from the lower end of Aristotle's biological hierarchy. It may be that Aristotle actively seeks out 'problem' cases as confirming his theory that distinctions between species and sexual roles tend to blur as we descend the *scala naturae*. As L. himself suggests, it is possible that Aristotle saw the exceptions as failures in nature rather than failures in his theory. If one emphasised these points more than L. in the end chooses to do in *this* study, the picture would be of a somewhat more theory-driven Aristotle. However, if, on occasion, L. allows such alternative images to emerge it is a testimony to the remarkable richness and subtlety of these explorations. This, indeed, is a work that more than any other succeeds in bringing out the complexities of Aristotle's work.

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JOHANSEN (T.K.) *Aristotle on the Sense-organs*. Cambridge UP, 1998. Pp. xvi + 304. £37.50. 05215-8338

There can be no proper understanding of Aristotle's account of sense-perception without an appreciation of the role he gives to the sense-organs. It is therefore surprising, given the growing interest in Aristotle's work in this area, that there has hitherto been no in-depth

study of the sense-organs. Johansen's study is based on a PhD thesis both suggested and supervised by Myles Burnyeat, someone who has himself contributed not a little to the burgeoning debate.

J. approaches the task in a lucid and thorough manner. He examines the key texts critically and presents a unifying theory: Aristotle, in J.'s view, seeks to explain the characteristics of the different sense-organs by reference to the goal that they serve (that of enabling animals to perceive). The power to perceive consists for Aristotle in the ability to be changed by colours, sounds, smells, flavours, and tangible qualities (the sense-objects). Because this ability is only found in Aristotelian matter (*hylê*) animals must have sense-organs to provide them with the requisite matter, i.e. the matter which can be changed by the various sense-objects. For example colour, which is the sense-object of sight, changes what is transparent. Consequently transparent matter is required if the animal is to see and this explains why animals have eyes (eyes according to Aristotle being made up of water).

How does J.'s theory sit with the well known controversy over Aristotle's doctrine that in perception the sense-organ takes on the form without the matter? Literalists explain the doctrine as referring to a physiological process wherein the eye, say, literally goes red when it sees red. The spiritualists say that the eye's taking on the form red means nothing more than that the perceiver becomes aware of redness. Aristotle's account of the sense-organs is in J.'s view acceptable on both the literalist and spiritualist position. This is because even if a material basis is necessary for sense-perception it is still an open question whether the material in question undergoes a physiological change when perception takes place. But J. goes on to argue that this neutrality favours the spiritualists. Spiritualists face an embarrassing question: as J. puts it (14), 'Why do we have eyes in our heads rather than simply holes, for why should the senses have a material basis if there is no material change in perception?' J.'s theory explains why we have eyes without having to assume material changes in perception and thus removes the embarrassment.

I would question J.'s contention that the theory he attributes to Aristotle is neutral between the literalist and the spiritualist position. Firstly he argues (91) that peripheral sense-organs like the eye are not where perception takes place: these organs are simply acting as conduits through which the action of the sense-object on the external medium (the gap between perceived and perceiver) is enabled to reach the true location of perception in the heart. They are in fact extensions to the medium and not sense-organs at all. Secondly he maintains (127) that the action of the sense-object on the medium is fundamentally different to action on a medium in other causal sequences. The medium in perception has a phenomenal role, that of allowing 'the sense-object to appear to a perceiver unhindered and undistorted through it' (120), and the 'change' undergone by the medium in perception consists merely in the fact that this phenomenal role is performed (146). Thus J. rules out the sort of change in the medium which the literalists require in the sense-organ. Since the sense-organ is itself really just a medium this disposes of the literalist interpretation (147).

It will, I hope, not detract from the value of J.'s

account as a contribution to the literalist/spiritualist debate to note that his explanation of the peripheral sense-organs is problematic. It seems a gross distortion of Aristotle's position to deny that perception takes place in these peripheral organs. Admittedly Aristotle regards the heart as the seat of the central faculty of sense but not at the expense of his view that the individual sense faculties are located in the peripheral sense-organs of which they are truly the form and realisation. Indeed if J. is correct then the eyes do turn out in the end to be something dangerously close to holes in the head.

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GOLDIN (O.) *Explaining an eclipse. Aristotle's Posterior Analytics 2.1-10*. Ann Arbor: U Michigan P, 1996. Pp. ix + 170. 0472105965.

One problem that the reader of *Analytica Posteriora* (*APo*) B can have is that if all deductions are based on definitions, no definitions can be deduced; and yet Aristotle (A.) devotes B8 to showing how a class of definitions can be deduced. It is this problem that Goldin tackles, which he interprets as the question of how one can have a deduction based on definitions, although the proof provides information going beyond the content of the definitions (ch. 1). The class of entities which can in this manner be defined in a deduction he sees, quite traditionally, as *per se* incidentals (*καθ' αὐτὰ συμβεβηκότα*). His solution (ch. 5, 6) (supported by a reading of the earlier parts of *APo* B (ch. 2, 4), and a defence of the traditional interpretation of assumptions of existence (ch. 3)) is that in order to proceed beyond a definition assumed by the science in question, we take a definition from another science. As G. sees, this solution runs counter to the prohibition against kind crossing (no premises are to be used that do not belong to the appropriate science—*APo* A 7, 9); which problem he suggests should be solved by positing different stages in A.'s thought (ch. 6 sec. C).

The solution should make any reader of A. uneasy, not merely because there is no separate reason to suppose that A7, 9 belong to a different stage of A.'s thought than B 8 (unless one separates books A and B radically, which G. does not); but simply because the examples of 'sciences' that G gives—'physics', 'chemistry' and the like—are not A.'s sciences at all; rather, those enquiries dealing with changing things are all parts of *φυσική* (*Metaphysics* E 1, cf. *Meteorologica* I 1). A.'s favourite example of a *per se* incidental is that the sum of the angles of a triangle equal two right angles: to which science outside geometry should one appeal to prove that?

Unfortunately for G., Jonathan Barnes' second (and much revised) ed. of his translation and commentary of *APo* (1994) was only available to him in the last stages of writing (viii). G. uses only the first ed.; but the second has much to offer, most obviously on the closely connected debates in Aristotelian scholarship (e.g. kind crossing in the *de Motu Animalium* was mooted by Nussbaum (1978)).

G. gives a clear discussion of central problems and