EUDEMUS

ZHMUD (L.) *The Origin of the History of Science in Classical Antiquity*. Translated by Alexander Chernoglazov. (Peripatoi 19.) Pp. xii + 331. Berlin and New York: Walter de Gruyter, 2006. Cased, €98, US$118.95. ISBN: 978-3-11-017966-8.
doi:10.1017/S0009840X07001916

This book investigates those works of Eudemus of Rhodes which deal with the history of the exact sciences. The first half discusses the intellectual context in which Zhmud believes we should understand Eudemus' work. Z. is probably at his best here, where he has substantial texts with which to work. There are chapters on the Greek idea of original discoverers, the early conception of science as *technê* and Z.'s dim view of the role of Plato and the Academy in the development of the mathematical sciences. A bridging chapter treats Aristotle's philosophy of science and the function of historical studies and methods in various projects carried out by early scholars of the Lyceum. The remainder of the book contains chapters devoted to each of Eudemus' lost works on the exact sciences and a conclusion on the decline in writing histories of science after Eudemus.

Z. has produced a highly erudite study examining the context and methods of three works that have been substantially lost, and which themselves were either surveys of, or critical discussions arising from, works that we no longer possess. In the late fourth or early third century B.C.E., as part of a broader Peripatetic project surveying the methods and progress of human knowledge, Eudemus produced three works that are generally called the *History of Geometry*, the *History of Astronomy* and the *History of Arithmetic*. Only fragments and paraphrases of passages survive, mostly in the late ancient commentators. Many scholars believe that a substantial part of our meagre evidence for the early history of the exact sciences in classical antiquity comes directly or indirectly from Eudemus' work.

It follows that any critical study of Eudemus' historiography must be highly speculative. Z., however, never confronts the hypothetical nature of this project directly. He instead attempts to argue that the subject of Eudemus' works 'coincides with the subject of the history of science as we understand it now' (p. 147). This claim contains a number of hidden assumptions, and its terms are never explicitly discussed. Z.'s belief that we shall all implicitly understand what he means by science and share his views on contemporary historiography leads to a number of recurring ambiguities. Nevertheless, although Z. does not define his terms explicitly, there are a number of indications of what he means by science and what he understands the practice of writing its history to be.

His understanding of 'science' and 'the scientific' is, apparently, strictly concerned with the mathematical sciences, and with these only in a deductive format. This view is most pronounced in his use of the adjective 'scientific'. Often this term is used vaguely to describe work that he believes is better or more developed in so far as it is more mathematical (ex. 12, 19, 60, 119, 247), but in one case he explicitly characterises 'axiomatic-deductive' systems as 'truly scientific' (p. 205). Indeed, Z.'s position that *good science* in antiquity is characterised by the deductive mathematics we find in so many works of the Hellenistic period[1] is explicitly stated in the introductory chapter.

[1]It should be stressed that, whereas Z. believes the axiomatic-deductive style of Greek exact science was developed in the early Classical period, the surviving works that are characteristic of

Here he tells us that his notion of Greek science is 'mostly confined to the exact sciences – geometry, arithmetic, astronomy, and harmonics', because in these 'we find the closest possible match between ancient and modern *concepts* of what science is as well as between ancient and modern *practice* of scientific research' (p. 11).

This latter statement is as incredible as anything we find in the book, because Z., again, does not tell us what he means by modern concepts or methods. For example, it is not clear whether he would take work such as Boyle's experiments on the spring of air, Helmholtz's investigation of the mathematical, physical and physiological foundations of music theory, or Fineman's use of mathematical diagrams to explicate quantum electrodynamics as essentially modern. Each of these has been discussed as an example of modern science, yet most historians of science would probably agree that in terms of concepts and practice they have little in common, and almost nothing in common with texts like the Euclidean *Section of the Canon* or Autolycus' *On the Movements of the Sphere.* By the same token, colleagues in a contemporary department of musicology or astronomy would find the *Section of the Canon* or *On the Movements* far removed, both conceptually and methodologically, from their current programmes of research. Furthermore, it is not clear why such considerations of modern ideas and practices should play a significant role in our study of ancient sources.

For Z., not only were the ideas and practices of the ancient exact sciences similar to current ideas and practices, but the history of science that Eudemus developed was very close to the history of science 'as we understand it now' (p. 147). This view is rather surprising for many reasons, not least of which is that contemporary historians of science have hardly reached a consensus that may simply be described as our present understanding of the history of science. Z. never articulates precisely what he takes this present understanding to be, but again there are a few passages that may encapsulate his views. According to Z., Eudemus used a method of discussing first discoverers, so as 'to include in the history of astronomy the pioneering theories whose further development contributed to the creation of the "correct" picture of the world' (p. 248). He was not, however, simply interested in cataloguing a list of discoverers but, as Z. states with respect to the history of geometry, 'like a modern historian of mathematics, Eudemus was interested not only in the discovery itself, but also in the details of the proof and its correspondence with demonstrations current in his own day, in peculiarities of terminology, connections with other sciences, etc.' (p. 201).

These passages give a sense of what Z. believes was important for Eudemus, but they leave open a number of questions concerning the latter's treatment of his sources and the organisation of his material, which are topics that should be fundamental to any understanding of historical method. Z. believes, although he cannot prove, that the sources of early Greek mathematics available to Eudemus were both 'various and abundant' (p. 148). Nevertheless, since these sources have been lost, it is impossible to say anything very specific about how Eudemus handled them, and Z. largely avoids the issue. With respect to organisation, Z. believes that Eudemus broadly followed a chronological structure, although he may have deviated from this in places to trace the history of specific problems (p. 149). His most important argument for this position is developed on the basis of the passage in Proclus' *Commentary to the First Book of the Elements* known as the *Catalogue of Geometers.* This passage is notoriously

the type of Greek science he regards as 'scientific' are all believed to have been written in the early Hellenistic period, or later.

problematic, however, and Z.'s treatment of it may be used as an example to discuss, more generally, his approach to the fragmentary sources that constitute his evidence for Eudemus' activity.

There is no general agreement on the source for the historical passages in the beginning of Proclus' *Commentary*, but a number of scholars have doubted that they go back to Eudemus' work.[2] Certainly, the *Catalogue* as it stands cannot be a direct quotation of Eudemus, because it discusses historical developments later than his time and it contains obviously Neoplatonic passages. Nevertheless, Z. believes that the substantial historical information goes back to Eudemus. Indeed, he claims to be able to identify all later additions and to be able to name their authors (pp. 179–90). The *Catalogue* is important to Z.'s project because he uses it as a keystone for his claims that Eudemus' histories were both chronologically accurate and historiographically close to our own (pp. 147–8). Whether the *Catalogue* really can bear this weight is doubtful. The supposed accuracy of the catalogue is based on such phrases as 'a bit younger than', 'a little younger', 'who lived in the same time' and so forth (p. 182). The *Catalogue*, whether or not stripped of its Neoplatonism, is a frustratingly brief document, largely a series of names with tantalising, but usually vague, attributions of accomplishment. I doubt whether many historians of science at work today would agree that this is the same in spirit or result as what they are working to accomplish.

Finally, Z. asserts that we can use the *Catalogue* to discover the overall organisation of Eudemus' treatises. He considers the *Catalogue* straightforward evidence that Eudemus worked chronologically. Indeed, he says, 'as we see from the *Catalogue*, he proceeded from generation to generation, from teachers to their disciples, rather than from one problem to another' (p. 149). When we consider that the *Catalogue* is actually found in Proclus' *Commentary*, a work that neither proceeds from 'generation to generation', nor 'from teachers to disciples', it is quite remarkable that Z. should claim that a few pages of the *Catalogue* can be used to make straightforward deductions about the entire work in which it is found. Such a chronological summary could be part of a work that was structured in any number of different ways.

Z.'s knowledge of his sources is encyclopedic and he uses them with some dexterity, but his arguments warrant closer scrutiny of their basic assumptions and his readers would benefit from more consistent attention to the difference between what can be known and what must be assumed.

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[2]For a recent example of such doubts see J. Mejer, 'Eudemus and the History of Science', in I. Bodnár, W.W. Fortenbaugh (edd.), *Eudemus of Rhodes* (New Brunswick, 2002), pp. 243–61.