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(*b*. Rhodes; *fl*. second half of fourth century b.c.)

philosophy, history of science.

From the title so often given in antiquity to Eudemus the Peripatetic philosopher, it is a fair deduction that he was born at Rhodes; and this is specifically attested by Strabo.[1] The dates of his birth and death are unknown, but his links with Aristotle and Theophrastus show when he flourished.

Nothing is known of his background save that he had a brother Boethus, who had a son, Pasicles.[2] He became a pupil of Aristotle, although whether first at Assos, Mitylene, or Athens must remain uncertain.[3] He won the master's good opinion to such an extent that he and Theophrastus of Lesbos were known as Aristotle's "companions."[4] It is disputed whether it was to him or to Eudemus of Cyprus that Aristotle addressed the moving verses, generally known as the "altar elegy," in which he expressed his veneration for Plato at a time when he had felt compelled to diverge from the Platonic philosophy, but on balance Eudemus of Rhodes would seem to be thus favored. (It is, however, the Cypriot and not the Rhodian Eudemus in whose honor Aristotle's early philosophical dialogue "Eudemus" is named.)

Aulus Gellius recounts that as Aristotle approached death, his disciples gathered round him and asked him to choose his successor; they agreed that Theophrastus and Eudemus were preeminent among them. A little later, when they were again assembled, Aristotle asked for some Rhodian and some Lesbian wine to be brought to him. He pronounced both to be civilized wines—the Rhodian strong and joyful, but the Lesbian sweeter, thus indicating Theophrastus as his successor.[5] Eudemus took the choice of Theophrastus in good part, for Andronicus of Rhodes, in a lost work quoted by Simplicius, records a letter that Eudemus wrote to Theophrastus asking that an accurate copy of passages in the fifth book of Aristotle's *Physics* be sent to him on account of errors in his own manuscript.[6] It is usually deduced from this passage that after Aristotle's death Eudemus set up his own school elsewhere (perhaps in his native Rhodes).

The main importance of Eudemus in the history of thought is that he, Theophrastus, Strato, Phanias, and others brought Aristotle's lectures, lecture notes, their own records, and the recollections of themselves and others to a state fit for publication, thus making the works of Aristotle available to the world. One of the three ethical works in the Aristotelian corpus, the *Eudemian Ethics*, actually bears Eudemus' name,[7] but the significance of the title, which is first attested by Atticus Platonicus[8] in the age of the Antonines, is still an open question, complicated by the fact that books IV-VI are identical with books V-VII of the *Nicomachean Ethics*. At various times it was thought that the treatise was a genuine work of Aristotle dedicated to Eudemus, or that Eudemus was himself its author, or that it was a work of Aristotle edited by Eudemus (opening to discussion whether Eudemus cited the master's words exactly or used them as the basis for what is substantially a work of his own, as he did with the *Physics*, see below).

But in 1841 L. Spengel pronounced the *Eudemian Ethics* to be a restatement of Aristotle's teaching with extensive additions by Eudemus. This view so prevailed that the Greek texts of Fritzsche (1851) and Susemihl (1884) were both entitled *Eudemi Rhodii Ethica*, and the English commentaries on the *Nicomachean Ethics* by Sir Alexander Grant (1857), J. A. Stewart (1892), and J. Burnet (1900) all took it for granted that Eudemus was the author.

Later P. von der Mühl (1909), E. Kapp (1912), and, most notably, W. Jaeger (1923) sought to restore the authenticity of the *Eudemian Ethics*.[9] Jaeger considered it to be intermediate to the ethics *more geometrico demonstrata* in the *Protrepticus*, as recovered from Iamblichus, and the final version of Aristotle's moral teaching in the *Nicomachean Ethics*. This notion of three stages in the development of Aristotle's ethics no longer convinces, and it is generally held nowadays that the differences between the *Eudemian Ethics*, the *Nicomachean Ethics*, and the *Magna moralia* are to be explained by the audiences to which they were addressed; but the belief that the *Eudemian Ethics* is a genuine work of Aristotle has been reinforced by a detailed examination of its language. Its style, in the nature of lecture notes with no literary graces, supports the hypothesis of Aristotelian authorship. It is cited or referred to in other works of Aristotle, notably the *Politics*.[10] If Eudemus were the author of the *Eudemian Ethics*, it is hardly conceivable that he would have allowed such an expression as *καθάπερ διαιρούμεθα καὶ ἐν τοῖς ἐξωτερικοῖς λόγοις* "as we have distinguished in the published writings."[11]

No recent commentators have produced a convincing solution; and it may now be regarded as certain, on grounds of style apart from other considerations, that Eudemus was not the author. In all probability it should be regarded as an authentic work of Aristotle, possibly edited after his death as Gigon believes;[12] why Eudemus' name came to be attached to it remains a puzzle.

Although the moral teaching of the *Eudemian Ethics* is fundamentally the same as that of the other ethical treatises, the final book differs in that it holds up as the ideal *τήν τοῦ θεοῦ θεωρίαν* "the contemplation of God." This has led to a picture of the Rhodian philosopher as the "pious Eudemus" which would lose its force if von Arnim is right in detecting the substitution of *θεός* ("God") for *νοῦς* ("mind") by a Christian interpolator.[13]

The sixth-century commentator Asclepius, noting the lack of orderliness and continuity in Aristotle's *Metaphysics*, relates that Aristotle, being himself conscious of these faults, sent the work to Eudemus for his opinion. Eudemus judged it unsuitable to publish such a work to all and sundry—thus implying a belief in an esoteric Aristotelian doctrine—and Asclepius adds that after Aristotle's death, when parts of the work were found to be missing, the school's survivors filled the gaps with extracts from his other works.[14] This is improbable, since the esoteric doctrine did not arise until later and, moreover, such a story would imply that Eudemus left Athens while Aristotle was still head of the school—a contradiction of evidence already given; nor does the *Metaphysics* draw on other works. Another commentator, Alexander of Aphrodisias, implies that Eudemus did some editorial work on the treatise; this is more likely, and accords with a scholium to one of the oldest manuscripts stating that most scholars attributed the second book, α minor, to his nephew Pasicles.[15]

Eudemus wrote a *Physics*, in four books, that covered the same ground as Aristotle's treatise, the first book corresponding to Aristotle's I and II, the second to Aristotle's III and V, the third to Aristotle's IV, and the fourth to Aristotle's VI and VIII, which confirms the belief that VII is not genuine. Simplicius used Eudemus' work extensively in his elucidation of Aristotle; some ninety fragments are gathered together by Wehrli. It is thus possible substantially to reconstruct Eudemus' treatise, but as it so largely overlaps that of Aristotle it is not necessary to discuss the contents here.

Eudemus made contributions of his own to the Aristotelian logic. He wrote a book—or possibly two separate books[16]—on analytics and the categories and another entitled *On Discourse*, which seems to have dealt with the same topics as Aristotle's *De interpretatione*. That Galen wrote a commentary on it is evidence that it had some vogue in antiquity.[17]

According to Boethius, Theophrastus and Eudemus (in one place "or Eudemus") added five moods to the four in the first syllogistic figure,[18] and a Greek fragment of unknown authorship adds that they were later made into a fourth figure.[19] The four moods of the first figure are those known since Peter of Spain as Barbara, Celarent, Darii, and Ferio. Boethius explains that the five new moods are obtained by conversion of the terms of the four original moods. Thus, if *A* is in all *B* and *B* is in all *C*, it follows that *A* is in all *C* (Barbara); and by conversion, if *A* is in all *B* and *B* is in all *C*, we may conclude that *C* is in some *A* This is the fifth mood, Bramantip, and in the same way the sixth, seventh, eighth, and ninth moods (Carmenes, Dimaris, Fesapo, and Fresison) may be obtained. (It has sometimes been queried why Aristotle himself did not group these last five moods in a fourth figure, for they are implicit in his work; Fesapo and Fresison are specifically mentioned by him, and he explicitly states that a syllogism always results from conversion of the premises.)[20]

The work of Theophrastus and Eudemus on the new moods is bound up with the distinction that they developed between necessary and merely factual premises and conclusions. Aristotle believed that there were combinations of an apodeictic and an assertoric premise which led to an apodeictic conclusion. For the first figure he laid down the rule that an apodeictic major and an assertoric minor may lead to an apodeictic conclusion, while the combination of an assertoric major and an apodeictic minor cannot. According to Alexander of Aphrodisias, the followers of Eudemus and Theophrastus took the opposite view, holding that if either the major or the minor premise is assertoric the conclusion must also be assertoric. Similarly they held that if either premise is negative the conclusion must also be negative, and if either premise is particular the conclusion must be particular. They summarized their doctrine in the saying that the conclusion must be like the "inferior premise,"[21] or as it was later put into *Latin, peiorem semper sequitur conclusio partem*.

Another divergence between Aristotle and his two leading pupils arose over problematic syllogisms. For Aristotle, the proposition "That all *B* should be *A* is contingent" entails "That no *B* should be *A* is contingent"; and "That some *B* should not be *A* is contingent," with related propositions; and the proposition 'That no *B* should be *A* is contingent" does not imply "That no *A* should be *B* is contingent." According to Alexander, Theophrastus and Eudemus rejected this departure from the general principle that universal negative propositions are simply convertible and particular negative propositions not convertible. They have found a supporter in modern times in H. Maier, but W. D. Ross regards Aristotle as completely justified.[22] It depends upon what Aristotle is understood to mean by contingency, and it is unfortunate that Alexander's book, *On the Disagreement Concerning Mixed Moods*... has not survived.

It is remarkable that in their development of Aristotle's logic the names of Theophrastus and Eudemus are so often conjoined. Although there are many references to Theophrastus alone, only one to Eudemus alone is recorded; it may thus rightly be inferred that Theophrastus had the major share in the work. Bochenski supposes that the *Organon* represents Aristotle's earlier logical thinking and that in his later lectures he advanced beyond it; and that Theophrastus and Eudemus, who were present at these lectures, separately represent the mature development of Aristotle's logical thought. The coincidence of their views, he thinks, cannot be explained by chance or close and prolonged collaboration.[23]

From a long passage in Damascius[24] it may be inferred that Eudemus wrote a history of theology that appears to have dealt with the origins of the universe and to have ranged over the views of the Babylonians, Egyptians, and Greeks. A single reference in Proclus[25] establishes that Eudemus wrote one purely mathematical work—*On the Angle*—in which he took the view that angularity is a quality rather than a quantity (since angularity arises from an inclination of lines, and since both straightness and inclination are qualities, so also must angularity be).

Eudemus is also important for his studies in the history of science. He wrote three works—a history of arithmetic, a history of geometry, and a history of astronomy—which are of capital value for the transmission of the facts about early Greek science. Although, like all of Eudemus' works, they have been lost, it is mainly through the use made of them by later writers that we possess any knowledge of the rise of Greek geometry and astronomy. Eudemus is not known to have had any predecessors in this field,[26] and he may justly be regarded as the father of the history of science, or at the least as sharing the paternity with his fellow Peripatetics Theophrastus, author of *Views of the Physicists*, and Menon, author of a history of medicine.

The *History of Arithmetic* is known from only one reference, made by Porphyry in his commentary on *Ptolemy's Harmonics*,[27] stating that in the first book Eudemus dealt with the Pythagorean correlation of numbers with musical intervals.

The *History of Geometry*, in at least two books, is known from many ancient references and citations. According to Simplicius, it was written in a summary style like a memorandum.[28] A passage in Proclus' commentary on the first book of Euclid's *Elements*[29] was formerly known as "the Eudemian summary" in the belief that it was an extract from this work. This cannot be so, since it leads up to the work of Euclid, who was later than Eudemus, and there is no stylistic break in the narrative. The earlier part—up to the sentence where Proclus writes, "Those who have compiled histories carry the development of this science up to this point" (*sc*. Philippus of Opus, who lived just before Euclid)—would appear to be a condensation of Eudemus' narrative, written soon after his death, for it is unlikely that a later writer would have stopped at that precise date. The summary tells how Thales introduced the study of geometry from Egypt into Greece and recounts the work of his successors, without, however, ever referring to Democritus. This omission offers further proof that the passage cannot be taken directly from Eudemus, since he would certainly have mentioned this mathematical pioneer who was held in high esteem by Aristotle (although Proclus might not).

One of the most important chapters in the history of Greek mathematics—the work of Hippocrates of Chios on the quadrature of lunes—is known through Eudemus. It is known from the use made of it by Simplicius in his commentary on Aristotle's Physics.[30] Simplicius reproduces passages from Eudemus, who may himself be giving the words of Hippocrates along with comments of his own; and many scholars have addressed themselves to the task of separating what Eudemus wrote from what Simplicius added.

From surviving references, Eudemus is also known to have recorded in his *History of Geometry* the theorem that if two triangles have two angles and one side equal, the remaining angle and sides will also be equal (Euclid 1.26), discovered by Thales and used by him to find the distances of ships from the shore;[31] the theorem that if two straight lines intersect the vertical and opposite angles are equal (Euclid 1.15), discovered but not proved by Thales;[32] the theorem that the interior angles of a triangle are equal to two right angles (Euclid 1.32), first proved by the Pythagoreans by means of a line drawn parallel to the base;[33] the "application of areas" (i.e., the erection on a straight line, or on a segment thereof, or on the straight line produced, of a parallelogram with a given angle equal to a given area, which is a species of geometrical algebra), also the discovery of the Pythagoreans;[34] the problem of drawing a straight line perpendicular to a given straight line from a point outside it (Euclid 1.12), first investigated by Oenopides,[35] who also first discovered the Euclidean method of constructing a rectilinear angle equal to a given rectilinear angle (Euclid I.23).[36]

Tannery thought that the *History of Geometry* was already lost by the time of Pappus, and that for his knowledge of such matters as the quadrature of the circle and the duplication of the cube Pappus relied on a compilation entitled ("Aristotelian apiary"), drawn up, perhaps toward the end of the third century b.c., by his older contemporary Sporus of Nicaea, who in turn would have drawn on Eudemus. This failed to convince Heiberg, who made out a strong case for believing that both Pappus and Eutocius had the text of Eudemus before them.[37]

Eudemus' *History of Astronomy*, also in at least two books, is of further value, through its use by later writers, as a source book. It is, for example, through this work that Oenopides is known to have discovered the obliquity of the ecliptic; and Eudemus recorded its value as being that of the side of a fifteen-sided polygon, that is, twenty-four degrees.[38] Eudemus' history is also the ultimate source, through its use by the Peripatetic philosopher Sosigenes (second century a.d.), of Simplicius' account of Eudoxus' system of concentric spheres on which the poles of the heavenly bodies rotate—the first attempt to account mathematically for the solar, lunar, and planetary motions.[39] Among other topics known to have been dealt with by Eudemus are solar eclipses, particularly Thales' prediction of the eclipse of 28 May 585 b.c.; the cycle of the great year after which all the heavenly bodies are found in the same relative positions; the realization by Anaximander that the earth is a heavenly body moving about the middle of the universe; the discovery by Anaximenes that the moon reflects the light of the sun and his explanation of lunar eclipses; and the inequality of the times between the solstices and the equinoxes.[40]

Aelian, writing in the second or third century a.d., has seven references to a work on animals written by Eudemus,[41] but it has been questioned whether he is to be identified with Eudemus of Rhodes. Apuleius mentions "Aristotle and Theophrastus and Eudemus and Lyco and other lesser Platonists" as having written on the birth and nourishment of animals,[42] and as, in the context, Eudemus of Rhodes must be understood, this would support the identification; but the citations given by Aelian are of fabulous stories about animals which do not fit in well with the serious scientific character of Eudemus of Rhodes.

A history of Lindos was written by a certain Eudemus. Wilamowitz was prepared to believe that this was Eudemus of Rhodes, but Wehrli thinks it highly improbable. There is no evidence on which the question can be settled, as Felix Jacoby sees it; but since Lindos was a port, with a famous temple, in Eudemus' native Rhodes, there is nothing improbable in the suggestion that so prolific an author as Eudemus should have recorded its history, perhaps after his return from Athens.[43]

NOTES

1. Strabo, XIV 2, 13.

2. Asclepius, In *Aristotelis Metaphysica*, I.1, 980[a] 22, Hayduck ed., 4.18–22; Scholium to Aristotle's Metaphysics α, 993[a] 30, *Scholia in Aristotelem* (*Aristotelis opera IV*), Brandis ed., 589 a 41–43.

3. W. Jaeger, *Aristoteles*, 109 n. 2, takes the view that he (and Theophrastus) became students of Aristotle at Assos; but this seems to be bound up with his view of the date of the *Eudemian Ethics*, and there is no real evidence one way or the other.

4. Ammonius, *In Aristotelis Analytica priora*, 1.9,. 30[a] 15, Wallies ed., 38. 38–39, *οί δ'έταῖροι αντον̂, Θεόφραστος καὶ Ενδ̂ημος*, is one of many passages in which the expression is used.

5. Aulus Gellius, Noctes Atticae, XIII. 5, Marshsall ed., II. 387, 1–29; Boethius, *De syllogismo hypothetico*, I, in Migne ed., Patrologia latina, LXIV, 83 ID, noted that Theophrastus was a man capable of all learning but tackling only the peaks, whereas Eudemus followed a broader road of learning; but it was as though he scattered seminal ideas without gathering any great harvest. This passage of Boethius, referring to the *Analytica*, is the only evidence of any difference between Theophrastus and Eudemus in the field of logic.

6. Simplicius, *In Aristotelis Physica*, VI, proemium, Diels ed., 923. 7–16.

7. It has almost universally been assumed that "Eudemian" refers to Eudemus of Rhodes, but, as Dirlmeier points out, there is no precise evidence whether Eudemus of Rhodes or Eudemus of Cyprus is indicated by the title. He himself makes the suggestion—which has not found favor—that as *Eudemian Ethics* 1.5 is a pessimistic reflection on the theme, "It is best not to be born," which plays an impressive part in the dialogue "Eudemus" but not in the other two ethical works, the *Eudemian Ethics* was intended to be a posthumous tribute to his friend the Cypriot (F. Dirlmeier, *Aristoteles magna moralia*, 2nd ed., 1966, p. 97).

8. As preserved by Eusebius, Praeparatio evangelica *XV*, in Patrologia graeca, Migne ed., XXI, 1305 A, Dindorf ed., I. 344. 24–26: *αί γον̂ν 'Αριστοτέλονς περὶ τανῖα πραγματείαι, Ενδήμειοί τε καὶ* Νικομάκειο9 *καὶ* Μεγάων *'*Ηθικών *επιγραφόμεναι.*

9. L. Spengel, "Uber die unter dem Namen des Aristoteles erhaltenen ethischen Schriften," in *Abhandlungen der Bayrischen Akademie der Wissenschaften*, **3** (Munich, 1981), 439–551; P. von der Mühl, *De Aristotelis Ethicorum Eudemiorum auctoritate* (Göttingen, 1909); E. Kapp, *Das Verhaltnis der eudemischen zur nikomachischen Ethik* (Freiburg, 1912); W. Jaeger, *Aristotelis* (Berlin, 1923; 2nd ed., 1955), pp. 237–270, trans. by R. Robinson (Oxford, 1934; 2nd ed., 1948), pp. 228–258.

10. F. Dirlmieier, *Aristoteles Eudemische Ethik*, pp. 112–115; for quotations in the treatise see the same author, "Merkwurdige Zitate in der Eudemischen Ethik des Aristoteles" in *Sitzungsberichte der Heidelberger Akademie der Wissenschaften*, philhist, Klasse (1962), Abh. 2.

11. Ethica Eudemia, 1218[b] 33–34, Susemihl ed., 16, B. 3–4.

12. O. Gigon, *Aristoteles Die Nikomachische Ethik*, p. 39.

13. H. von Arnim, *Die drei Aristotelischen Ethiken*, p. 68. 1

14. Asclepius, *In Aristotelis Metaphysica*, I. 1, 980[a] 22, Hayduck ed., 4.4–15.

15. See note 2. Asclepius in the passage referred to in the same note says that it was book A which Pasicles was alleged to have written, but this, he adds, is untrue.

16. Alexander, *In Aristotelis Analytica priora*, Wallies, ed., 3.14–10, 124.8–15, 126.29- 127.2, 141.1–5, 173.32–174.3, 220.9–16, 389.31–39.3; Alexander, *In Aristotelis Topica*, Wallies ed., 131.14–19; Philoponus, *In Aristotelis Analytica priora*, Wallies, ed. 48.12–18, 123.12–20, 129.15–19; Ammonius, *In Aristotelis Analytica priora*, Wallies, ed. 38.38–39.2, 45.42–45, 49.6–12; Olympiodorus, Prolegomena, Busse ed., 13.24–25. Eudemus is named by Philoponus, In Aristotelis Categorias, proemium, Busse ed., 7.16, along with Phanias and Theophrastus as the author of *Κατηγοριαι, Περὶ έρμηνείας*, and *Άναητικά*. He is named by David, *In Porphyrii Isagogen*, Busse ed., 102. 4 with Theophrastus alone as the author of Κατηγοριαι; but the individual citations catalogued above make it likely that the *Άναητικά* and the Κατηγοριαιare the same work.

17. Alexander, *In Aristotelis Analytica Topica*, Wallies, ed., 69.13–16, *In Aristotelis Analytica priora*, Wallies, ed., 16.12–17, Aristotelis Metaphysica, Hayduck ed., 85.9–11; scholium In Aristotelis Analytica priora I, codex 1917, Brandis ed., 146a 24. As seen in the previous note, Philoponus refers to this work by the same title as that of Aristotle,Περὶ ἑρμηνείας, but this would appear to refer to its subject matter and the title Περὶ *ηεξέως* is better attested.

18. Boethius, *De syllogismo categorico*, II, Migne ed., *Patrologia latina*, LXIV, 813 C ("Theophrastus vel Eudemus"), 814 C ("Theophrastus et Eudemus"), 815 B ("Theophrastus et Eudemus". Alexander, *In Analytica priora*, 1.4, 26^{b} 30, Wallies ed., 69. 26, attributes the five additional moods to Theophrastus without mention of Eudemus.

19. For references to later publications and discussions of this anonymous Greek fragment see N. Rescher, *Galen and the Syllogism* (Pittsburgh, 1966), p. 2, n. 9.

20. Aristotle, *Analytica Priora, I, 29^{a}] 23*.

21. Alexander, *In Analytica Priora*, Wallies ed., 124 8–127.16. W. D. Ross, Aristotle's Prior and *Posterior Analytics*, pp. 41–42, suggests that the distinction between Aristotle and his followers is not so sharp as might at first appear.

22. Alexander, *In Analytica Priora*, Wallies ed., 159. 8–13, 220. 9–221.5; H. Maier, *Die Syllogistik des Aristoteles*, IIa, 37–47; W. D. Ross, Aristotle's Prior and *Posterior Analytics*, p. 45.

23. I. M. Bochenski, *La logique de Theophraste*, p. 125

24. Damascius, *Dubitations et solutiones de primis principiis* 124–125, Ruelle ed., I, 319.8–323.17.

25. Proclus, *In Primum Euclidis*, definition 8, Friedlein ed., 125.6.

26. It is reading too much into Proclus, *In Primun Euclideis*, Friedlein e., 65. 14, to suppose that Hippias wrote a history of mathematics.

27. Porphyry, *In Ptolemaei Harmonica*, Düring ed., in *Göteborgs högskolas Årsskrift*, **38** (1932), 114.23–115.9

28. Simplicius, *In Aristotelis Physica*, Dies ed., 60, 42–44.

29. Proclus, *In Primun Euclidis*, Friedlein ed., 64. 16–70. 18, trans. by Glenn R. Morrow as *Proclus' A Commentary on the First Book of Euclid's Elements* (Princeton, 1970), pp. 51–70.

30. Simplicius, *In Aristotelis Physica* Diels ed., 60. 22–68. 32.

31. Proclus, *In primum Euclidis*, Friedlein ed., 352. 14–16, the application of the theorem to the distances of ships raises problems, for which see Thomas Heath, *A History of Greek Mathematics*, I, 131–133.

32.Proclus, *In Primum Euclidis*, Friedlein ed., 299. 1–5.

33.*Ibid*., 379.2–16

34*Ibid*., 419.15–18.

35.*Ibid*.,283.7–8. In this case Eudemus is not specifically mentioned as the source, although he must be.

36.*Ibid*., 333.5–9.

37. Paul Tannery, "Sur les fragments d'Eudeme de Rhodes relatifs à I'historie des mathématiques" in Annales de la Faculté des Lettres de Bordeaux, **4** (1882), 70–76, reprinted in Memoires scientifiques, I (Toulouse-Paris, 1912), 156–177; "Sur Sporos de Nicee," in Annales de la Faculte des Lettres de Bordeaux, **4** (1882), 257–261, repr. in Mémoires scientifiques, I (Toulouse-Paris, 1912), 178–184; Bulletin des sciences, **7** (1883), 283–284, repr. In Mémoires scientifiques, II (Toulouse-Paris, 1912), 4–5; J. L. Heiberg, in Philologus, **43** (1884), 345–346.

38. Theon of Smyrna, Expositio rerum mathematicarum, Hiller ed., 198.14–15, 199.6–8, with Diels's conjecture of Λόξωι ½ for διάζσξωι.

39. Simplicius, *In Aristotelis De caelo*, Heiberg ed., 488.18–24, 493.4–506.18. A brief account is given by Aristotle, *Metaphysics*, A8, 1073^{b} 17–1074^{a}14. For translations and explanations see G. Schiaparelli, *Le sfere omocentriche di Eudosso,*

di Callippo e di Aristotele, and T. L. Heath, *Aristarchus of Samos*, 193–211; *A History of Greek Mathematics*, I, 329–334; and *Greek Astronomy*, 65–70.

40. Clement of Alexandria, *Stromata*, I, 14, 65.1, Stählin ed., II (Berlin, 1960), 41.8–15; Diogenes Laertius, I, 23, Long ed., 9.18–21; Theon of Smyrna, Hiller ed., 198.16–199.2; Simplicius, *In Aristotelis De caelo*, Heiberg ed., 471.1–6.

41. Aelian, *On the Characteristics of Animals*, III, 20, 21; IV, 8, 45, 53, 56; V, 7.

42. Apuleius, *Apologia*, 36.

43.*Die Fragmente der griechischen Historiker*, Jacoby, ed., IIIB (Leiden, 1950), nos. 524, 532B-C 10, C32, D1, D2, Ἐνδημος ἐν Λινδιακῳ (*sc*. λόγῳ) pp. 503, 508, 510, 512, 513, *Kommentar*, IIIb (Leiden, 1955), 441–442, and *Noten*, IIIb (Leiden, 1955), 259. Jacoby's conclusion is, "Bei Eudemos denkt man natürlich zuerst an der Schuler des Aristoteles... Aber der Name ist gewöhnlich, und es fehlt an entscheidenden Grunden fur die Identifikation." For Wilamowitz see "Nachrichten über Versammlungen," reporting a paper by U. von Wilamowitz-Moellendorff to the Archäologische Gesellschaft zu Berlin, 4 March 1913, in *Berliner philologische Wochenschrift* (1913), col. 1372.

BIBLIOGRAPHY

I. Original Works. From references in ancient writers Eudemus is believed to have written the following works. None has survived except in quotations or paraphrases. There are variants for the Greek titles, but those given are the most probable. A few of the titles are uncertain and are preceded by a question mark: (1) Ἀναλντικά (?Κατηγοριαι)—possibly a separate work; (2) Περὶ λέξέως; (3)φνσικά (4) History of Theology; (5) Περὶ γωνίας; (6) Ἀριθμητικὴ ἱστορία; (7) Γεωμετρκά ἱστορία; (8) Ἀστρολοηικὴ ἱστορία; (9) (?)Stories of Animals.

In addition, for a reason which cannot now be ascertained, the name of Eudemus is attached to the Ἠθικά Ενδήμεια (or Ενδημία) of Aristotle. The best text of the Eudemian ethics is still that of F. Susemihl, [*Aristotelis Ethica Eudemia*] *Eudemi Rhodii Ethica* (Leipzig, 1884), but a new critical ed. b y R. Walzer for the Oxford Classical Texts series is now in press.

Quotations from Eudemus by ancient writers have been collated in L. Spengel, *Eudemi Rhodii Peripatetici Fragmenta quae supersunt* (Berlin, 1866; 2nd ed., 1870); F. W. A. Mullach, in *Fragmenta philosophorum Graecorum*, III (Paris, 1881), 222–292; and, most recently and most satisfactorily, in Fritz Wehrli, *Eudemos von Rhodos*, in *Die Schule des Aristoteles, Texte and Kommentar*, VIII (Basel, 1955; 2nd ed., 1969).

II. Secondary Literature. According to Simplicius, a life of Eudemus was written in antiquity by an otherwise unknown Damas. It has not survived. Modern studies of Eudemus by A. T. H. Fritzsche, *De Eudemi Rhodii philosophi Peripatetici vita et scriptis* (Regensburg, 1851); C. A. Brandis, *Handbuch der Geschichte der Griechisch-Römischen Philosophie*, III, 1 (Berlin, 1860), 215–250; E. Zeller, *Die Philosophie der Griechen in ihrer geschichtlichen Entwicklung*, II, 2, 3rd ed. (Leipzig, 1879; Obraldruck-Leipzig, 1921), 869–881; and E. Martini in Pauly-Wissowa, VI (Stuttgart, 1907), cols. 895–901, are now superseded by Wehrli (see above), who has also written a new article, "Eudemus von Rhodos," in Pauly-Wissowa, supp. XI (Stuttgart, 1968), cols. 652–658.

For the *Eudemian Ethics see* P. von der Mühl, *De Aristotelis Ethicorum Eudemiorum auctoritate* (dissertation, Göttingen, 1909); E. Kapp, *Der Verhältnis der eudemischen zur nikomachischen Ethik* (dissertation, Freiburg, 1912); W. Jaeger, *Aristoteles, Grundlegung einer Geschichte seiner Entwicklung* (Berlin, 1923; 2nd ed., 1955), 237–270, trans. by R. Robinson as *Aristotle, Fundamentals of the History of His Development* (Oxford, 1934, 2nd ed., 1948), 228–258; H. von Arnim, "Die drei Aristotelischen Ethiken," in *Sitzungsberichle der Akademie der Wissenschaften in Wien*, Phil.-hist. Klasse, **202** (Vienna, 1921); Franz Dirlmeier, *Aristoteles Eudemische Ethik*, in *Aristoteles Werke in Deutscher Übersetzung, Grumach* ed., VII (Berlin, 1962; 2nd ed., 1969) with elaborate intro. and notes (see especially introduction, 110–143), and Franz Dirlmeier, *Aristoteles Magna moralia in Aristoteles Werke*, Grumach ed., VIII (Berlin 1958; 2nd ed., 1966), 97–99.

The contribution of Eudemus to the development of Aristotelian logic cannot easily be separated from that of Theophrastus, and may be studied in I. M. Bochenski, *La logique de Théophraste* (Fribourg, 1947) and *Ancient Formal Logic* (Amsterdam, 1951), pp. 72–76; W. D. Ross, *Aristotle's Prior and Posterior Analytics* (Oxford, 1949), pp. 41–42, 45–47; Jan Lukasiewicz, *Aristotle's Syllogistic* (Oxford, 1953; 2nd ed., 1957), pp. 25–28, 38–42; Storrs McCall, *Aristotle's Modal Syllogisms* (Amsterdam, 1963), pp. 2, 15–16.

Eudemus' studies in the history of mathematics are the subject of the following papers by Paul Tannery: "Sur les fragments d'Eudème de Rhodes relatifs à l'histoire des mathématiques," in *Annales de la Faculté des Lettres de Bordeaux*, 4 (1882), 70–76, repr. in *Mémoires scientifiques*, I (Toulouse-Paris, 1912), 168–177; "Le fragment d'Eudème sur la quadrature des lunules," in *Mémoires de la Société des sciences physiques et naturelles de Bordeaux*, 2nd ser., 5 (1883), 217–237, repr. i n *Mémoires scientifiques*, I (Toulouse-Paris, 1912), 339–370. His papers on Hippocrates of Chios are also relevant. For the question whether Eudemus' history was directly available to Simplicius and Eutocius, see J. L. Heiberg, *Philologus*, **43** (1884), 345–

346. Eudemus' contributions to the history of science are summarized in Thomas Heath, *A History of Greek Mathematics* (Oxford, 1921), I, 118–120; II, 244.

U. Schoebe has written a Latin dissertation on the first book of Eudemus' *Physics under the title Quaestiones Eudemeae de primo Physicorum libro* (Halle, 1931).

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