

Some Details of Eudemus' History

The history of Greek mathematics up to the time of Euclid (300 BCE) was written by Eudemus, a pupil of Aristotle. This history was lost, but it is believed to be the basis of the first paragraph of the following survey given by Proclus in the fifth century CE in the course of his commentary on the first book of Euclid. It should be noted that the word *stoicheia*, translated below as *basic principles*, is the title of Euclid's treatise, usually translated as *The Elements*.

First of all Thales, after going to Egypt, transmitted this theory to Greece, and, while he discovered many things for himself, also communicated the principles of many of them to those around him, attacking some [problems] from a more general point of view and others more intuitively. Next after him, Mamercus,¹ brother of the poet Stesichorus, is mentioned as having been seized by a zeal for geometry; and Hippias of Elis reports that he acquired a good reputation in geometry. After them, Pythagoras transformed the philosophy of geometry into a curriculum for liberal education, examining its principles from the highest on down, scrutinizing its theorems abstractly² and intellectually; and he was the one who discovered the existence of irrationals³ and the structure of the cosmic figures [regular solids]. After him Anaxagoras of Clazomenae took an interest in many [questions] having to do with geometry, as did Oenopides of Chios, who was a little younger than Anaxagoras. Plato mentioned both of them in the *Anterastae* as men who acquired a good reputation in mathematics. After them Hippocrates of Chios, who discovered the quadrature of the lune, and Theodorus of Cyrene became prominent in geometry. For Hippocrates was the first of those we have mentioned who wrote a book on the basic principles [of geometry]. [It is also said that] Plato, who appeared after them, made a very great contribution both to other [parts of] mathematics and to geometry because of his enthusiasm for them, which is clearly shown by the fact that his writings are densely packed with mathematical terms, and throughout them he arouses admiration for mathematics among those undertaking [the study] of philosophy. Living at the same time were Leodamas of Thasos, Archytas of Tarentum, and Theaetetus of Athens, by [all of] whom the theorems were increased in number and arranged in a more logical order. Later than Leodamas were Neoclides and his pupil Leon, who further enriched [the legacy] of their predecessors, so that Leon compiled a book on the basic principles that took better account of the quantity [of theorems], the use of proof, and distinguishing when a construction that is being sought is possible and when it is not. Eudoxus of Cnidus, who was a little later than Leon and became a member of Plato's company, was the first to increase the number of what are generally called theorems; to the three means already known he added three more and increased the number of [results] involving the section that originated with Plato, thereby applying analysis to them. Amyclas of Heracleia, one of Plato's group, Menaechmus, who attended the lectures of Eudoxus and was a close companion of Plato, and his brother Dinostratus, [all three] made the whole of geometry still more perfect. Theudius of Magnesia was regarded as outstanding in both mathematics and the rest of philosophy. For he arranged the basic principles beautifully and made many of the restricted⁴ [results] more general. There was also Athenaeus of Cyzicus, who lived about this time and became famous in other areas of knowledge, but most of all in geometry. [All of] these worked together in the Academy, carrying on joint research. Hermotimus of Colophon greatly advanced the [research] undertaken by Eudoxus and Theaetetus, discovered many of the

¹ This name is not certain in the Greek manuscripts.

² Literally "woodlessly," that is, in an immaterial way.

³ Some authorities, among them Heath, have suggested that this word (*alogon*) should be emended to *analogon*, which means *proportions*.

⁴ The word is not certain in the Greek manuscripts.

basic principles and wrote about certain locus problems. Philippus of Mende, a pupil of Plato, encouraged by him to study mathematics, carried on research in accordance with Plato's program and attacked whatever [problems] he thought would contribute to Plato's philosophy.

Now, some [writers] terminate their discussion of the subject after writing their histories up to this point. But not much later than these [men] is Euclid, who, in assembling the basic principles, after arranging many of [the theorems] of Eudoxus and perfecting many of those of Theaetetus, also elevated to the status of irrefutability [propositions] for which his predecessors had given weak proofs. This man lived in the time of Ptolemy I; for Archimedes, when attacking [problems] first recalls [the work] of Euclid. It is also said that Ptolemy once asked him [Euclid] if there was a shorter road to geometry than through the basic principles, and Euclid replied that there was no royal road to geometry.⁵ He therefore came later than those in Plato's group but before Eratosthenes and Archimedes; for these two men were contemporaries of each other, as Eratosthenes says somewhere. By party [Euclid] was a Platonist and was at home in that philosophy; and that is why he took the structure of the so-called Platonic figures as the ultimate goal of his entire *Elements*.

Who were these people? Whether Proclus and his sources are entirely accurate or not, this summary makes a good starting point in the search for information about the development of Greek geometry. In this passage Proclus mentions 25 men who were considered to have made significant contributions to mathematics, although he describes those contributions briefly if at all. Of these 25, five are well known as philosophers (Thales, Pythagoras, Anaxagoras, Plato, and Aristotle); three are famous primarily as mathematicians and astronomers (Euclid, Eratosthenes, and Archimedes). The other seventeen have enjoyed much less posthumous fame. Some of them are so obscure that no mention of them can be found anywhere except in Proclus' summary. Some others (Theodorus, Archytas, Menaechmus, Theaetetus, and Eudoxus) are mentioned by other commentators and by Plato. The thirteen just named are the main figures used in the textbook to sketch the history of Greek geometry. It is clear from what Proclus writes that something important happened to mathematics during the century of Plato and Aristotle, and the result was a unique book, Euclid's *Elements*. Chapter 10 represents an attempt to reconstruct this development.

⁵ The fifth-century anthologist Stobaeus tells the same story about Alexander the Great and Menaechmus.