EUCLID'S ELEMENTS
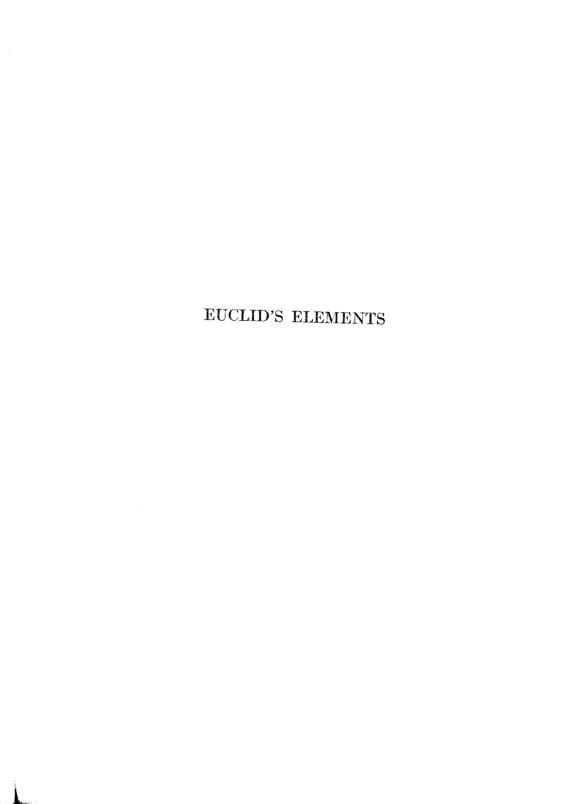
BIOGRAPHICAL NOTE

EUCLID, *fl. c.* 300 B.C.

EUCLID is said to have been younger than the first pupils of Plato but older than Archimedes, which would place the time of his flourishing about 300 B.C. He probably received his early mathematical education in Athens from the pupils of Plato, since most of the geometers and mathematicians on whom he depended were of that school. Proclus, the Neo-Platonist of the fifth century, asserts that Euclid was of the school of Plato and "intimate with that philosophy." His opinion, however, may have been based only on his view that the treatment of the five regular ("Platonic") solids in Book XIII is the "end of the whole *Elements*."

The only other fact concerning Euclid is that he taught and founded a school at Alexandria in the time of Ptolemy I, who reigned from 306 to 283 B.C. The evidence for the place comes from Pappus (fourth century A.D.), who notes that Apollonius "spent a very long time with the pupils of Euclid at Alexandria, and it was thus that he acquired such a scientific habit of thought." Proclus claims that it was Ptolemy I who asked Euclid if there was no shorter way to geometry than the *Elements* and received as answer: "There is no royal road to geometry." The other story about Euclid that has come down from antiquity concerns his answer to a pupil who at the end of his first lesson in geometry asked what he would get by learning such things, whereupon Euclid called his slave and said: "Give him a coin since he must needs make gain by what he learns."

Something of Euclid's character would seem to be disclosed in the remark of Pappus regarding Euclid's "scrupulous fairness and his exemplary kindness towards all who advance mathematical science to however small an extent." The context of the remark seems to indicate, however, that Pappus is not giving a traditional account of Euclid but offering an explanation of his own of Euclid's failure to go further than he did with his investigation of a certain problem in conics.

Euclid's great work, the thirteen books of the *Elements*, must have become a classic soon after publication. From the time of Archimedes they are constantly referred to and used as a basic text-book. It was recognized in antiquity that Euclid had drawn upon all his predecessors. According to Proclus, he "collected many of the theorems of Eudoxus, perfected many of those of Theatetus, and also brought to incontrovertible demonstration the things which were only loosely proved by his predecessors." The other extant works of Euclid include: the *Data*, for use in the solution of problems by geometrical analysis, *On Divisions* (of figures), the *Optics*, and the *Phenomena*, a treatise on the geometry of the sphere for use in astronomy. His lost *Elements of Music* may have provided the basis for the extant *Sectio Canonis* on the Pythagorean theory of music. Of lost geometrical works all except one belonged to higher geometry.

Since the later Greeks knew nothing about the life of Euclid, the mediaeval

translators and editors were left to their own devices. He was usually called *Megarensis*, through confusion with the philosopher Eucleides of Megara, Plato's contemporary. The Arabs found that the name of Euclid, which they took to be compounded from *ucli* (key) and *dis* (measure) revealed the "key of geometry." They claimed that the Greek philosophers used to post upon the doors of their schools the well-known notice: "Let no one come to our school who has not learned the *Elements* of Euclid," thus transferring the inscription over Plato's Academy to all scholastic doors and substituting the *Elements* for geometry.

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