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(b. Antinoupolis, Egypt, fl. fourth century A. D.[?])

*mathematics.*

Serenus was the author of two treatises on conic sections, *On the Section of a Cylinder* and *On the Section of a Cone*, which have survived, and a commentary on the *Conics* of Apollonius, which has not. From a subscription in a later hand to the Vatican archetype of the first-named work and from the title of the second as given in a Paris manuscript from Mount Athos, Serenus' birth can be placed at Antinoupolis, a city founded by Hadrian in A.D. 122. This birthplace gives an upper limit for his date. As Serenus reckoned Apollonius among the "ancient" writers on conics, and used two lemmas proved by Pappus to transform certain unequal proportions,<sup>1</sup> he is generally thought to have flourished in the fourth century. Certainly his surviving works belonged to an age when Greek geometry had passed its creative phase,<sup>2</sup>

*On the Section of a Cylinder*, dedicated to an otherwise unknown Cyrus, consists of an introduction, eight definitions, and thirty-three propositions. It counters what is said to have been a prevalent belief—that the curve formed by the oblique section of a cylinder differs from the curve formed by the oblique section of a cone known as the ellipse. In the final five propositions Serenus defended a friend Peithon, who, not satisfied with Euclid's treatment, had defined parallels to be such lines as are cast on a wall or a roof by a pillar with a light behind it. Even in the decline of Greek mathematics this description had been a source of amusement to Peithon's contemporaries.<sup>3</sup>

*On the Section of a Cone*, also dedicated to Cyrus, consists of an introduction and sixty-nine propositions. It deals mainly with the areas of triangular sections of right or scalene cones made by planes passing through the vertex. Serenus specified the conditions for which the area of a triangle in a certain class is a maximum, those for which two triangles in a particular class may be equal, and so on. In some instances he also evaluated areas.

Serenus himself bore witness to his lost commentary on Apollonius.<sup>4</sup> Certain manuscripts of Theon of Smyrna preserve a fragment that may have come from that work or from a separate collection of lemmas. It is introduced with the words, "From Serenus the philosopher out of the lemmas," and it lays down that if a number of rectilinear angles be subtended at a point on the diameter of a circle (not being its center) by equal arcs of the circle, an angle nearer the center is always less than an angle farther away: this is applied to angles subtended at the center of the ecliptic by equal arcs of the eccentric circle of the sun.

## NOTES

1. *De sectione conii*, Prop. XIX, in J.L. Heiberg, *Sereni Antinoensis opuscula*, pp. 160.15–162.11; Pappus, *Collectio* VII. 45 and 47, in F. Hultsch, *Pappi Alexandrini Collectionis quae supersunt*, II (Berlin, 1877), pp. 684.20–686.4, 686.15–27.

2. Halley's beliefs (*Apollonii Pergaei Conicorum libri octo, Praefatio ad finem*) that Serenus was born at Antissa in Lesbos and that a lower date for his life is given by an apparent reference to him in the commentary of Marinus (fl. A.D. 425) on Euclid's *Data* (David Gregory, *Euclidis quae supersunt omnia* [Oxford, 1703], p. 457.3) have been shown philologically by Heiberg in his review of M. Cantor, *vorlesungen über Geschichte der Mathematik* in *Revue critique d'histoire et de Littérature*, **11** (1881), 381. and by Menge (*Euclidis opera omnia*, J.L. Heiberg and H. Menge, eds., VI [Leipzig, 1896], p. 248.3–4, where there is no mention of Serenus) to be erroneous,

3. J.L. Heiberg, *Sereni Antinoensis opuscula*, p. 96.14–25.

4. *Ibid.*, pp. 26–27.

## BIBLIOGRAPHY

**I. Original Works.** It seems likely that from the seventh century the two surviving works of Serenus and the commentary of Eutocius were bound with the *Conics* of Apollonius—Theodorus Metochita certainly read them together early in the fourteenth century—and their survival is probably due to these circumstances. A Latin trans. of Serenus' *De sectione cylindri* and *De sectione conii* was published by F. Commandinus at the end of his *Apollonii conicorum libri quatuor* (Bologna, 1566). The Greek text was first published by E. Halley in *Apollonii Pergaei Conicorum libri octo et Sereni Antinoensis De sectione cylindri et*

*coni libri duo* (Oxford, 1710). A definitive critical ed. with Latin trans. Was published by E. Nizze, *Serenus von Antissa: Ueber den Schnitt des Cylinders* (Stralsund, 1860) and *Ueber den Schnitt des Kegels* (Stralsund, 1861); and there is an excellent French trans. with intro. and notes by Paul Ver Eecke, *Serenus d'Antinoë Le livre De la section du cylinder e le livre De la section du cône* (Paris-Bruges, 1929).

The fragment from the lemmas has been published by T.H. Martin, *Theonis Platonici Liber De astronomia* (Paris, 1849; repr. Groningen, 1971), 340–343, with a Latin trans, and by J. L. Heiberg, *Sereni Antineonsis opusula*, XVIII–XIX.

**II.** Secondary Literature. See Thomas Heath, *History of Greek Mathematics*, II (Oxford, 1921). 519–526: J.L. Heiberg, “Über der Geburtsort des Serenos,” in *Bibliotheca mathematica*, n.s. **8** (1894). 97–98: Gino Loria, *Le scienze esatte nell’ antica Grecia*, 2nd ed. (Milan, 1814), 727–735: T. H. Martin. *Theonis Platonici Liber De astronomia* (Paris, 1849; repr. Groningen, 1971), 79–81; and Paul Tannery, “Serenus d’ Antissa,” in *Bulletin des sciences mathématique et astronomiques*, 2nd ser., 7 (1883), 237–244, repr. in *Mémoires scientifiques*. I (Paris-Toulouse, 1912), 290–299.

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