Commandino, Federico | Encyclopedia.com

(*b*. Urbino, Italy, 1509; *d*. Urbino, 3 September 1575),

mathematics

The little that is known about Commandino's life is derived mainly from a brief biography written by a younger fellow townsman who knew him well for many years toward the end of his career.

Descended from a noble family of Urbino, Commandino studied Latin and Greek for some years with a humanist at Fano. When Rome was sacked on 6 May 1527 by the army of Charles V, the Orsini, a leading noble clan, fled to Urbino. For one of their sons they procured a tutor proficient in mathematics, who also taught Commandino. After this tutor became a bishop on 6 June 1533, he obtained for Commandino an appointment as private secretary to Pope Clement VII. However, the pontiff died on 25 September 1534, and Commandino went to the University of Padua. There he studied philosophy and medicine for ten years, but he took his medical degree from the University of Ferrara.

Returning to his birthplace, Commandino married a local noblewoman, who died after giving birth to two daughters and a son. Commandino resolved not to marry a second time. After his son's death he put the girls in a convent school (and later found husbands for them). Withdrawing from the general practice of medicine, he turned to his true vocation: editing, translating, and commenting on the classics of ancient Greek mathematics. Gaining renown thereby, Commandino was designated the private tutor and medical adviser to the duke of Urbino. The duke, however, was married to the sister of a cardinal; and the latter persuaded Commandino to be his personal physician in his intellectually stimulating household in Rome.

Commandino had been translating into Latin and commenting on Archimedes' *Measurement of the Circle* (with Eutocius' commentary), *Spirals, Quadrature of the Parabola, Conoids and Spheroids, and Sand-Reckoner*. Besides the first printed edition of the Greek text of these five works and an earlier Latin translation of them (Basel, 1544), he had access also to a Greek manuscript in Venice, where his patron was residing when Commandino published this Archimedes volume in 1558.

During the previous year Commandino had heard complaints about the difficulty of understanding Ptolemy's *Planisphere*, which showed how circles on the celestial sphere may be stereographically projected onto the plane of the equator. Although the Greek text of the *Planisphere* is lost, it had been translated into Arabic, and from Arabic into Latin. This Latin version, done at Toulouse in 1144, and Jordanus de Nemore's *Planisphere*, both of which had been printed at Basel in 1536, were edited by Commandino and, together with his commentary on Ptolemy's *Planisphere*, were published at Venice in 1558.

Ptolemy's *Analemma* explained how to determine the position of the sun at a given moment in any latitude by an orthogonal projection using three mutually perpendicular planes. Again, as in the case of Ptolemy's *Planisphere*, no Greek text was available to Commandino (a portion was later recovered from a palimpsest); but an Arabic version had been translated into Latin. This was edited from the manuscript by Commandino (Rome, 1562). Besides his customary commentary, he added his own essay *On the Calibration of Sundials* of various types, since he felt that Ptolemy's discussion was theoretical rather than practical.

Commandino's only other original work, dealing with the center of gravity of solid bodies, was published in 1565 at Bologna, of which his patron had become bishop on 17 July of the preceding year. Commandino's interest in this topic was aroused by Archimedes' *Floating Bodies*, of which he had no Greek text, unlike the five other Archimedean works he had previously translated. Since his time a large part of the Greek text of *Floating Bodies* has been recovered, but he had only a printed Latin translation (Venice, 1543, 1565), which he commented on and corrected (Bologna, 1565). In particular the proof of proposition 2 in book II was incomplete, and Commandino filled it out. One step required knowing the location of the center of gravity of any segment of a parabolic conoid. No ancient treatment of such a problem was then known, and Commandino's was the first modern attempt to fill the existing gap.

Archimedes' *Floating Bodies* assumed the truth of some propositions for which Commandino searched in Apollonius' *Conics*. Of the *Conics*' eight books only the first four are extant in Greek, and he had access to them in manuscript. An earlier Latin translation (Venice, 1537) was superseded by his own (Bologna, 1566), to which he added Eutocius' commentary, the relevant discussion in Pappus' *Collection* (book VII), the first complete Latin translation (from a Greek manuscript) of Serenus' *Section of a Cylinder and Section of a Cone*, and his own commentary.

Overwork and the death of his patron on 28 October 1565 greatly depressed Commandino; and he returned to Urbino, where he could live quietly, for many months on a salt-free diet. He resumed his former activities, however, after being visited by John Dee, who gave him a manuscript Latin translation of an Arabic work related to Euclid's *On Divisions* (of figures), of which the Greek original is lost. Commandino published this Latin translation and added a short treatise of his own to condense and generalize the discussion in the manuscript (Pesaro, 1570).

At the request of his ruler's son, Commandino translated Euclid's *Elements* into Latin and commented on it extensively (Pesaro, 1572). Also in 1572 he published at Pesaro his Latin translation of and commentary on Aristarchus' *Sizes and Distances of the Sun and Moon*, with Pappus' explanations (*Collection*, book VI, propositions 37–40).

For those of his countrymen who did not know Latin, Commandino supervised a translation of Euclid's *Elements* into Italian by some of his students (Urbino, 1575). His own Latin translation of Hero's *Pneumatics* (Urbino, 1575) was seen through the press by his son-in-law immediately after his death. From a nearly complete manuscript, needing three months' work at most, his faithful pupil Guidobaldo del Monte published Commandino's Latin translation of and commentary on Pappus' *Collection*, books III-VIII (Pesaro, 1588).

In the sixteenth century, Western mathematics emerged swiftly from a millennial decline. This rapid ascent was assisted by Apollonius, Archimedes, Aristarchus, Euclid, Eutocius, Hero, Pappus, Ptolemy, and Serenus—as published by Commandino.

BIBLIOGRAPHY

A list of Commandino's publications is available in Pietro Riccardi, *Biblioteca matematica italiana*, enl, ed., 2 vols, (Milan, 1952) I. cols, 42 359–365; II, pt, 1 col, 15; II pt. 2 col. 117. II pt, 5 cols. 9, 49–50; II, pt, 6 col. 189; II pt, 7 cols. 25–26. Riccardi omits *Conoids and Spheroids* (I, col. 42); misattributes the Italian translation of Euclid's *Elements* to Commandino himself (I, col. 364): and misdates Pappus' *Collection* as 1558 (correct date, 1588; II, pt. I, col. 15). To Riccardi's list of writings about Commandino (I, col. 359; II, pt. 1, col. 15) add Edward Rosen, "The Invention of the Reduction Compass," in *Physis*, **10** (1968), 306–308; and "John Dee and Commandino," in *Scripta mathematica*, **28** (1970), 321–326.

Bernardino Baldi's biography of Commandino, completed on 22 November 1587, was first published in *Giornal de' letterati d'Italia*, **19** (1714), 140–185, and reprinted in *Versi e prose scelte di Bernardino Baldi*, F. Ugolino and F.-L. Polidori, eds. (Florence, 1859), pp. 513–537.

Edward Rosen