Biographical Encyclopedia of Astronomers

Stewart, Matthew

Born Rothesay, (Strathclyde), Scotland, January 1717

Died Catrine, (Strathclyde), Scotland, 23 January 1785

Matthew Stewart is remembered primarily for an attempt to deduce the Sun's distance by purely geometrical means. Son of Reverend Dugald Stewart, minister of the parish of Rothesay, and Janet Bannatyne, Stewart received his early education on the Scottish Isle of Bute, then entered the University of Glasgow in 1734, intending to follow his father's wishes by pursuing an ecclesiastical career

At Glasgow, Stewart turned to mathematics while studying with Robert Simson, with whom he developed a lifelong friendship. Simson's field of study was ancient geometry, specifically an attempt to reconstruct both Apollonius's *Loci Plani* and Euclid's lost three-volume work on porisms. (A porism is essentially a geometrical proposition intermediate between a theorem and a problem; such a proposition, depending on the starting point, is either impossible or possible in an infinite number of ways.) In 1741, Stewart left Glasgow to continue his mathematical education at the University of Edinburgh under one of Simson's former students, Colin Maclaurin. Here Stewart deepened his expertise in more modern realms of mathematics, such as calculus and analytic geometry, including astronomical applications. At the same time, Simson periodically communicated his own progress in ancient mathematics to Stewart, who refined these studies on his own.

In 1746, while serving as minister of the parish at Roseneath, Dunbartonshire, Stewart published his breakthrough work, *Some General Theorems of Considerable Use in the Higher Parts of Mathematics*. Some of the work undoubtedly arose from Simson's continuing correspondence with Stewart, but was published with Simson's approval. *General Theorems* established Stewart's reputation in the mathematical community and led to his appointment as professor of mathematics at Edinburgh in September 1747, following Maclaurin's death

In 1756, Stewart published an essay on a geometric analysis of Johannes Kepler's second law (equal areas). His second book, *Tracts, Physical and Mathematical*, appeared in 1761. Here, Stewart analyzed the motions of planets, including the perturbations of one planet on another, using purely geometrical means; he further established a geometrical technique to approximate the Sun's distance by considering the observed mean angular motion of the apogee of the Moon's orbit

The year 1763 brought two further publications: another volume of geometrical propositions plus Stewart's result for the solar distance. That result—29,875 Earth radii, or about 119 million miles (191 million km)—was much larger than previous determinations and proved controversial. An anonymous pamphlet entitled *Four Propositions* appeared, disputing Stewart's solar distance largely on the basis of the simplifying assumptions he had made. (The

pamphlet's author, John Dawson, a surgeon from Sudbury, Yorkshire, England, came forward after Stewart's death.) A harsher attack by John Landen followed in 1771.

His health in decline, Stewart retreated to his estate at Catrine in 1772. Stewart's son, Dugald, carried out his father's duties at the university and, in 1775, was elected to a joint professorship with him

Stewart was elected a Fellow of the Royal Society in 1764. Correspondence between Robert Simson and Matthew Stewart is archived at the University of Glasgow and was published in *The Proceedings of the Edinburgh Mathematical Society* XXI (1902-1903): 1-38.

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Selected References

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