Biographical Encyclopedia of Astronomers

Mayer, Johann Tobias

Born Marbach near Stuttgart, (Germany), 17 February 1723

Died Göttingen, (Germany), 20 February 1762

Selenographer Tobias Mayer prepared the earliest quantitative map of features on the surface of the Moon, as well as lunar tables used by Neville Maskelyne in preparing early editions of the *Nautical Almanac*. Mayer was the son of a cartwright who left his trade in 1723 to work as foreman of a well-digging crew in Esslingen, Baden-Württemberg, where his family joined him a year later. Following the death of his father in 1731, Mayer was placed in the local orphanage and taught himself mathematics from Christian von Wolff's *Anfangs-Gründe aller mathematischen Wissenschaften* (Foundations of All Mathematical Sciences). His mother found work in Saint Katharine's Hospital, which probably explains why Mayer began preparing architectural drawings of the hospital at barely 14. His skill in this area attracted the notice of a noncommissioned officer in the Swabian district artillery, then garrisoned in Esslingen, under whose direction in 1739 Mayer produced a book on military fortifications; later that year he drew a map of Esslingen and its environs.

Mayer's first book, published around 1741, deals with the application of analytical methods to the solution of geometrical problems. His second, *Mathematischer Atlas* (1745), appeared during the period in which he briefly worked for the firm of Johann Andreas Pfeffel of Augsburg, Bavaria. Its choice of subject matter is a good indicator of the extent of Mayer's scientific knowledge at that time. On leaving Augsburg, he joined the Homann Cartographic Bureau in Nuremberg, Bavaria, where he devoted five years to improving the state of mapmaking. Mayer collated geographical and astronomical data and made observations of occultations and eclipses. He drew over 30 maps, of which the Mappa Critica of Germany is considered the most significant, as it set new standards for handling geographical source materials and for applying astronomical data to the determination of latitude and longitude

In 1747 and 1748, Mayer obtained a large number of meridian transits of the Moon and made numerous measurements of its angular diameter to facilitate the lunar eclipse method of fixing longitude. In addition to determining the selenographic coordinates of 89 major lunar markings, he also accounted for irregularities in the Moon's orbital motion and libration.

The *Kosmographische Nachrichten und Sammlungen auf das Jahr 1748* (Nuremberg, 1750), which Mayer edited for the newly formed Cosmographical Society, contains a description of his glass micrometer, his observations on the solar eclipse of July 25, 1748, and occultations of some bright stars, his major treatise on lunar libration, and his considerations on why the Moon cannot have an atmosphere

In early 1751, Mayer took a professorship at the Georg-August Academy in Göttingen. This was a nominal position, based solely on his reputation as a cartographer and practical

astronomer. Shortly before leaving Nuremberg, he married Maria Victoria Gnüge, with whom he had eight children, of whom only three survived.

In 1752, Mayer drew up new lunar and solar tables, accurate to 1 arcminute. Comparing his positional values to historical observations (for instance, those made at all lunar and solar eclipses described since the invention of the telescope), he found that all discrepancies were attributable to errors in star positions and the inferior quality of the instruments used. On the recommendation of James Bradley, Mayer's lunar tables, edited by Nevil Maskelyne, were used to compute the lunar and solar ephemerides for the early editions of the *Nautical Almanac*

Mayer's further research included eliminating errors from a 6-ft.-radius mural quadrant to be installed in Göttingen, inventing a new method for calculating the circumstances of solar eclipses, studying the proper motion of stars, and compiling a catalogue of zodiacal stars. His works on each of these subjects were published posthumously in Georg Christoph Lichtenberg's *Opera inedita Tobiae Mayeri* (Göttingen, 1775). Appended to the book is a copper engraving of Mayer's map of the Moon. At 8 inches in diameter, it was the most accurate map of the visible lunar surface for half a century and was reproduced by Johann Schröter in his *Selenotopographische Fragmenten*.

Mayer's later work included efforts to improve land measurement, a method to find geographical coordinates independent of celestial observation. In 1765, his widow received £3,000 from the British government in recognition of her husband's claim, presented a decade earlier, for one of the prizes in connection with the quest to determine longitude at sea.

Much of the manuscript material relating to Mayer is preserved in Göttingen at the Lower Saxony State and University Library.

Richard Baum

Selected References

Forbes, Eric G. (ed.) (1972). *The Unpublished Writings of Tobias Mayer*. 3 Vols. Göttingen: Vandenhoeck & Ruprecht.

—— (1971). *The Euler-Mayer Correspondence* (1751–1755). London: Macmillan.