Biographical Encyclopedia of Astronomers

Boskovic, Rudjer [Roger] J

Born Ragusa (Dubrovnik, Croatia), 18 May 1711

Died Milan, (Italy), 13 February 1787

The polymathic Jesuit Rudjer Boskovic contributed to practical and theoretical mathematics, optics, and astronomy. He was born to Nikola Boskovic, a merchant, and Paula Bettera. After his early After receiving his education at the Jesuit school in Ragusa, Boskovic entered the Jesuits in 1725 and then studied at the Collegium Romanum. He progressed quickly in his studies. He was made professor of mathematics at the Collegium Romanum in 1740, before he was ordained and even before he had completed his theology studies. In 1759, Boskovic left Rome for Paris, where he joined the Academy of Sciences, becoming a corresponding member. After staying there for six months, he traveled first to London, where he met many scientific and philosophical figures before continuing his tour of Europe and returning to Italy in 1763. Boskovic became professor of mathematics in Pavia, where he focused on optics and also led efforts to build the Brera Observatory in Milan (though his plans were not fully realized). In 1770, he moved to the Scuole Palatine in Milan, but trouble led to his resignation from his professorship in 1772. When Pope Clement XIV banned the Jesuit order the following year, Boskovic moved to Paris, where he again concentrated on optics and astronomy as captain of optics in the French navy. In 1782, he returned to Italy, eventually settling in Milan, where he worked at the Brera Observatory until his death.

Boskovic argued against blind loyalty to Aristotelian physics and did not suffer fools gladly. This characteristic led to many disputes and contributed to many of his political difficulties. In his early days, Boskovic was not allowed to teach the Copernican system openly as fact. Out of respect for the Roman Inquisition, Boskovic taught it as a mathematical hypothesis and mentioned the need to satisfy censors in order to acquire the imprimatur, but urged its acceptance nonetheless. His influence helped minimize the hostility of Catholic churchmen to the Copernican system, and he convinced Pope Benedict XIV to remove *De Revolutionibus* from the Index of Forbidden Books.

Boskovic demonstrated considerable practical and theoretical talent. He was commissioned to repair the fissures in Saint Peter's dome as well as in other cathedral domes, to direct the drainage of the Pontine marshes, and to survey the meridian of the Papal states

His practical inventions include the ring micrometer, which enabled him to determine the relative positions of two celestial bodies. Boskovic was the first to apply probability to the theory of errors, as was later acknowledged by Pierre de Laplace and Carl Gauss. His ideas also led to methods developed by Laplace and Gauss to compute the orbits of comets and asteroids. In his analysis of the vis viva controversy, about which he concluded that it was a verbal rather than a philosophical problem, Boskovic also first expressed his atomic theory based on a universal force law describing both attractive and repulsive regions; he developed the details of this theory in his *Theoria Philosophiae Naturalis*

Boskovic's interest in astronomy led him to a complete study of optics, optical instruments, and the theoretical foundations and instrumental practice of observational astronomy. He formulated a general photometric law of illumination, developed a law of light emission, and worked for the improvement of lenses and optical devices. His *Dioptrics* addresses many

principles of telescopic observation, including achromatic lenses and the importance of eyepieces; it also offers an impressive example of Boskovic's accuracy in measuring the reflection and dispersion of light using his own invention, the vitrometer. Boskovic's astronomical efforts yielded many other results as well, including methods to determine the Sun's rotation, details of the transit of Mercury, and observations of the aurora. In 1753, he refuted Leonhard Euler's analysis of the lunar atmosphere, arguing that it was, at best, far less dense than supposed. In 1766, Boskovic communicated to Joseph de Lalande a method of measuring the speed of starlight by using a telescope filled with water to discover whether light travels with the same velocity in air and in water. In 1770, as the first director of the Brera Observatory, he made preparations to carry out this experiment, but could not do so before his removal.

Boskovic was a correspondent for the Royal Society of London and a frequent contributor to the Jesuit periodical Mémoires des Trévoux. He regularly encouraged international scientific cooperation. He helped convince the Royal Society to form an expedition to observe the 1761 transit of Venus, but was unable to participate in the observations himself. The Royal Society subsequently invited Boskovic to lead a trip to California to observe the 1769 transit of Venus, but this was canceled for political reasons

Boskovic lived a long, fruitful life in which he explored diverse interests. Eastern European and Russian scientists have long shown a strong interest in his work; more recently, Western scientists have become better acquainted with his contributions, yielding a host of recent books and articles. His legacy has been preserved in the special Boskovic Archives in the Rare Books Library at the University of California, Berkeley. The nearly 200 items housed there include many of his 66 scientific treatises and over 2,000 letters of correspondence with other mathematicians, including Laplace, Jean D'Alembert, Daniel Bernoulli, Euler, and Joseph Lagrange. Various symposia have been held on the anniversaries of Boskovic's publications, birth, and death. A lunar crater also honors him.

Joseph F. MacDonnell

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