

Mary Somerville

At the time of her death in Naples, Italy, English writer **Mary Fairfax Greig Somerville** (December 26, 1780 – November 29, 1872) was called the “Queen of nineteenth-century Science” by the *London Morning Post*. At the time of her demise at the age 92, she was in the process of writing a book on quaternions and reviewing a book on finite difference techniques. She made the first English translation of Pierre de



Laplace’s five-volume opus *Mécanique céleste*, which incorporated developments in celestial mechanics from the time of Isaac Newton. Somerville entitled her 1831 translation *Mechanism of the Heavens*. In her handwritten autobiography, penned in her 89th year, she recognized that this work was far and away her most important, writing, “All my other books will soon be forgotten, by this my name will be alone remembered ...” In many cases the translator of a great work is actually a partner of the original author, both in exposition and in substance. To read a mathematical work, even in a foreign language, is not a terribly difficult task. The language and the formulae can be learned and their meaning apprehended. But to read the most profound mathematical works with such an appreciation that the translator stands on the same level as the great minds that originated them, requires a superb intellect. That was the case of Somerville.

Mary Fairfax was born at Jedburgh, Scotland, the daughter of Admiral William George Fairfax and his second wife Margaret Charters. Girls of Mary’s class received rather desultory and rudimentary educations, little beyond mastery of the social and domestic arts that would serve them when they found a husband. While her brother received first class schooling in preparation for the university, her

reading was mostly confined to the Bible and otherwise she was, in her own words, “allowed to grow up a wild creature.” When her father, returning from long service at sea, discovered what a little “savage” his ten-year-old daughter had become, he sent her to Miss Primrose’s boarding school at Musselburgh. There for twelve months she learned reading, writing, French and English grammar, the only full-time instruction of her life. Fortunately she had a lively and persistent mind, immense curiosity and an eagerness to learn.

During her early teens, Mary came across some strange symbols in a ladies’ fashion magazine. The symbols were “algebra,” and caught her fancy. Wishing to know more about them, she convinced her younger brother’s tutor to give her copies of Bonnycastle’s *Algebra* and Euclid’s *Elements*, which she studied on her own. When her father discovered her reading mathematics, he forbade it, fearing the strain of abstract thought on a female body and mind. This ban led her to continue her study in secret. At the time, it was believed that were a female to study subjects requiring arduous mental effort, particularly abstract ones like mathematics and the sciences, she would do herself irrecoverable physical and mental harm. In addition, there was the commonly held notion that educating females beyond certain “womanly” arts, was not only a waste but unseemly as well.

In May 1804, Fairfax married a cousin, Captain Samuel Greig, who was a member of the Russian Navy. Although he cared nothing for mathematics and science and did not value intellectual women, he never interfered with his wife’s studies. After only three years of marriage, she became widowed, with a comfortable inheritance that left her financially independent and free to study according to her personal convictions. During the day she tended to her two sons, and in the evenings she mastered J. Ferguson’s *Astronomy* and read Newton’s *Principia*. She became a prime model of an intellectual woman for a group of young liberal intellectuals, who sought educational and social reforms for women. She regularly corresponded with William Wallace, professor of mathematics at Edinburgh, who served as her mentor. In 1812 Mary Greig married another cousin, Dr. William Somerville. He was

an army doctor, and was very supportive of his wife's aspirations. Throughout their sixty years of marriage, he took great pride in her accomplishments and fame. At age thirty-three Mary Somerville continued her rigorous course of reading French books of higher mathematics and astronomical science recommended to her by Wallace. Her husband was eventually named to the Army Medical Board, and the family, which included four children, settled in London. They were immediately introduced into the best intellectual society.

In 1825 Somerville carried out experiments in magnetism that were presented in a paper "The Magnetic Properties of the Violet Rays of the Solar Spectrum" to the Royal Society. Aside from the astronomical observations of Caroline Herschel, it was the first paper by a female to be read to the Royal Society and published in its *Philosophical Transactions*. In 1828 Somerville was persuaded by Lord Brougham, on behalf of the Society for the Diffusion of Useful Knowledge, to write a popularized rendition of Laplace's *Mécanique céleste*. Unsure of her qualifications for such a task, Somerville secretly undertook the project assured that, should she fail, the manuscript would be destroyed and its very existence would be known only to those immediately involved. In her treatise, she added full mathematical explanations and diagrams missing from the original so that it would be readable by a large audience. To her surprise *The Mechanism of the Heavens* sold well and won her much praise. It was used in advanced courses at Cambridge, and her preface, reprinted as *A Preliminary Dissertation of the Mechanism of the Heavens* (1832), was used in British textbooks for almost a century. At fifty-one Somerville embarked on a career as a scientific expositor. Her second book, *On the Connection of the Physical Sciences* (1834) was an account of physical phenomena and the connections among the physical sciences. Her discussion of a hypothetical planet perturbing Uranus in the sixth edition of the work (1842) led John Couch Adams to his investigation and subsequent discovery of Neptune.

When her husband's health deteriorated, the Somervilles moved to Italy, where at age sixty-eight, she

published her most successful book, *Physical Geography*. This was widely used in schools and universities for the next fifty years. At the age of eighty-nine, she published her fourth and final book, *On Molecular and Microscopic Science*, a summary of the most recent discoveries in chemistry and physics. That same year, she completed her autobiography, published posthumously as *Personal Recollections From Early Life to Old Age of Mary Somerville* (1873). Somerville made no major discoveries in the various sciences she so enthusiastically studied. Through her zest for learning and her vast readings in any number of different fields, she became acquainted with what was new in mathematics and the sciences, and using her own considerable ability for seeing connections together with a gift for clear and cogent explanation, she became a leading spokesperson for science. Her choice of material and her early insistence of viewing “physical science” as a whole went a long way towards determining the nature of the subject. She found no conflict between science, mathematics and her deep religious convictions. On the contrary, she wrote: “Nothing has afforded me so convincing a proof of the unity of the Deity as those purely mental conceptions of numerical and mathematical science which have been by slow degrees vouchsafed to man, and are still granted in these higher times by the Differential Calculus, now superseded by the Higher Algebra, and all of which must have existed in that sublimely omniscient Mind from eternity.”

In 1832 the Royal Society informed Somerville that in appreciation for her contributions to physics and astronomy, a bust of her had been commissioned to stand in their Great Hall. She was apprised that the Society’s members would “honor Science, their country and themselves, in paying this proud tribute to the powers of the female.” While the Society was willing to honor Somerville’s mind, its recognition did not extend to allowing her to become a member. Although her treatises were used as textbooks at Cambridge, she was never permitted to enter the university’s lecture halls, either as a student or a teacher. She was however elected to the Royal Astronomical Society in 1835 (at the same time the

honor was extended to Caroline Herschel). An ardent supporter of the emancipation and education of women, her signature was the first to appear on the massive petition to parliament to give women the right to vote. To honor her efforts in behalf of female education, Somerville College, Oxford was named for her.

Quotation of the Day: “Sometimes I find mathematical problems difficult, but my obstinacy remains, for if I do not succeed today, I attack them again on the morrow.” – Mary Somerville