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(*b*. Dublin, Ireland, 2 November 1826; *d*. Oxford, England, 9 February 1883)

mathematics.

Smith's contributions to mathematics, although relatively few, were not slight in importance. His best work was done in number theory, but he also wrote on elliptic functions and geometry.

Smith was the youngest of four children of John Smith, an Irish barrister, and the former Mary Murphy. His mother's family were country gentry from near Bantry Bay. After his father's death in 1828. Smith's mother took the family to the Isle of Man in 1829 and to the Isle of Wight in 1831. Smith was taught entirely by his mother until 1838. when he was given instruction by a Mr. R. Wheler. In 1840 the family moved to Oxford, and Henry Highton was engaged as tutor. When Highton went to teach at Rugby School in 1841. Smith accompanied him as a pupil but was soon removed, following his brother's death, and spent some time in France and Switzerland. He won a scholarship to Balliol College, Oxford, in 1844. Benjamin Jowett later described his natural abilities as greater those of anyone he had ever known at Oxford, and T. H. Huxley made a similar comment. While on a visit to Rome. Smith was obliged by illness to interrupt his studies at Oxford between 1845 and 1847; but during his convalescence in Paris he attended the lectures of Arago and Milne-Edwards. After returning to Oxford he won the Dean Ireland scholarship in classical learning in 1848, and took a first class in the schools of both mathematics and *literae humaniores* in 1849. He was elected a fellow of Balliol and in 1851 was senior mathematical scholar in the university. Smith was long undecided between a career in classics and one in mathematics. He was elected Savilian professor of geometry in 1860, fellow of the Royal Society in 1861, and president of the Mathematical Section of the British Association and fellow of Carpus Christi College, Oxford, in 1873; from 1874 he was keeper of the University Museum, and in 1877 he became first chairman of the Meteorological Council in London. Smith devoted considerable effort to educational administration and reform, and was appointed an Oxford University commissioner in 1877. Smith was an unsuccessful Liberal candidate for Parliament. He died unmarried. The many eulogies to his powers and character are tempered with hints that he was lacking in ambition; and this was, no doubt, the secret of his undoubted popularity.

After graduating, Smith published a few short papers on number theory and geometry but soon turned to an intensive study of Gauss, Dirichlet, Eisenstein, and other writers on number theory. His reports to the British Association between 1859 and 1865, which contain much original work, were the outcome of this study. He presented important papers to the Royal Society on systems of linear indeterminate equations and congruences, and established a general theory of *n*-ary quadratics permitting the derivation of theorems on expressing any positive integer as the sum of five and seven squares. (Eisenstein had proved the theorem for three squares, and Jacobi for two, four, and six.) Smith's general theory with *n* indeterminates has been described by J. W. L. Glaisher as possibly the greatest advance made between the publication of Gauss's *Disquisitiones arithmeticae* (1801) and Smith's time.

Smith gave only an abstract of his results in 1864, and in 1868 he provided the general formulas without proofs. In 1882 the French Academy, not knowing of his work, set the problem of five squares for its Grand Prix des Sciences Mathématiques; the last of his published memoirs contains his entry, with proofs of the general theorems so far as they were needed. The prize of 3,000 francs was awarded to Smith posthumously in March 1883. An apology was subsequently made for awarding the prize jointly to a competitor (Minkowski), who seems to have followed Smith's published work.

Smith extended many of Gauss's theorems for real quadratic forms to complex quadratic forms. During the last twenty years of his life he wrote chiefly on elliptic functions; in a field marred by an excessive number of alternative methods and notations, his work is especially elegant. At the time of his death Smith had almost completed his "Memoir on the Theta and Omega Functions," which was written to accompany Glaisher's tables of theta functions. The memoir is a very substantial work running to 208 large quarto pages in the second volume of Smith's collected papers. As an appendix to the same volume there is an introduction written by Smith for the collected papers of W. K. Clifford, and papers written for the South Kensington Science Museum on arithmetical and geometrical instruments and models. Smith was one of the last mathematicians to write an original and significant memoir in Latin, "De fractionbus quibusdam continues" (1879).

BIBLIOGRAPHY

Smith's mathematical works are assembled in *The Collected Mathematical Papers of Henry John Stephen Smith*, J. W. L. Glaisher,. ed., 2 vols. (Oxford, 1894). This collection includes a comprehensive mathematical introduction by the editor (I, Ixi–

xcv), a portrait, and biographical sketches containing references to nonmathematical writings and to forty mathematical notebooks, more than a dozen of which include unpublished works.

Apart from the introduction to the collected papers, the best biographical notice is the obituary by J. W. L. Glaisher, in *Monthly Notices of the Royal Astronomical Society*, **44** (1884), 138–149. For references to similar notices by P. Mansion, L. Cremona, W. Spottiswoode, and others, see G. Eneström, "Biobibliographie der 1881–1900 verstorbenen Mathematiker," in *Bibliotheca mathematica*, 3rd ser., **2** (1901), 345. For a different collection of references, see A. M. Clerke's article on Smith in *Dictionary of National Biography*. See also A. Macfarlane, *Lectures on Ten British Mathematicians of the Nineteenth Century* (New York, 1916), 92–106.

The introductory material for *Collected Mathematical Papers*, by C. H. Pearson, Benjamin Jowett, Lord Bowen, J. L. Strachan-Davidson, Alfred Robinson, and J. W. L. Glaisher, is reprinted without change in *Biographical Sketches and Recollections (With Early Letters) of Henry John Stephen Smith* (Oxford, 1894). It includes new material in the form of fifteen early letters, one to Smith's mother and the rest to his sister Eleanor.

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