# Ivory, James | Encyclopedia.com

Complete Dictionary of Scientific Biography COPYRIGHT 2008 Charles Scribner's Sons
7-9 minutes

(*b.* Dundee, Scotland, 17 February 1765; *d.* London, England, 21 September 1842)

*mathematics*.

The son of James Ivory, a watchmaker, Ivory was educated at the universities of St. Andrews (1779-1785) and Edinburgh (1785-1786). After taking the M .A. degree (1783) he studied theology, with a view to entering the Church of Scotland. His studies in divinity were not pursued further, for immediately on leaving the university he was appointed teacher of mathematics and natural philosophy in Dundee. After three years he became the manager of a flaxspinning company in Forfarshire (now Angus). In 1804 the company was dissolved, and Ivory took up a mathematical professorship at the Royal Military College at Great Marlow (subsequently at Sandhurst). He held this office until 1819, when ill health compelled an early retirement. During the remainder of his life Ivory lived in London, devoting himself entirely to mathematical investigations, the results of which he made available in a long series of articles published in scientific journals. Sixteen of his papers were printed in the *Philosophical Transactions of the Royal Society* (he was elected a fellow of the Society in 1815). He was awarded the Copley Medal in 1814 and received the Royal Medal in 1826 and 1839 .

Ivory's interests lay mainly in the application of mathematics to physical problems, and his principal contributions may be summarized under six categories .

1. The attraction of homogeneous ellipsoids upon points situated within or outside them. His paper "On the Attractions of Homogeneous Ellipsoids," containing the well-known theorem which bears his name, in which the attraction of an ellipsoid upon a point exterior to it is made to depend upon the attraction of another ellipsoid upon a point interior to it, was printed in the *Philosophical Transactions* for 1809 (pp. 345-372). Although Laplace had already reduced this problem to a similar form, Ivory's solution was regarded as simpler and more elegant .

2. Critical commentaries on the methods used by Laplace in the third book of the Mecanique celeste for computing the attraction of spheroids differing little from spheres and the substitution of analytical methods for some of Laplace's geometrical considerations (1812, 1822). Although some of Ivory's criticisms seem to have been unjustified, Laplace himself paid tribute to Ivory's work.

3. The investigation of the orbits of comets (1814).

4. Atmospheric refraction (1823, 1838).

5. The equilibrium of fluid bodies (1824, 1831, 1834, 1839).

6. The equilibrium of a homogeneous ellipsoid with three unequal axes rotating about one of its axes, based on a theorem of Jacobi and Liouville (1838).

Ivory's scientific reputation, for which he was accorded many honors during his lifetime, including knighthood of the Order of the Guelphs, Civil Division (1831), was founded on the ability to understand and comment on the work of the French analysts rather than on any great originality of his own. At a time when few in England were capable of understanding the work of Laplace, Ivory not only grasped its significance but also showed himself capable, in many cases, of substituting a clearer and more direct process for the original. Ivory's work, conducted with great industry over a long period, helped to foster in England a new interest in the application of analysis to physical problems .

# BIBLIOGRAPHY

A list of ninety papers published by Ivory is in the Royal Society, *Catalogue of Scientific Papers*, III, 502-505. These include brief notes, comments and corrections, correspondence from the *Philosophical Magazine* (1821-1828), and his most important papers in the *Philosophical Transactions of the Royal Society*.

Biographical notices include R. E. Anderson in *Dictionary of National Biography*, XXIX, 82-83; and W. Norrie in *Dundee Celebrities* (Dundee, 1878), pp. 70-73. An informed critique of Ivory's work is in *Proceedings of the Royal Society*, n .s. 55 (1842), 406-513. Isaac Todhunter discusses Ivory's contribution to the theory of attraction in *A History of the Mathematical Theories of Attraction and the Figure of the Earth*, 2 vols . (London, 1873), II, 221-224, and *passim*.

Margaret E. Baron