Routh, Edward John | Encyclopedia.com

(*b*. Quebec, Canada, 20 January 1831; *d*. Cambridge, England, 7 June 1907) *mechanics*.

Born in Canada, the son of a high-ranking army officer, Routh was sent to England in 1842 to attend University College School, London. He subsequently studied at University College, London, where he fell under the influence of Augustus de Morgan, and after graduating B.A. there, he matriculated as a pensioner at Peterhouse, Cambridge. James Clerk Maxwell entered Peterhouse at the same time but transferred after two terms to Trinity College (it is said because he saw in Routh a strong competitor for the academic honors in the gift of the fellows of Peterhouse). If Maxwell moved for that reason, then his judgment was sound, for in the mathematical tripos of 1854, Routh was senior wrangler and Maxwell was second. In the examination for the Smith's prizes of the same year the names of Routh and Maxwell were bracketed as first equal; it was the first time on record that the examiners had divided the honors equally between two candidates.

Elected to a fellowship of Peterhouse in 1855, Routh thenceforth dedicated himself to the task of preparing undergraduates for the public examinations of the University of Cambridge. He was an inspiring teacher and became the most famous of the great Cambridge "coaches." His success in coaching students for the mathematical tripos may be gauged by the fact that twenty-seven of his students were senior wranglers and more than forty of them were Smith's prizemen. His gift for lucid exposition is also evidenced by his authorship of a set of advanced treatises which were destined to become the standard texts of classical applied mathematics. The first, and probably the most famous, of these was the two-volume *A Treatise on Dynamics … of Rigid Bodies* (1860); by the time of the author's death this had gone to a seventh edition and, in German translation, had the distinction of a foreword by Felix Klein. This was followed by *A Treatise on Analytical Statistics …* (1891) and *A Treatise on the Dynamics of a Particle …* (1898). Routh was coauthor (with H. W. Watson) of *Solutions of Senate House Problems* (1860).

Although he regarded himself primarily as a teacher, Routh through his original papers made a distinctive contribution to classical mechanics. His theorem of the "modified Lagrangian function" was one of the most significant contributions to the mechanics of his time. It was contained in the *Treatise on the Stability of a Given State of Motion, Particularly Steady Motion* (1877) for which he was awarded the Adams Prize for that year. For this and for his work on dynamical stability, interest in which has recently revived, he was elected a fellow of the Royal Society of London. In 1883 he shared with his friend W. H. Besant the distinction of being the first to graduate Sc.D. in the University of Cambridge.

BIBLIOGRAPHY

I. Original Works. Routh's books were *Analytical View of Sir Isaac Newton's Principia* (London, 1855), written with H. Brougham; *A Treatise on the Dynamics of the System of Rigid Bodies* (London, 1860); *A Treatise on the Stability of a Given State of Motion Particularly Steady Motion* (London, 1877); *A Treatise on Analytical Statics with Numerous Examples*, 2 vols. (Cambridge, 1891–1892); and *A Treatise on the Dynamics of a Particle With Numerous Examples* (Cambridge, 1898). He also wrote numerous papers, the results of which are reported fully in the treatises cited above.

II. Secondary Literature. Short notices of Routh's life are contained in obituaries by W. W. Rouse Ball, in *Cambridge Review*, **28** (1907), 480–481; by S. Larmor, in *Nature* (27 June 1907), 202; A. J. Forsyth, in *Proceedings of the London Mathematical Society*, **5** (1907), xiv–xx; and H. H. T., in *Monthly Notices of the Royal Astronomical Society*, **68** (1908), 239–241. See also the obituary notice, J. Larmor, in *Proceedings of the Royal Society*, **84A** (1910–1911), xii–xvi; and J. D. Hamilton Dickson, in *Dictionary of National Biography*, 2nd. supp., III, 233–235.

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