Hirst, Thomas Archer | Encyclopedia.com

(*b*. Heckmondwike, Yorkshire, United Kingdom, 22 April 1830; *d*. London, United Kingdom, 16 February 1892),

mathematics, geometry, education.

Thomas Hirst was a leading member of London's scientific community during the mid- and late Victorian period. Although his geometrical research proved unimportant, he was a significant reformer of British mathematical education and, as a member of the X-Club, of scientific activity generally. The journals he kept throughout his life are an invaluable source of information and comment on British and European scientific circles in the second half of the nineteenth century.

Early Life and Career . Hirst was born to Thomas Hirst (1797–1842) and Hannah Oates (1804–1849), who headed a family of prosperous wool staplers. After leaving the West Riding Proprietary School in Wakefield at the age of fifteen, he served an apprenticeship surveying the construction of railways in Yorkshire and began a daily journal that he was to keep more or less regularly throughout his life. A fellow surveyor, who also kept a journal, was the much older Irishman, John Tyndall, with whom he formed a lifelong friendship. Both men used their journals to express thoughts on their reading, self-improvement, and the foibles of daily life. Under Tyndall's mentorship, Hirst began to answer mathematical problems in the *Family Herald* and to read Charles Lyell on geology, George Combe on phrenology, Jeremiah Joyce on natural philosophy, and Robert Chambers's *Vestiges of the Natural History of Creation*(1844). He enrolled in evening classes at the Halifax Mechanics Institute, where he read Thomas Carlyle and gained valuable teaching experience. Carlyle's idealism inspired young men like Tyndall and Hirst to develop an inner spirituality linked to a self-consistent naturalistic, integrative view of man, nature, and society that avoided the traditional contradictions of revealed religion.

On the completion of his apprenticeship in 1850, Hirst abandoned the career of civil engineering that was open to him and, inspired by Tyndall's example, he studied chemistry, physics, and mathematics at the University of Marburg in Hesse-Darmstadt. He obtained his doctorate under Friedrich Stegmann on the conjugate diameters of the triaxial ellipsoid in 1852, following which he joined Karl Knoblauch in research on magnetism. He then moved to Berlin where he developed a special friendship with Jakob Steiner, from whom he learned not only pure geometry but also an approach to mathematics teaching that was strongly influenced by the Swiss educational reformer Heinrich Pestalozzi. In 1853 he succeeded Tyndall as a teacher of natural philosophy and surveying at Queenwood College in Hampshire, England, and supplemented his income with French, German, and Italian translations for *Philosophical Magazine*, several of which (notably the translation of Rudolf Clausius's kinetic theory) proved of lasting significance. He married Ann Martin in 1854 but was left a widower after only three years.

A Continental Education . Abandoning teaching, he moved to Paris to devote himself to independent mathematical research and for further studies with Joseph Liouville and Michel Chasles, whose geometry he particularly admired. Moving to Rome in 1858 at the height of the Risorgimento (the movement for Italian unification), he attended the lectures of Barnaba Tortolini and became friendly with other Italian mathematicians, most notably Luigi Cremona, with whom he struck up a correspondence important to both. His experiences with leading continental mathematicians led Hirst to question the absolute, logical, deductive methods of Euclid that dominated English schooling. Although Hirst's commitment to synthetic, rather than analytical, geometry, resulted in a rather special corpus of mathematical research, the educational philosophy he had absorbed during his *Wanderjahre* was to be of considerable importance for English education. Moreover, as one of the few English mathematicians educated in France, Germany, and Italy and through his frequent continental travels and regular correspondence with leading continental mathematicians, he served as a channel through which European work became known in the United Kingdom.

Teaching and Organizational Work . Hirst returned to London in October 1859, intimately acquainted with what was happening in European mathematics. For the next nine years he lodged with Tyndall, under whose wing he soon met a great many of the scientific and literary lions of the day. These savants opened a new world of social and intellectual advantage to him. Materially, he survived on a small inheritance and from teaching mathematics at University College School in London. A giant physically—he was well over six feet tall, with a huge bald head and black beard—he intimidated some of the schoolchildren. While a strict disciplinarian, in practice he proved very adept at explaining complex ideas in a simple manner, and was patient and kind to the hopeless and extremely stimulating to the able. In 1864 he joined with Tyndall, Thomas H. Huxley, Joseph Hooker, Herbert Spencer, and others in the formation of the X-Club, a dining club united by the spirit of political liberalism, scientific materialism, and religious agnosticism. The club's legendary influence upon the organization and image of Victorian science between the 1860s and the 1890s gave a practical focus to Hirst's otherwise lonely life and secured his position in the interlocking directorate of metropolitan science. In 1865, together with other University College associates such as Augustus De Morgan, he became a cofounder of the London Mathematical Society and served as its president between 1872 and 1874. Elected a Fellow of the Royal Society in 1861, Hirst was active on its council during the society's reforming years. His work included management of the society's Government Grant Committee, whose patronage was important for younger research workers. He also acted as secretary of the British Association for the Advancement of Science from 1866 to 1870, a position he regarded as "no joke," that is, it required far more work than he had anticipated.

In 1865, at the age of thirty-five, Hirst moved sideways and upward from school teaching to the chair of physics at University College. Two years later, on De Morgan's retirement, Hirst transferred to the chair of pure mathematics. In 1870 his experience of teaching geometry to the Ladies Educational Association of London (a pioneering organization for women's education) kindled his interest in geometrical reform. In the following year he played an important role in founding the Association for the Improvement of Geometrical Teaching (AIGT; from 1897 the Mathematical Association). He shared the opinion of several progressive teachers that the reform of geometrical teaching in Great Britain was overdue and that the syllogistic system of Euclid should be superseded by more direct and practical methods of demonstration. He was the AIGT's first president, serving from 1871 to 1878.

Geometrical Research . Hirst's own geometrical research was on positive- and negative-derived pedal surfaces and quadratic transformations and inversions of plane curves. Throughout his exceedingly abstract publications in leading British and continental periodicals, three things stand out: Hirst's continual use of analogy and extension of theorems to many dimensions; his ability to generalize the results of other mathematicians (particularly those of Steiner, Chasles, and Cremona) as far as possible; and his concern to show that the work of other mathematicians was derivable from a synthetic geometry that was more intuitively meaningful, logical, and vigorous than analytic geometry.

Hirst was permanently dissatisfied with his meager output of research papers in comparison with his contemporaries—a mere twenty papers over a thirty-year period. He changed positions frequently, hoping that he would gain more time for geometry and freedom from depression and ill health. From 1870 to 1873 Hirst was assistant registrar of the University of London, and from 1873 until 1883 (when he took early retirement) he was director of the new Royal Naval College at Greenwich. The remaining eight years of his life were spent wandering around Europe and socializing in the Athenaeum Club in London. Ironically, his retirement was relatively unproductive, apart from work inspired by Cremona on line congruences. In 1890 he symbolically burned his mathematical notebooks and published nothing more. He died in 1892, a victim of the great influenza epidemic that struck London that winter.

Hirst's death marked the end of a generation of scientists, mathematicians, and educators who had given a particular character to scientific London during the 1860s and 1870s. Through the diaries he left, which Tyndall's widow transcribed in the twentieth century, historians have a clear window through which the social context of mid-Victorian scientific London and other European cities can be viewed.

BIBLIOGRAPHY

WORK BY HIRST

Nurzia, Laura, ed. *La Corrispondenza di Luigi Cremona (1830–1903)*. Vol. 4. Palermo, Italy: Universita Bocconi, 1999. Contains Hirst's letters to Cremona.

OTHER SOURCES

Barton, Ruth. "An Influential Set of Chaps: The X Club and' Royal Society Politics, 1864–85." *British Journal for the History of Science* 23 (1990): 53–81.

———. "Hirst, Thomas Archer." In *Dictionary of Nineteenth-Century British Scientists*, edited by Bernard Lightman. Vol. 2. London: Thoemmes Continuum, 2004. Offers an excellent analysis of Hirst's position in Victorian society.

Brock, William H. "Geometry and the Universities: Euclid and' His Modern Rivals, 1860–1901." *History of Education* 4 (1975): 21–35.

Eve, Arthur S., and C. H. Creasey. *Life and Work of John Tyndall*.' London: Macmillan, 1945.

Gardner, Helen J., and Robin J. Wilson. "Thomas Archer Hirst—Mathematician Xtravagant." *American Mathematical Monthly* 100 (1993): 435–441, 531–558, 619–625, 723–731, 827–834, 907–915. Uses Hirst's journals for information on nineteenth-century mathematicians.

MacLeod, Roy M. "The X-Club: A Social Network of Science in' Late-Victorian England." *Notes and Records of the Royal Society* 24 (1970): 305–322.

Rice, Adrian, Robin J. Wilson, and Helen J. Gardner. "From' Student Club to National Society: The Founding of the London Mathematical Society in 1865." *Historia Mathematica* 22 (1995): 402–421.

Richards, Joan L. *Mathematical Visions: The Pursuit of Geometry in Victorian England*. Boston: Academic Press, 1988. Provides context to the debate over analytic and synthetic geometry.

Secord, James A. *Victorian Sensation: The Extraordinary Publication, Reception, and Secret Authorship of "Vestiges of the Natural History of Creation."* Chicago: University of Chicago Press, 2000. Uses Hirst's journals as a guide to how the Victorians read literature.

Wilson, Robin J. "Hirst, Thomas Archer." In *Oxford Dictionary of National Biography*. Oxford: Oxford University Press. 2004.

William H. Brock