

Arthur Cayley

Deborah Kent

Tony Crilly. 2006. *Arthur Cayley: Mathematician Laureate of the Victorian Age*. Baltimore: The Johns Hopkins University Press. ISBN 0-8018-8011-4. xxiii + 610 pp.

Tony Crilly's comprehensive and elegant work provides the first biographical study of the prominent and highly prolific Victorian mathematician Arthur Cayley. This massive volume, a product of twenty years' painstaking research, discusses nearly all of Cayley's life and a majority of his mathematical work.

The book opens with a story of the last family photograph of Cayley, an introduction that stresses the distance between Cayley's world and our own. The text that follows depicts Cayley entirely in his own context—from his childhood years in St. Petersburg through his death in Cambridge in 1895—working all the time to bridge the gap between the reader and the increasingly distant Victorian world.

Cayley received a top-notch education, first at King's College London, and later at Trinity College, Cambridge. As a Cambridge student, Cayley distinguished himself in mathematics, becoming the top mathematics student—or Senior Wrangler—as well as winning the prestigious Smith Prize in mathematics. Crilly describes in detail intellectual life at the time, while establishing an understanding of Cayley's own experience by referencing, among other sources, Cayley's library check-out records. Crilly's explanation of the Tripos-dominated Cambridge is equally thorough as it succeeds in communicating to the modern reader the nature of that English university in the Victorian world.

On graduation from Cambridge, Cayley traveled a bit before returning to London to become a barrister. It was in London that Cayley began a lifelong friendship with James Joseph Sylvester, another outstanding mathematician of the day. Cayley and Sylvester collaborated extensively, primarily on the development of invariant theory, although

both pursued a variety of mathematical interests. Eric Temple Bell would later refer to the pair as “The Invariant Twins” in his popular work *Men of Mathematics*. As it happens, Crilly’s biography of Cayley appeared simultaneous to a related, and also excellent, biography of Sylvester, *James Joseph Sylvester: Jewish Mathematician in a Victorian World*, by Karen Parshall. Crilly and Parshall’s twin biographies investigate two very different individuals, resulting in complementary pictures of mathematical life and work in the context of Victorian Britain.

Over seventeen years as a successful London lawyer, Cayley gave all his leisure time to mathematics and produced more than two hundred mathematical papers. These papers include many of his most substantial contributions to invariant theory. Crilly devotes some time and care to treating Cayley’s practice and assumptions in this work. Cayley’s legendary powers of calculation and deft handling of unwieldy formulae perhaps interfered with his ability to communicate. Cayley often attributed to his audience mathematical skill they rather lacked.

In 1863, Cayley returned to Cambridge with an appointment as the new chair in pure mathematics at Trinity College. The same year, Cayley married Susan Moline. Although they raised two children in later years, Crilly provides very little information of the Cayley’s life at home, although we learn a bit about his mountain climbing interests and love of classical culture. Cayley is, however, portrayed as an active force in defending undergraduate study of pure mathematics, working to improve the education of women, pursuing the theory of curves and surfaces, along with maintaining continued interest in invariant theory and elliptic curves. Although Cayley also applied his mathematics in the areas of chemistry and astronomy, he was England’s leading pure mathematician throughout the nineteenth century.

This biography includes over one hundred pages of notes and bibliographic information, in addition to a useful index, as well as tables of chronology and genealogy. An assortment of pictures, manuscripts, and diagrams is unfortunately grouped in the middle of the book, rather than distributed throughout as well-placed illustrations to the text. A first appendix lists several hundred members of Cayley’s community of scholars and friends with their dates and a short description of their link to Cayley. Thirty-five of these are entered in boldface as intimates in Cayley’s social circle. A second appendix provides a glossary of mathematical vocabulary described to aid the modern reader in navigating terms Cayley (and Sylvester) introduced to describe their expanding mathematical world.

Crilly's biography does not aspire to technical precision and, accordingly, the level of mathematical detail in this biography will not satisfy a mathematician in search either of Cayley's technical expertise or of an interpretation of his work in a modern context. Although a few more examples might have been helpful, the work nonetheless conveys the full and active life out of which Cayley produced the thirteen volumes of his collected mathematical papers.

In this well-written work, Crilly has accomplished a thoroughly researched and historically sensitive account that not only furnishes an authoritative biography of Arthur Cayley, but also serves as an indispensable reference for matters related to mathematics in the Victorian age.