Biographical Encyclopedia of Astronomers

Cayley, Arthur

Born Richmond, (London), England, 16 August 1821

Died Cambridge, England, 26 January 1895

The mathematical contributions of Arthur Cayley have strongly influenced the development of modern physics and astronomy, on both the smallest and largest scales of the Universe. Cayley, the second son of Henry Cayley and Maria Antonia Doughty, was born while his parents were visiting England. His father was a merchant who traded with Russia and lived in Saint Petersburg. He was eight years old before his parents returned to live permanently in England.

Cayley went to a private school at Blackheath and later attended King's College School in London. His remarkable mathematical abilities were revealed early in life. He was admitted to Trinity College, Cambridge. Graduating as senior wrangler in 1842, Cayley was also awarded first place in the Smith's Prize. He was elected a fellow of Trinity College and became an assistant tutor for three years. During this time, Cayley was deeply immersed in mathematical research and publication

Upon the expiration of his fellowship, Cayley chose law as his profession; he studied at Lincoln's Inn and was called to the bar in May 1849. After 14 years (1863), he accepted the newly established Sadlerian Professorship of Pure Mathematics at Cambridge University. That same year, Cayley married Susan Moline of Greenwich; the couple had two children

The remainder of Cayley's life was devoted to research in pure mathematics, theoretical dynamics, and mathematical astronomy. He is considered to be a joint founder, with James Joseph Sylvester, of the theory of invariants and was responsible for creating the theory of matrices. Both areas of Cayley's research have acquired extraordinary significance in the development of 20th-century physics, especially relativity theory and early quantum theory (e.g., matrix mechanics). Cayley also originated the geometry of "higher spaces" (n dimensions) and, perhaps most importantly, demonstrated how "metrical geometry" may be reduced to "projective geometry." This important step enabled Felix Klein to unify both Euclidean and non-Euclidean geometries into a single, more comprehensive geometry. Cayley's other contributions to astronomy were in the traditional area of physical astronomy, as related to the development of the disturbing function in lunar and planetary theory.

Beyond his mathematical investigations, Cayley assumed active roles in a large number of scientific associations. Between 1859 and In 1882, he served as editor of the *Memoirs* and *Monthly Notices of the Royal Astronomical Society*, except for his two-year term as society president (1872–1874). Cayley was awarded numerous mathematical and scientific honors, including the Royal Medal and the Copley Medal of the Royal Society (London) and the De Morgan Medal of the London Mathematical Society. He was president of the London Mathematical Society, the Cambridge Philosophical Society, and the British Association for the Advancement of Science. Cayley was actively involved in mathematical pursuits until his death.

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