

Biographical Encyclopedia of Astronomers

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McVittie, George Cunliffe

Born Smyrna (Izmir, Turkey), 5 June 1904

Died Canterbury, Kent, England, 8 March 1988

British mathematician and relativist George C. McVittie made important contributions to the problem of comparing the predictions of different general relativistic models of the Universe with observations. He was the son of a British merchant father and an Alsatian mother, born in a largely immigrant community that also included Jason Nassau (later director of the Warner and Swasey Observatory, Case Western Reserve University, Cleveland, Ohio, USA). With his brother, McVittie was homeschooled, developing an interest in both astronomy and Turkish archaeology. The family was on holiday in England in the summer of 1922 when a change in government in Turkey led to the sacking of Smyrna and the destruction of their home. None of them ever returned. After a spell helping his father, McVittie won a bursary and entered Edinburgh University in 1923 to study mathematics and natural philosophy. Benefiting from the excellent teaching of Sir Edmund Whittaker and Charles Darwin, he progressed with high honors and scholarships to his master's degree.

In 1927, McVittie began research on the Maxwell-Einstein equations under the supervision of Whittaker. In 1928, he moved to Cambridge University where he received his only formal training in astronomy and, working under Arthur Eddington, completed a Ph.D. dissertation on unified field theories (the attempt to unify electromagnetism and general relativity, the theory of gravity, into a single set of equations) in 1930. He failed, but as did Einstein, who persisted in the attempt until near his death. In 1930, McVittie began work (part of it in collaboration with William McCrea) on the fate of density perturbations in a nearly homogeneous, static universe and then turned to the fate of condensations in an expanding universe, which grow more slowly than those on a static matrix - but still grow, so that galaxies indeed do form!

McVittie held academic positions at Leeds (1933/1934), Liverpool (1934-1936), and London (a readership at King's College 1936-1948 and a professorship at Queen Mary College 1948-1952). Between 1939 and 1945, McVittie was seconded to Bletchley Park to work on deciphering meteorological information from enemy territory and to attempt to restore accurate weather forecasting of the sort that had previously depended on international cooperation. The work of his group was enormously successful; he visited both the United States and Canada (an essential collaborator in receiving and decoding Japanese meteorological information) to help establish their programs. McVittie was awarded the OBE for this work. Some of it was later published in meteorological journals

During his London years, McVittie was one of the editors of *The Observatory* and of the *Quarterly Journal of Mechanics and Applied Mathematics*. He also gave some attention to Edward Milne's theory of kinematical relativity, but soon concluded that the Einsteinian theory had a better chance of describing the observed universe. McVittie's 1937 book, *Cosmological*

Theory, began the process of asking how valid comparisons between data and theory might be made on the scale of the whole universe. At London, he was an inspiration to the young Arthur C. Clarke (among many other students) and served on the council of the Royal Astronomical Society

In 1952, McVittie made big changes in both his personal and professional life when he and his wife Mildred moved to Urbana, Illinois, USA. He became a professor and head of a dwindling Department of Astronomy at the University of Illinois. During his 20 years in Urbana, McVittie built the department into a thriving research school, equipped with both optical and innovative radio telescopes. This suited his interest in comparing astronomical and cosmological theory with experiment; he kept in close contact with the wealth of new ideas and observational discoveries that emerged in the discipline during his time at Urbana

McVittie's monograph *General Relativity and Cosmology* (1955, 1964) belongs to the Urbana period. A comparison of the two editions is particularly interesting. The first described cosmological observations in terms of time and distance, using formulas that were linear approximations to the equations of general relativity and appropriate only for nearby objects. The advent of radio astronomy and the discovery of much more distant galaxies and quasars prompted him to recast the entire discussion in terms of exact equations in the only directly measurable quantity, redshift, in the second edition

In 1961, McVittie became secretary of the American Astronomical Society, holding the office until 1969. He was the last person to run the society on a part-time basis. Toward the end of his tenure, he helped oversee a number of difficult transitions, including the establishment of subdisciplinary divisions, the transfer of ownership of the *Astrophysical Journal* from the University of Chicago to the society, and the transformation of the Annie J. Cannon Prize into a research award. In curious irony, given his birthplace, McVittie was by then a conservative voice counterbalancing the "young Turks." He also managed a series of publications on steady-state cosmology (which he never really believed in), stellar statistics, gravitational collapse, and the redshift-distance relationship.

On his retirement in 1972, the McVitties moved to Canterbury, England, where the University of Kent welcomed him as an honorary professor of theoretical astronomy. The word "honorary" rapidly became a misnomer; he began teaching astronomy to the natural scientists and general relativity to the applied mathematics group, which he joined. McVittie supervised several mathematics doctoral students, including D. L. Wiltshire, R. P. A. C. Newman, and G. G. Swinerd, who produced important results. Also, 50 years after his 1933 paper, he published a solution of the nonlinear differential equation (NLDE) arising from a cosmological model. It is a quirk of history that his 1983 paper eventually led to the formation of a very strong NLDE group within applied mathematics at Kent

Some books on differential geometry offended McVittie's sense of orderliness and clarity of thought, and in the last year of his life, McVittie turned to Clifford algebra as a vehicle for understanding gravitation at the elementary-particle level. Up to a week before his death in March 1988, he was working on a fourth-order generalization of Einstein's equations, based on the Clifford algebraic approach.

In Canterbury, McVittie rediscovered his love for archaeology and played an active part in the Canterbury Archaeological Trust, of which he was treasurer from its foundation in 1976. He was elected to the Royal Society of Edinburgh (but not that of London). Minor planet (2417) McVittie was named for him.

J. S. R. Chisholm

Selected References

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Runcorn, S. Keith et al. (1990). *Vistas in Astronomy* 33: 39-81. (A collection of articles on McVittie, with contributions by Roy Chisholm, W. Davidson, R. Hide, E. Knighting, W. McCrea, Donald E. Osterbrock, K. A. Pounds, and G. W. Swenson.)