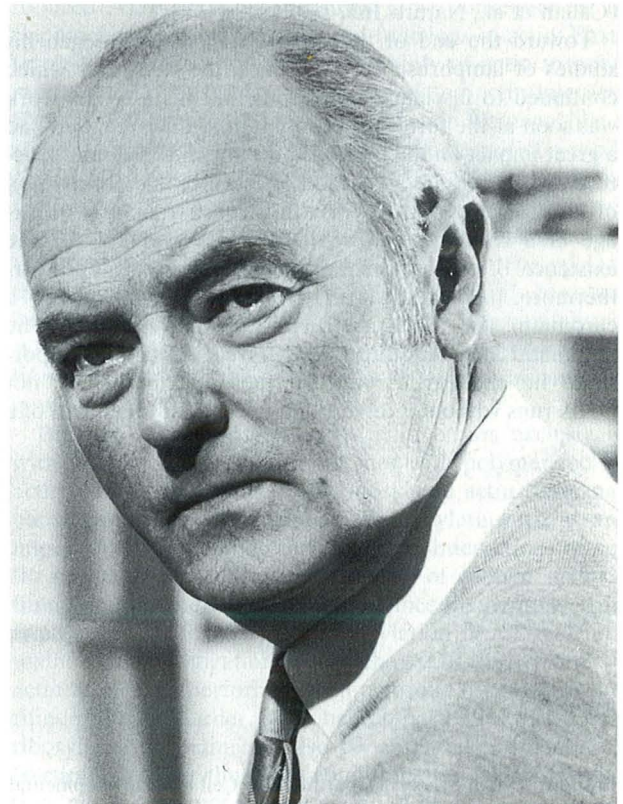


## Harold Garnet Callan 1917–1993

Professor Harold Garnet Callan, honorary member of the German Society for Cell Biology, died on the 3rd November 1993, at the age of 76. His name is inseparably connected with lampbrush chromosomes, the most spectacular and aesthetically alluring form of chromosomes, which occupied the major part of his scientific career. "Mick" Callan's pioneering studies led to fruitful new concepts, served as a building block for many subsequent studies by others, and contributed enormously to our current understanding of chromosome organization and activity.

Born in Maidenhead (Berkshire/England) to a naval architect father and school teacher mother on March 15, 1917, Mick Callan was educated at King's College in Wimbledon and St. John's College in Oxford. In 1938 he received his B.A. degree from Oxford University with first class honors in Zoology. He was then awarded a scholarship for postgraduate research at the Stazione Zoologica in Naples/Italy. These studies were interrupted by the Second World War, during which Callan held commissions as flight lieutenant and squadron leader in the Royal Air Force, and became an expert in the application of the newly developed radar technology. In Naples in 1944, he married Amaryllis Dohrn, the daughter of the Director of the Stazione Zoologica. Following his war service, Callan worked for a short time at the Biophysics Department of the University College, London. He later joined the Institute of Animal Genetics in Edinburgh under the direction of the famous developmental biologist C. H. Waddington, where he received his doctoral degree (D.Sc.). He was ap-



pointed as Professor to the Chair of Natural History at the University of St. Andrews in Scotland in 1950, a position he held for the following 32 years. There he built the Department of Zoology into a large and thriving institution equipped to deal with modern cell and molecular biology and which quickly gained an international reputation for excellence.

It was shortly after the war that Mick Callan first realized the experimental potential of the large nuclei of amphibian oocytes. In the preface of his masterly monograph on lampbrush chromosomes (Springer-Verlag, 1986) he wrote: "It strikes me as remarkably appropriate that my wife's father, Dr. Reinhard Dohrn, who was for many years Director of the Stazione Zoologica at Naples, was personally acquainted with Dr. J. Rückert, the investigator who first put lampbrush chromosomes 'on the map' and gave them their name. Rückert studied the lampbrush chromosomes of elasmobranchs at the Stazione Zoologica towards the end of the 19th century, and it was in this same institute that I first saw the germinal vesicles of newt oocytes in 1947, and came to realize the particular advantages for study that are offered by these enormous cell nuclei, and their equally gigantic chromosomes." Before Callan began his studies of lampbrush chromosomes, he made important and seminal discoveries of nuclear envelope structure. With the help of Dr. S. G. Tomlin, who operated an early model of the Siemens electron microscope in the Wheatstone Physics Laboratory of King's College in London, he examined whole-mount preparations of manually isolated nuclear envelopes from amphibian oocytes. Mick Callan was the first to describe nuclear pores (Callan et al., *Nature* **163**, 280, 1949)!

Toward the end of the forties Mick Callan began his studies of lampbrush chromosomes, the structures which continued to fascinate him throughout his life. His work was soon at the forefront of research in this area, and had a great impact on the interpretation of chromosome structure and function in general. For instance, his observation of "double-loop-bridges" resulting from a transverse breakage of a chromomere provided direct evidence for the existence of two chromatids per chromosome, and, furthermore, had indicated that the lateral loops contain a chromatin axis which is structurally continuous with the chromatid axis. Another issue of great theoretical importance he challenged was the question whether or not DNA runs without interruption throughout the length of a

chromatid and helps to maintain its structural integrity. The application of deoxyribonuclease directly to unfixed lampbrush chromosomes allowed him to answer this question.

Though Mick Callan was educated in classical cytology he quickly combined cytological approaches with molecular, biochemical and immunological methods as they became available. For example, he and his collaborators hybridized radioactively labeled cloned histone genes in situ to the nascent transcripts of lampbrush chromosomes. The outcome of these pioneering experiments indicated that it should, in principle, be possible to identify the genetic nature of any chromosomal loop. In addition, biochemical and immunological investigations aimed at identifying the protein composition of the nascent RNA transcripts of lampbrush chromosome loops have also been initiated by Mick Callan and his group.

When he retired from his professorial duties in 1982, Mick Callan continued to carry out research at the bench. Then, as an Emeritus Professor, he had the time to tackle an old problem which he had attempted to solve years ago: to develop a reliable technique that would allow the isolation of lampbrush chromosomes from *Xenopus laevis* oocytes, the most extensively studied amphibian species, and to establish a working map by which each bivalent could be identified. Beginning from 1985, Mick spent several months each year with his friend and colleague Professor Joe Gall at the Department of Embryology at the Carnegie Institution in Baltimore, MD/USA. In a joint effort they succeeded in "taming" the lampbrush chromosomes of *Xenopus laevis*, making them available for in situ hybridization studies. In addition, together they have described novel supramolecular assemblies in oocyte nuclei ("snurposomes") which today are believed to play a role in RNA processing.

Mick Callan had justly received numerous national and international scientific honors during his life. He was elected Fellow of the Royal Society (FRS), Foreign Member of the American Academy of Arts and Sciences and the Accademia Nazionale dei Lincei, Roma, and, in 1976, Honorary Member of the German Society for Cell Biology. His research contributions will be a rich and continuing source of insight and inspiration to scientists for years to come.

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