

Obituary

W. Maxwell Cowan (1931–2002)

The remarkable successes of modern biomedical research stem from a combination of factors: talented scientists have enjoyed an intellectual climate that encourages innovation and excellence, and they have received growing funding support from public and private sources. W. Maxwell Cowan, who died on 30 June, will be remembered for his outstanding contributions relating to each of these factors. He was a renowned neuroanatomist who charted fundamental aspects of brain circuitry and development. He helped to shape modern neuroscience as an integrated yet interdisciplinary field, not least through his editorship of several journals. In the last decade of his working life, he moved onto a broader stage at the Howard Hughes Medical Institute (HHMI), where he orchestrated the expansion of its support for research.

For more than a century, neuroanatomists have worked to decipher the fabulously complex neural circuitry that underlies brain function. Progress has depended on a succession of methodological advances for analysing axonal pathways with increasing precision and sensitivity. Cowan entered this field on moving in 1953 to Oxford, UK, from South Africa, where he had studied under Raymond Dart, the discoverer of the early prehuman fossil *Australopithecus africanus*.

At Oxford, Cowan carried out doctoral research under Wilfrid LeGros Clark, a leading neuroanatomist. Cowan and his colleagues (most notably T. P. S. Powell) used the then new silver-staining methods based on axonal degeneration to chart the connections of many different brain structures, particularly those involving the thalamus, hypothalamus and hippocampus. Although the ‘degeneration’ methods had serious technical limitations, these observations formed the basis for much of our current understanding of brain circuitry.

In 1966, Cowan moved to the University of Wisconsin and, two years later, to St Louis, to head the Department of Anatomy at Washington University School of Medicine — where we now work. Around this time, discoveries in other laboratories revealed that neurons have a specialized transport system for conveying materials between their cell bodies and synaptic terminals. Cowan recognized that if tracer molecules were piggybacked onto this system, many of the drawbacks of



A founder of modern neuroscience, and a guiding hand in biomedical research

degeneration-based methods for tracing neuronal pathways could be circumvented. He and his colleagues introduced a method for injecting radioactive amino acids into specific sites in the brain, to reveal the distribution of labelled proteins that underwent anterograde transport (that is, from neuronal cell bodies to their axonal terminations). This was a key step in launching modern neuroanatomy, which now uses a variety of tracers — transported in an anterograde, retrograde or bidirectional manner — to reveal how neurons connect with one another. Increasingly widespread application of these methods at Washington University and elsewhere generated a revolution in neuroanatomy in the 1970s.

An advantage of the tracer-based method was its applicability to the developing brain, which is notoriously difficult to study with the classical degeneration methods. Over the next 20 years, much of Cowan’s research was directed at questions of how connections form and are refined during development, and how they can be modified in the adult. He also explored factors that influence neuronal survival, inspired by his long friendship with Viktor Hamburger, whose own studies of cell death during development led to the identification of nerve growth factor and other agents that control the growth of neurons.

In the late 1960s, an identity crisis was brewing in brain research — the number of neuroscientists was increasing rapidly, yet they were typically scattered across

departments of anatomy, physiology, biology and pharmacology. Neuroscience did not exist as a generally recognized field of investigation or of graduate training. Over the ensuing two decades, Cowan was prominent in helping to launch and define neuroscience as a broad yet integrated discipline. He took over editorship of the faltering *Journal of Comparative Neurology* in 1969, reviving it as a major neuroscience journal. He attracted a diverse group of scientists to his department, renamed it the Department of Anatomy and Neurobiology, and led it to pre-eminence as a centre of interdisciplinary neuroscience research. An infamous feature that he instituted was the Saturday morning seminar series, where full attendance was expected.

In 1980, Cowan moved to the Salk Institute, where he served as vice-president from 1982 to 1986. The talented young investigators in his laboratory continued to produce striking results, but increasingly his time was occupied with administration. He became the inaugural editor of *The Journal of Neuroscience* in 1982 and led it to prominence. His recruitment, in 1984, to the Medical Advisory Board of the HHMI gave him a wider arena in which to exercise his scientific and organizational talents to their fullest effect.

The HHMI is the largest private supporter of biomedical research in the United States, and his advice helped bring neuroscience into the portfolio of programmes sponsored by the institute. In 1988, he became vice-president and chief scientific officer of the HHMI, and over the subsequent 12 years played a pivotal role in shaping the institute’s scientific agenda. During this period, the number of HHMI-supported investigators more than doubled, as did the number of academic institutions at which they are located.

Cowan’s depth of knowledge of neuroscience was legendary. Equally impressive was his voracious appetite for learning about the full breadth of research activities supported by the HHMI. Cowan was a masterly communicator, equally effective at holding the attention of scientific experts and a lay audience. He has left an indelible stamp on the field of modern neuroscience and on the broader realm of biomedical research. **David C. Van Essen and Joseph L. Price** *David C. Van Essen and Joseph L. Price are in the Department of Anatomy and Neurobiology, Washington University School of Medicine, 660 S. Euclid, St Louis, Missouri 63110-1093, USA. e-mail: vanessen@v1.wustl.edu*

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