John Murdoch Mitchison

11 June 1922 – 17 March 2011

J.M.Mitchison, invariably known as Murdoch, had a long and distinguished career in the University of Edinburgh, beginning in 1953. He was born in London into a remarkable family. His father, Dick Mitchison, was a Labour shadow cabinet member in the 60s. His mother Naomi, was a distinguished writer and her brother J.B.S.Haldane was one of the key founders of modern genetics. Murdoch's two brothers are also prominent biologists.

As a boy, he won a scholarship to Winchester which he enjoyed, describing most of the teaching as excellent. This led to a scholarship at Trinity College, Cambridge to read medicine. He finished his Tripos in 1941 but by that time was sure that he didn't want to proceed further with medicine even before he was recruited into Operational Research (OR) for the remainder of the war. OR incorporated a number of bright young scientists, some went to Bletchley Park, others were set to investigating diverse projects of military concern. Murdoch was involved with gunnery, the calculation of range tables, the armour plating of tanks and – as he related it - somewhat hilarious research into the viscosity of mud. He ended the war in northern Italy with the 8th Army, one of his responsibilities being the daily production of 'Mud Reps' to help with the deployment of armoured vehicles.

On demobilization Murdoch returned to Cambridge to start a research career in the zoology department. Cambridge at that time was a hotbed of new ideas and approaches to biology. The new science of molecular biology, whose primary interest was the structure and function of macromolecules, was developing fast, stimulated by researchers with backgrounds in physics and chemistry. Murdoch interacted with several of these molecular biologists but maintained his own particular interest in the biology of cells. The range of techniques available for the study of living cells was quite limited at that time, However Murdoch's skills with machinery and knowledge of physics led him, in collaboration with Michael Swann, to build his own apparatus for investigating the biophysical properties of cell membranes. He was an excellent microscopist and their studies on dividing sea urchin eggs revealed major changes in membrane stiffness during the first cleavage division after fertilization. This was related to ideas about the mechanism of cleavage and in turn led to Murdoch's interest in the cell division cycle. This field, in which he became a world leader, was to occupy him in one way or another for the rest of his life.

During the 1950s Edinburgh made some important new appointments in biology. C.H.Waddington came to the Chair of Genetics, followed by Michael Swann to Natural History who soon persuaded Murdoch to join him in 1953. He was joining at a time of exciting new developments in cell biology and in a University which was itself growing with a number of young staff. It was also a very friendly place which was well-suited to Murdoch and his wife Rosalind (Rowy) an economic historian whose *History of Scotland (*1st edn.1970*)* has been a landmark in the field. The Mitchison family – 3 daughters and a son - soon became important members of the University community and beyond. They were generous and hospitable to a fault and a generation of young lecturers and research workers gained much from their friendship and support.

Murdoch rapidly picked up his research programme in Edinburgh where he was appointed to the resuscitated Chair of Zoology. The importance his research was recognized by election to the Royal Society of Edinburgh in 1966 and to the Royal Society of London in 1978.

He began to study in detail the way in which cells grew – their pattern of mass increase between one division and the next. After preliminary studies with several microorganisms, he settled on studying the fission yeast *Schizosaccharomyces pombe*. Its cells were larger and easier to study than those of bacteria and had another key advantage. They grow by linear extension and divide by medial fission. This meant that any pattern by which growth occurred could be simply measured by rate of length increase. Correspondingly the position of an individual cell in the division cycle could be determined by a simple length measurement. Additionally, it allowed Murdoch and his long-term collaborator Jim Creanor to make cultures of cells that divided synchronously by selecting small cells from a growing population and allowing them to grow on. This procedure enabled them to study how growth, the

pattern of macromolecular synthesis and metabolic activity changed during the cell cycle. In later studies it became important that the fission yeast cells, unlike those of bacteria, are those of a eukaryote, i.e. those with a nucleus and individual chromosomes like all plants and animals. They thus offer a good model for studies on advanced organisms.

Murdoch's ideas about the cell cycle were presented comprehensively in his *"Biology of the Cell Cycle"* (1971) a hugely influential book which brought new interest to the field and influenced a great deal of subsequent research. He proposed the idea of a "growth cycle" which was largely independent of the major events of the cell cycle such as DNA replication and mitosis. He also raised the question of whether cell cycle progress was determined by a master timer or by a dependent sequence of events.

One chapter in the book was about the control of cell division, an interest shared by young researchers such as Paul Nurse, Kim Nasmyth and Peter Fantes when they joined his lab in the first half of the 1970s. The elongation of *S. pombe* cells during the cell cycle had been observed to continue when its progress was blocked with inhibitors and this gave Paul Nurse the idea of isolating mutants conditionally defective in cell cycle progress by searching for abnormally elongated cells. After leaving Murdoch's group further progress on the genetic control of cell division led to Nurse's Nobel Prize in 2001.

Murdoch always led an excellent and friendly research group. He would spend long periods talking in the lab and his infectious enthusiasm added greatly to the ideas that were developing about cell cycle control at the time. He was a generous lab head: in spite of the time he spent in discussion, only rarely did he ask for his name to be included on the author list of publications, because he felt his contribution was not enough to warrant it.

All this active research life went on in parallel with the extensive administration as Head of a large and growing zoology department. Nor was his active support of research and teaching confined to his own research area at the cellular end of biology. Under his leadership the zoology department flourished in several branches of this very broad field.

Murdoch was involved with numerous professional organizations here and internationally. He served on the then Science Research Council and was a founder Board member of the Royal Commission on Pollution.

He played a significant part in the University of Edinburgh's administration at a time when academics played a much bigger role than now. He twice served on the University Court, once during that particularly intriguing time when Gordon Brown then a student, having been elected as Rector, chose to exercise the Rector's prerogative and chair the Court's meetings. Murdoch enjoyed detail and for many years skillfully chaired the University's Works and Buildings Committee concerned with the development and maintenance of the University's huge and scattered estate. He knew this estate well and was concerned with its environment as well as its buildings. Having always been a devoted and highly knowledgeable gardener, one of his master strokes was to persuade the University to appoint a 'Superintendent of Grounds'. He watched over and discussed landscapes and plantings with that first Superintendent - Geoff Brooks - who, with the long line of grounds staff who have followed since, have transformed the environment especially of King's Buildings, George Square and the Pollock Halls. Their work contributes enormously to the quality of life of all who work in the University. For many of us this is one recurring memorial to a great colleague.

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