Stamp Vignettes focus on biographical details and accomplishments related to science and medicine, and not individual views and prejudices except where they had a major impact on the subject’s life. The authors of Stamp Vignettes do not intend to imply any endorsement of such views when discussing a Stamp Vignette on Medical Science.

The biological concept of a long-lived “stem cell” population that can both self-renew and give rise to differentiated cellular progeny was first proposed by embryologists in the 19th century. However, experimental evidence that such stem cells actually existed in mammals was scant until 2 Canadians at the University of Toronto performed a series of now-classic experiments in irradiated mice, inspired in part by Cold War-era fears of nuclear catastrophe.

James Edgar Till was born on a farm in Lloydsminister, a rural community that straddles the border of Saskatchewan and Alberta, on August 25, 1931. He attended the University of Saskatchewan on a scholarship from the Standard Oil Corporation, and received a bachelor’s degree in 1952 and master’s degree in physics in 1954. Till then went on to Yale University for a PhD in biophysics, which he obtained in 1957. He was recruited to the University of Toronto by cobalt-60 radiotherapy pioneer Harold Johns (1915-1998) for post-doctoral work, and spent the rest of his career in Toronto.

Ernest Armstrong “Bun” McCulloch was born into a wealthy family in Toronto on April 27, 1926, studied at the elite Upper Canada College, and received his medical degree in 1948 from the University of Toronto. His father and 2 uncles were physicians. After medical school graduation, he trained in hematology at Toronto General Hospital and Sunnybrook Hospital, but developed a growing interest in scientific research, and gradually reduced his clinical volume to focus more on the laboratory. He joined the newly created Ontario Cancer Institute in 1957, and conducted research on hematopoiesis and leukemia.

In the early 1960s, McCulloch and Till collaborated on a series of experiments in which they injected bone marrow cells into heavily irradiated mice. Initially, Till provided expertise on radiation sources and radiation delivery, while McCulloch offered the perspective of a hematologist. Later, they collaborated in all aspects of the research.

After injection of the marrow cells, small nodules grew on the spleens of the irradiated mice 1-2 weeks later, the number of which was proportionate to the number of marrow cells injected. Till and McCulloch named these nodules “spleen colonies,” and observed they differentiated into the 3 primary blood lineages: red cells, white cells, and platelets. The nodules were rare — about 10,000 marrow cells had to be injected to create one nodule — so Till and McCulloch speculated that each nodule arose from a single stem cell. This work was published in Nature in 1963 and was highly influential.

Later Till and McCulloch obtained evidence that some (but not all) of the spleen colony cells were also self-renewing, the other critical property of a stem cell. Key collaborators in this work included a molecular biologist, Louis Siminovitch (b. 1920) and a graduate student, Andrew Becker (1935-2015), who performed chromosomal studies showing the spleen colonies were a genetically identical group of cells and therefore represented a single clone. Further experiments demonstrated that some anemic...
mice strains had a defective marrow micro-environment that could not support blood cell production by the hematopoietic stem cells.

Till became a Fellow of the Royal Society of Canada in 1969, a Fellow of the Royal Society of London in 2000, and was made an Officer of the Order of Canada in 1994. McCulloch received the same honors: Fellow of the Royal Society of Canada in 1974, Fellow of the Royal Society of London in 1999, and Officer of the Order of Canada in 1988. Till and McCulloch were both inducted into the Canadian Medical Hall of Fame in 2004, and jointly received the Albert Lasker Award in 2005.

McCulloch died on January 20, 2011. He was married to Ona for nearly 58 years, and had 5 children. Till remains University Professor Emeritus at the University of Toronto, and has written in recent years on open access to scientific publications and Internet ethics.

Till and McCulloch were honored jointly by Canada Post in September 2020, as part of a “Medical Groundbreakers” stamp series (Scott # pending). McCulloch is the figure depicted wearing spectacles.

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