

## Barbara McClintock

Dr. Barbara McClintock (B.S. '23, M.S. '25, Ph.D. '27) was an outstanding, precedent-setting scientist and Cornellian. Although almost unable to attend college because she was female, she was able to enroll in CALS at the last minute, when her father relented. At Cornell, she discovered her love of genetics, and began the groundbreaking studies in genetics that she continued throughout her life, using corn as her model organism. In 1983, Dr. McClintock was the first (*and thus far only*) woman to win a solo Nobel Prize in Physiology or Medicine, for her painstaking work and major breakthroughs that challenged dogma and which, despite their importance, had been unappreciated for decades.

The Nobel Prize recognized Dr. McClintock's astonishing discovery that the genome is not static: genes move around ('transpose', 'jump') within cells. She discovered this through elegant, rigorous, and complex experiments on the cause of mottled pigmentation of corn kernels. Genome instability was an iconoclastic idea that challenged the prevailing dogma that the organism's genome never changes. The idea was difficult to understand, and was not accepted for decades. However, in the last third of the 20<sup>th</sup> century, geneticists began to realize that Dr. McClintock was right. They found that gene rearrangements occur in all organisms (bacteria, fungi, animals, plants) and are responsible for major phenotypic traits, as well as actions of some pathogens (including viruses), and critical for immunity, fertility, and some cancers.

Prior to her work on transposable elements, Dr. McClintock had already made major discoveries that revolutionized our understanding of inheritance, beginning in her undergraduate, graduate, and postgraduate years (as an Instructor) at Cornell. She developed methods to visualize corn chromosomes, identified their unique morphological features, and assigned linkage-groups of genes to each chromosome. She visualized how chromosomes move and behave during cell division and, for the first time in any organism, how chromosomes recombine during meiosis. She discovered how radiation damages chromosomes' morphology, stability, and behavior during cell division, and the unique, important, and special nature of chromosome ends (telomeres). Fellow Cornell graduate student and colleague (and, later, National Academy member) Dr. Marcus Rhoades credited Dr. McClintock with 10 of the 17 significant advances in cytogenetics made by (all!) Cornell scientists between 1929 and 1935.

In addition to the Nobel Prize, Dr. McClintock received many recognitions for her groundbreaking work. A partial list is: Guggenheim Fellow (1933), US National Medal of Science (1970), in the first cohort of MacArthur Fellows (1981), Wolf Prize in Medicine (1981), Lasker Basic Medical Research Award (1981), the first Thomas Hunt Morgan Medal from the Genetics Society of America (1981; she was the only woman among its first 20 recipients), Mayer Prize from the Académie des Sciences, Institut de France (1982). She was the third woman elected to the US National Academy of Sciences (1944), a Fellow of the American Academy of Arts and Sciences (1959), received an Achievement Award from the AAUW (1947), Benjamin Franklin Medal for Distinguished Achievement in the Sciences (American Philosophical Society; 1993),

and was inducted into the National Women's Hall of Fame (1986). In 2014, the Maize Genetics community created a prize in her name (the McClintock Prize in Plant Genetics and Genome Studies). In 2005 Dr. McClintock was featured on a US postage stamp, the only woman among the American Scientists honored with stamps in that series.

Dr. McClintock was not only a precedent-setting scientist; she also broke ground for women in many ways. Some are noted above; others include having been the first female President of the Genetics Society of America. At many times she was sidelined or unable to advance through the academic ranks because of her gender. In response, she just pushed through, and fearlessly did her science through temporary positions at various universities (Cornell, Missouri, Columbia) and, finally, a permanent appointment at the Carnegie Institution of Washington's Genetics Department at Cold Spring Harbor Laboratory. She was named a Distinguished Service Member of the Carnegie Institute of Washington in 1967. She was and remains a role model for many female (and other) scientists for her dedicated, rigorous science, her brilliance, her persistence, and her encouraging of their research and of out-of-the-box thinking.

Dr. McClintock was a dedicated Cornellian, even after her undergraduate, graduate, and early post-graduate work. As just one example, she served as an A.D. White Professor (1965-1974). She always spoke highly of her experience at Cornell in interviews or in casual discussions with visitors to Cold Spring Harbor. In 1992 (the year in which Dr. McClintock died), the McClintock family endowed an award in her name, for each year's top senior graduate student(s) in what is now the School of Integrative Plant Science students.

Cornell has only recognized Dr. McClintock in small ways, largely not very visible especially to undergraduates. In the early 2000s, CALS created McClintock Professorships, currently held by Drs. John Lis, Susan McCouch, June Nasrallah, and Chelsea Specht. In 2020, the "Biology without Borders" seminar series was re-named for Dr. McClintock. A shed in the Botanic Gardens, at which a famous picture was taken of Dr. McClintock with other leading corn geneticists, was renamed the McClintock Shed (after it was nearly demolished, until geneticists protested strenuously). Finally, distressed that the University had no recognition of this amazing alumna, undergraduate Juliet Jacobson '16 spearheaded an effort (and obtained funding from PCCW) to create a small exhibit about Dr. McClintock, in a corner of Mann library.