Scientist’s quest to prove genes ‘jump’ forever shook up genetics

For much of the 20th century, genes were considered to be stable entities arranged in an orderly linear pattern on chromosomes, like beads on a string. In the late 1940s, Barbara McClintock challenged existing concepts of what genes were capable of when she discovered that some genes could be mobile. Her studies of chromosome breakage in maize led her to discover a chromosome-breaking locus that could change its position within a chromosome.

McClintock went on to discover other such mobile elements, now known as transposons. She also found that depending on where they inserted into a chromosome these mobile elements could reversibly alter the expression of other genes. She summarized her data on the first transposable elements she discovered, *Ac* and *Ds*, in a 1950 PNAS Classic Article, “The origin and behavior of mutable loci in maize.” Although their existence was accepted relatively soon after by maize geneticists, the widespread nature of mobile genetic elements and the implications of McClintock’s discovery took decades to be widely recognized.

McClintock described the initial reaction to her discovery as “puzzlement, even hostility.” Speaking of the scientific community at large she said “I was startled when I found they didn’t understand it; didn’t take it seriously.” The concept of transposition did not fit easily within the framework of genetics at the time. McClintock’s description of mutations that switched genes on and off was at odds with the existing idea that mutations permanently inactivated genes.

Furthermore, decades of genetic mapping data had shown that genes were arranged linearly in fixed positions relative to each other, which made it hard for researchers to accept that genes could move within the genome.

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