



Women in Science

Barbara McClintock

PRESENTER

Another Nobel Laureate who changed our fundamental understanding of the way we work, was American geneticist Barbara McClintock, born in 1902. Hilary MacQueen is Head of the Department of Life Sciences.

Hilary MacQueen

She was an extraordinary scientist not only because of the times in which she lived but because of her scientific achievements during those times. She went to university with the reluctant agreement of her mother who didn't believe that girls should be educated because it didn't really train them for marriage, studied botany in fact and went on to become a graduate student. In those days women were not generally awarded PhDs and particularly not in genetics but because she was looking at the genetics of maize, she was allowed to get her PhD in botany rather than the genetics which was where her heart really lay and things really came to a head for her when she moved to Cold Spring Harbour which was a very famous biology research institute in up state New York.

Now what Barbara McClintock achieved was to elucidate the mechanisms of recombination of genes during meioses, which is the process that happens when germ cells are made in biology. Recombination is an incredibly important genetic mechanism. It's the whole mechanism that evolution works with. If you didn't have a reshuffling of genes at each generation, evolution would have no raw material to work with and Barbara McClintock's great achievement was firstly that she was able to sort out exactly what was going on between generations in maize and she was able to work out what happened to the chromosomes. Now the only tools at her disposal back in those days, we're talking about work here in the 1940s mainly, was cytogenetics which basically meant staining the chromosomes and looking at them down a microscope. Now bearing in mind that at this time nobody really knew very much at all about what the hereditary material was, DNA was a sort of fairly good bet but that was by no means accepted universally and, in fact, the structure of DNA wasn't elucidated until 1953, which was quite some time after this. So Barbara McClintock was effectively working in the dark with this. What she was doing was observing her material, seeing what happened, not bringing any preconceptions to the work and making deductions and interpretations of her data and that is just the perfect way to do science.

Now it wasn't all plain sailing for her at all. Because some of her work was a little bit forward in terms of the general thinking, she did have some trouble getting it accepted and that became even more pronounced when she carried out the work that perhaps she's actually best known for, which is to identify transposable genes, what were called jumping genes back then. These were genes which rather than lying neatly in their predetermined place on the chromosome, which was the general view back then, she discovered that some genes actually have the potential to move around and where they move from and where they move to is very important in the way that the cell expresses the rest of its genes. So radical was her work that she actually couldn't get it published and, in fact, from 1953 she stopped publishing her work altogether because it was just too much for the general science world and it wasn't until very much later in the 1960s and early 70s that people went back and looked at her really quite seminal work and said, yes, this mechanism explains exactly what we're observing again today, she was right all along. When I was at university learning about transposition, this was in the mid 70s, she was being hailed as a hero at that stage and indeed quite rightly so. Now I was lucky enough to go and hear Barbara McClintock talk in the early 80s when I think she would have been about 80 years old. Many people would have been very bitter and twisted and quite grumpy about their whole life experience but not her, she was dignified, she was the ultimate scientist, she discussed her previous work only in

very small detail and she was actually far more interested to tell us all about what she was doing now and she was entirely forward thinking and forward looking. She really was a grand old lady.

I'm delighted that in 1983 she was awarded the Nobel Prize and she was the only woman actually to have been awarded a Nobel Prize all by herself and I think that was quite ironic in a way because that was the way that she had had to work all the way through her scientific career. She was on her own, she was solitary, she was fighting, she was really trying hard to make her voice heard amongst the general raucous interventions of the conventional view of things and she died at the age of 90 so not very long ago. She not only did beautiful scientific work that transformed the way we think about the subject but she remained dignified under pressure and I think that's why she gets my vote.