

that this book will be enjoyed widely and will be much appreciated by both specialists and scientifically thoughtful lay readers. ■

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## Uncovering chromosomes

### The Man Who Invented the Chromosome: A Life of Cyril Darlington

by Oren Solomon Harman

Harvard University Press: 2004. 342 pp.

\$49.95, £32.95, €46.10

Rena Selya

Cyril Dean Darlington was responsible for our understanding of the behaviour of chromosomes during mitosis and meiosis. Working with plants at the John Innes Horticultural Institution in London in the 1920s, he displayed a keen eye for microscopy, and spent much of his time exploring the structures of the cell. His scientific insights, however, were more often the result of theoretical reasoning than careful empirical observation. His 1932 masterpiece, *Recent Advances in Cytology*, earned him both great praise and harsh criticism because of his unorthodox methods.

As Oren Solomon Harman shows in *The Man Who Invented the Chromosome*, Darlington's controversial cytological research clarified many basic biological issues and provided essential evidence for the evolutionary synthesis of the 1940s. He 'invented' the chromosome by describing its behaviour in a way that made genetic and evolutionary sense. His description of the way chromosomes line up with their homologous copies before cell division settled a long-running debate among cytologists over whether chromosomes pair up end to end or next to each other, and accounted for the phenomenon of crossing over. His contributions to biology were significant, yet he has been overlooked in the history of the life sciences.

One of the book's strengths is Harman's deft description of the confusion that reigned in the biological community in the first half of the twentieth century. He shows how well-educated, talented researchers could draw opposing biological conclusions from experimental data because of their conflicting disciplinary affiliations and generational perspectives. When Darlington began his work at the John Innes, under William Bateson, he stumbled into a community in epistemological upheaval. Despite his position as one of the founders of modern genetics, Bateson



Look at it my way: the results of Darlington's unorthodox methods eventually convinced his critics.

resisted the chromosome theory of inheritance because he felt there were too many experimental exceptions for it to explain Mendelian inheritance. Young US geneticists were willing to extrapolate from data from a model organism, whereas cytologists spent years accumulating evidence from a range of plant and animal species before drawing general biological conclusions. Harman gives the reader a sense of Darlington's growing confidence as he made bold claims that were eventually accepted by biologists of all disciplines.

A strong commitment to an evolutionary perspective led Darlington to some unpopular conclusions, which he published in books and articles aimed at a wide audience. Convinced that biological principles, especially genetics, dictate human values, he espoused strong eugenic programmes and argued for the biological existence of race, especially after UNESCO published its statements on race in the early 1950s. Darlington studied human history through the lens of evolutionary pressure, concluding that genetic and environmental diversity should be maintained to ensure the survival of the human race. Although his ideas were unpopular so soon after the Second World War, he felt that the time had come for science to determine morality: religion and politics should be replaced by evolutionary logic for individuals, countries and humanity.

The influence of science on society was unidirectional, however. Darlington firmly believed that political considerations should never influence science, whether under liberal or totalitarian governments. He was one of the first scientists outside the Soviet Union to recognize the danger in Trofim Lysenko's scientific and political positions. Despite the fact that some of Darlington's work on cytoplasmic inheritance could have supported a

Lamarckian view of heredity, he criticized Lysenko's science while other biologists played down its influence. He took no pleasure in accurately predicting the terrible fate of Soviet geneticists, and he chastised colleagues who were loyal to the Communist party.

Darlington was a lifelong diarist, and Harman makes fine use of the red bound notebooks that now reside in the Bodleian Library in Oxford. He attributes Darlington's scientific success, after a lonely and academically undistinguished childhood, to a combination of intelligence, arrogance and the desire to please a demanding, emotionally distant father. Harman chronicles Darlington's tumultuous personal life (he had three wives), and incorporates the recollections of two of his children. He describes Darlington's thoughts and feelings in a novelistic manner, so the scientist comes across as a complex, if not altogether likeable, person.

The prose is occasionally melodramatic: "It was as if the chromosomes themselves, at the other end of the ocular lens, could feel it: Darlington was hungry." Still, the style conveys Darlington's human side well. Harman does not fall into the trap of tediously chronicling the life of his subject, but rather presents Darlington's scientific research and popular writings as the expression of paradoxical personal and intellectual themes.

Because of his controversial views and brusque personality, Darlington faded from the public eye before his death in 1981. But the spectres of genetic determinism and political interference in science remain with us, and Harman provides a cautionary tale for those who seek to tie our humanity too closely to what is found in our chromosomes. ■  
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