

genetic engineering, chromosome abnormalities, the gene in action and the role of multifactorial inheritance in the causation of common diseases. Two final chapters discuss genetic counselling and prenatal diagnosis.

The new edition has been substantially revised and expanded without altering its basic structure, and also has some visual improvements which I like. These include slightly heavier print, bold lower case instead of expanded upper case lettering for section headings, and better designed figures of pedigrees, all of which make for easier reading. There are also a number of new illustrations, and the omission of figure 62 of the 7th edition – I don't think this can ever have helped a reader to understand 'the control of polypeptide formation in the cell'. Figure 111, giving the standard band numbering of the human chromosomes, is taken over from the 7th edition, but should have been printed at twice the size so that one can read the band numbers without using a magnifying glass. An extraordinary statement on page 182, to the effect that restriction enzymes are so named because they are the product from one strain of bacteria that restricts the subsequent growth of certain other bacteria on the same medium, should have been replaced by a definition slightly nearer the truth. However, these and the occasional misprint (plasma for plasmid, numbrs for numbers) are very minor blemishes in the new edition, and I hope it will remain an essential textbook in the training of medical students.

This book is, of course, only an introduction to a continually expanding branch of applied genetics, but I think it should prove of interest to most students of biology. The cautious approach to genetic knowledge through collection of pedigrees of possibly genetic abnormalities, bedevilled by the problem of different genes giving the same syndrome, is well illustrated by many examples, and makes a striking contrast to the experimental approach in other branches of genetics. To take one example, achondroplastic dwarfism is well known as a dominant genetic defect. The mutation rate based on a very extensive Danish survey was given in the seventh edition as 1 in 20000 gametes, but was reduced to 1 in 1 000 000 gametes in the eighth edition. The difference arises from the discovery that a proportion of such dwarfs who die very early are actually recessive homozygotes for another gene or genes, whose inclusion as dominants biases the analysis. Another point of interest is that it needed the development of caesarian section to enable achondroplastic women to produce children. As a result, marriages of affected by affected have occurred, and these produced a mixture of normal achondroplastic and much more severely affected children in roughly Mendelian proportions. The last group can clearly be assumed to be affected homozygotes. A comparable example is Apert's syndrome, a severe congenital malformation of sporadic occurrence, whose causation was unknown. Surgical treatment has been developed which

relieves the cranial abnormality and consequent mental retardation; and as a result several affected persons have produced children. A proportion of these had the same abnormality, thus proving that Apert's syndrome is, in fact, a dominant genetic defect. These are two examples out of many.

I enjoyed reading this new edition, and think it worth recommending to a wide biologically oriented public. Non-medical readers may have trouble with the names of many of the hereditary conditions discussed, but the actual syndromes are generally briefly summarized.

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The Life and Work of J. B. S. Haldane. By KRISHNA R. DRONAMRAJU. Aberdeen: Aberdeen University Press. 1985. 211 pages. £14.90. ISBN 0 08 0324363.

The lives of scientists rarely make good subjects for the biographer: they usually live a rather sheltered life, and argue about esoteric topics which would baffle even scientists in other disciplines and will lose interest as scientific progress marches on. If scientists appear in public they are likely to be incomprehensible unless a television crew has been at work on them, and on politics they are no more trustworthy than professional politicians. Most of them maintain a very low profile except among their colleagues, with whom they quarrel in a rather refined way. So novels and plays about scientists (excluding science fiction, Galileo and Darwin) are rare and not then very exciting.

J. B. S. Haldane (1892–1964) was a remarkable, even unique, exception to this generalization. He seems to have received, and needed, very little training in any branch of science apart from a few terms at school and what he learned as his father's physiological guinea-pig. He went to Oxford with a mathematical scholarship, changed after a year to 'Greats' (a mixture of Classics and the Humanities really designed for making top civil servants), and obtained a first-class degree which was announced on 4 August 1914.

After surviving a more than eventful war which he seems to have thoroughly enjoyed, Haldane became first a lecturer in Physiology at Oxford and then in Biochemistry at Cambridge (without having a degree in either subject). At the same time he was making a variety of important contributions to genetics, particularly in the development of a mathematical theory of evolution, was writing the best of all articles on popular science, and was becoming a dedicated Marxist, which eventually embroiled him in the Lysenko controversy.

In 1957 he and his wife Helen Spurway rather ostentatiously shook the dust of England from their feet, after a minor incident involving Helen and a Police dog's tail, and retired to India, where their life did not remain altogether peaceful. Clearly here is ideal

material for the writer; and Ronald Clark has, in fact, written an excellent (and highly entertaining) biography of J. B. S. Haldane, first published four years after his death and reissued as a paperback in 1984, which covers his life, work, politics and uneasy relations with other people. After reading it one does not feel an obvious need for further studies on Haldane the man and the scientist, though reprints of some of his books would be welcome. Thus Alan Ferscht starts the 1984 edition of his book *Enzyme Structure and Function* with the statement that Haldane's book on enzymes in 1930 is still worth reading.

But one biography often begets another, and Krishna Dronamraju has now produced a new one in which he claims that Clark's 'formal' biography (I don't know what he means by this term) is weak on Haldane's work and particularly so on his life in India. He sets out to put the record straight in the book under review, which took some twenty years of intermittent writing after Haldane's death. Dronamraju appears a particularly appropriate scholar to fill in the picture of Haldane's later life and work, since he joined the Haldanes as a newly graduated botanist shortly after they settled in India, lived with them and learned and worked under Haldane's close direction, and was with Haldane on all his subsequent travels throughout India and abroad. He was evidently treated as a favoured son, and was in the best position to become a Boswell to Haldane's Johnson.

In view of his extraordinary memory and wide range of scientific and cultural knowledge, Haldane's conversation doubtless rivalled that of Samuel Johnson, but Dronamraju is no Boswell, and we do not get the pick of day-to-day exchange in India which would have made this book a real joy to read. Dronamraju has worked hard to give us the science as well as the life, but much of his book either repeats in less detail what can be found in Clark or gives an unlively guidebook description of the many travels of Dronamraju and Haldane together, which covered all the tourist sites in India – temples, Taj Mahal, erotic sculptures at Konarak, Sherpa Tensing and his Mountaineering Institute, and so on and so on, as well as probably every Indian Scientific Institute which Haldane visited on behalf of the Indian Government. One can only marvel at and envy Dronamraju's good fortune and wish he had been able to give us more detail of these experiences, including particularly Haldane's comments.

Dronamraju makes a brave attempt to explain Haldane's many contributions to science and perhaps exaggerates the importance of some of them, but the interested reader can go to the original references to reach a balanced view. He also quotes from a number of Haldane's more famous essays and summarizes what other essays deal with, and this is a valuable contribution: it may perhaps lead to more of these essays being published. He also includes some of Haldane's comic verse from *Brighter Biochemistry*, pub-

lished annually at the Cambridge Biochemical Institute from 1925 to 1933: but to appreciate them fully we need a Ph.D. thesis to explain all the private jokes. For example, what was Perkins doing with *Sacculina*, and how does it 'destroy the theory that boys will be boys'? Should I know who 'the ever-patient Perkins' is or was? Probably. I do know who Woolf (mentioned in the same poem) was, and wonder whether he wrote better verse than Haldane while in Cambridge. Haldane's verses published in Dronamraju's book have not worn too well, and by far his best poem is 'Cancer's a Funny Thing', written early in 1964 when he was already seriously ill with cancer, and reprinted by Ronald Clark.

I would have liked information on two questions which neither biographer discusses. First, what happened to Helen Spurway after Haldane's death? Helen was by no means *persona grata* with many geneticists, and I believe that more than one British University Department which would have been very glad to welcome Haldane as a senior citizen and father figure was not prepared to make a tenured post available to Helen so that she could continue there after his death. But clearly Helen Spurway was very good for Haldane and an ardent supporter in times of trouble. Her life should have been completed at least by Dronamraju, on whom she must have had a strong influence as friend and collaborator. It would also have been of particular interest to have Helen's reminiscences of Haldane.

The second and more serious gap, which Dronamraju should certainly have filled in, is the longer-term influence which Haldane had on Indian science. Are there no Haldane Universities, Institutes or even Chairs to remember him by? He broadcast, travelled and lectured very widely while in India. Did he leave a strong influence on his many listeners, did he leave a strong nucleus of research workers who have now reached influential positions? Are his books and papers and even the Indian years of the *Journal of Genetics* now required reading for Indian students of genetics, or has his name and influence in India subsided without trace? It is a vast country with six major and at least fifteen minor languages, and to make a lasting mark on it may well have been too much even for Haldane to achieve. Haldane collected a small group of young Indian scientists to work under his direction and influence, soon after he and Helen arrived in India. It would have been of great interest to learn what has happened to each of them, and particularly whether any of them have risen to positions of eminence in Indian science, as Haldane hoped they would.

The best features of Dronamraju's book include Vicky's cartoon drawing of Haldane on the jacket. Potential readers should also look out for Julian Huxley's description of Haldane's visit to the Huxley house as a young lecturer at Oxford, L. C. Dunn's story of Haldane coming in to a meeting of the

Genetical Society when R. A. Fisher was lecturing, and especially Dronamraju's eye-witness account of R. A. Fisher's only actual visit to Haldane, in Calcutta. No doubt John Maynard Smith could supply equally revealing anecdotes if his lips were unsealed. I will add a small one: in the early 1950s at meetings of the Genetical Society, a favourite dinner-table topic was the length of time each of us had had a paper waiting for publication in the *Journal of Genetics*. Tipped off by an expert, I called on Haldane to enquire about my manuscript, which had been languishing in his hands for many months. He proceeded to

delve into a pile of papers standing desk-high beside him, and produced my paper from near the bottom of the pile. He looked blankly at a path-coefficient diagram (Sewall Wright had been staying with us in Edinburgh), said 'Harrumph', or words to that effect, and my paper appeared in the next number. I hope dissatisfied authors will not apply the same technique to me.

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