Book Reviews

Neurospora – Contributions of a Model Organism. Rowland H. Davis. Oxford University Press. 2000. 346 pages. Price £69.50. ISBN 0-19-512236-4.

The filamentous fungus Neurospora was arguably the founding organism of molecular biology, and it certainly provided the early support for the one gene–one enzyme hypothesis, the over-simple but basically correct foundation for so much that has happened since. Since the early days, however, it has been overtaken, first by *Escherichia coli* and then, as a model eukaryote, by budding yeast – *Saccharomyces cerevisiae*. But Neurospora has remained as a strong minority interest, and it has many advantages. It grows fast, producing useful spores, has a reasonably quick and easily managed sexual cycle with the possibility of ordered tetrad analysis, and has an abundance of auxotrophic mutants. In comparatively recent years, easy methods have been developed for transforming it with DNA, and this gives access to Eric Selker's duplication-induced gene disruption (RIP), probably the most facile system of targeted gene silencing available in any organism. Not least of Neurospora's advantages is that it is different from yeast, which in some ways is a very unrepresentative eukaryote. And the analysis of the complete DNA sequence of Neurospora is well under way.

In the earlier years of Neurospora biochemical genetics, the ready availability of auxotrophic mutants made it most useful for studies of intermediary metabolism. But now that metabolic biochemistry has been so largely worked out, attention has turned to a host of other aspects of its molecular biology – gene structure and organisation, mutagenesis and radiation repair, regulation of gene action, responses to stress, growth and form, mitochondria, plasmids, and sexual and asexual incompatibility mechanisms. Rowland Davis has set out to give us some account of virtually everything that has ever been done on the organism, and he comes close to that objective, backing up his summaries with a nearly comprehensive bibliography. He gives due, but not excessive, prominence to the field in which he himself was a pioneer – metabolic intracellular compartmentalisation. His book will be of great value as a source of reference, though it will doubtless need up-dating in a year or two.

Although the book will be widely appreciated, I do not think that many will find it easy reading. The author assumes a broad background knowledge of molecular biology, and takes for granted familiarity with a wide range of technical terms, not all of which were clear to me. There is a great deal of detail, and, as is only to be expected with ongoing biology, not all of the detail is reduced to order. More of the information, especially on effects of mutations, might have been more accessibly presented in tabular form. The index could have been more comprehensive, and the cross-references in the text would be more useful with page numbers. But at least we are always given references to the original literature.

There were only one or two places where I thought Davis had omitted anything of importance. I would have liked to have seen more discussion of the mechanism of recombination, particularly of the somewhat vexed problem of the relationship between gene conversion and crossing-over. Davis rightly gives some emphasis to the recent provocative findings of David Catchside's group in Adelaide on the *am* gene, but there is an abundance of older data that he could well have mentioned, notably that of Mary Case and Norman Giles on *pan-2*. Incidentally, mutational sites within *am* were first mapped, not by any consistent inequality of recombinant flanking marker classes, but by polarity of gene conversion. Another old body of work that I thought should have been described was Fred de Serres' use of the purple *adenine* mutants for fine-structure mapping and, especially, for studies of mutagenesis. That was a fine experimental system in its day, and still of interest, I would have thought.

However, such questions as one may have in reading this book are nearly all trivial in comparison with the scope of the whole work. Rowland Davis is to be congratulated on the great amount of material that he has reduced to manageable form. His book is sure to find a place in our libraries, probably eventually in successive editions.

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Dorothy Hodgkin – a Life. By Georgina Ferry. Cold Spring Harbour Laboratory Press. 2000. 423 pages. Price £15.00. ISBN 0 87969 590 0.

This book, published in 1998 in Britain and now published in the USA, does so much more than merely document the life and work of a remarkable woman: outstanding scientist and Nobel laureate, inspirational teacher, devoted wife and mother, and indefatigable advocate for peace through international scientific collaboration. All of this achieved in a male-dominated world and effectively all of it through the pain and debilitating effects of rheumatoid arthritis.

The author was given access by her children to Dorothy's private papers in addition to researching the more accessible archives found around the world and she has added to this interview material from many friends, former students and colleagues (in most cases the two are synonymous) to put together an engaging and thoroughly readable biography. The book is not flawless – for instance, it might have benefited from a few more pictures, since Dorothy's science was by its very nature, pictorial – this is a petty concern in comparison to the vividly and accurately portrayed character who emerges from its pages. Her gentleness, her concern for others, her commitment to education, her ability to inspire and above all her absolute dedication to the science in which she was engaged, are all but tangible.

Dorothy Crowfoot was born in Cario where her father was a civil servant overseas with the Department of Education at the time. Her schooling, a mixture of the formal and informal took place around Beccles on the Norfolk–Suffolk border but her interest in chemistry began around the age of ten when she was able to do her own experiments in the attic of the house her parents rented. She went to Oxford to read chemistry in 1928, emerging 4 years later, having done her project in x-ray crystallography, with a First, only the third ever to be awarded to a woman by Oxford. Wanting to discover the structures of biologically important molecules, she moved to Cambridge to work with J. D. Bernal who at the time was working on sterols. She rapidly became indispensable and amongst other things, the first ever x-ray photograph of a protein (pepsin) was taken in 1934. She moved back to a fellowship at Somerville College in 1934 and remained in Oxford until her retirement in 1977 and it is interesting that for much of this time she was not formally on the University payroll. Further, for much of her early career her research was supported by the Rockefeller Foundation before the Royal Society and then increasingly the Science Research Council took over funding her research. The essence of British academic science and its politics, not to mention the emerging field of biological crystallography during this period have been nicely captured by Ms Ferry and makes fascinating reading.

Although Dorothy photographed insulin, and a number of other proteins, in the late 1930's, she also solved a number of 'small molecule' crystal structures at a time when most in the field were still examining simple salts and minerals. She solved the structures of cholesterol, penicillin and vitamin B_{12} by a combination of supreme chemical insight, determination and hard work; and it was her work on the latter two that resulted in her being the sole recipient of the 1964 Nobel prize in chemistry, only the third ever woman and the first British one. The insulin structure came out in 1969 although the definitive paper at high resolution was not published until 1988. Not only did she work tirelessly and brilliantly, she also married Thomas Hodgkin in 1937 and raised three children in a manner not unlike her own upbringing since both she and to a greater extent her husband, travelled widely.

While Dorothy's mother had taken her to political meetings as a child, and her association with Bernal also contributed to her sense of social justice, it was not really until after her Nobel prize, which she learnt about in Ghana, that she was able to have some influence in this area. A tireless worker for scientific freedom and social justice, she travelled constantly throughout her life forming bridges between groups of scientists regardless of where they were. Thus she was able to involve Chinese, Russians, Indians and Africans in scientific exchanges under the aegis of the International Union of Crystallography and the Pugwash Conferences, both of which she served as President. Indeed, she attended the triennial IUCr conference in Beijing in 1993 not long before her death in 1994. At that time, tributes to her and her work appeared all over the world in both the scientific and popular press. It is entirely fitting that both buildings and scholarships bear her name.

The journal of Anthony Powell not only reveals a man firmly on the right politically with little interest in science but also contains sadly unkind comments about Dorothy at the time she gave him an honorary degree at Bristol University when she was its Chancellor. Had he made the effort to get to know her, even he could not but have been impressed by her 'saintly, gentle, tolerant love of people' and her devotion to the cause of peace, as she impressed all who knew her and all who read this biography.

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