In the balance

Edward Abraham

Miracle Cure. The Story of Antibiotics. By Milton Wainwright. *Blackwell: 1990. Pp.196. £16.95.*

MILTON Wainwright has written a readable pot-pourri. Much of it is concerned with the assessment of credit for the discovery of the clinical value of penicillin and streptomycin, but the author strays into other areas, including a description of some bizarre procedures that have previously been claimed to cure bacterial infections and the fiasco of the antibiotic patulin and the common cold.

The author, who is in the Microbiology Department at the University of Sheffield, states that he has "attempted to redress recent attempts to downgrade the role played by Sir Alexander Fleming in the discovery of this most famous antibiotic". Some may wonder whether this is necessary, for Fleming's name has been embedded in the public mind, while Florey's and Chain's have not. Yet Fleming was not elected to the fellowship of the Royal Society until 1943, 20 years after he had first been proposed by Almroth Wright. Wainwright suggests that this should carry little weight with "anyone who is familiar with the routes by which one can succeed to this august body". The precise implication of his phrase is not clear. But great trouble was taken to ensure that Fleming's candidature was not adversely affected by publicity for the findings in Oxford in 1940 and 1941. And it should be remembered that the Royal Society is concerned with science, not merely with medicine.

Fleming's chance discovery of penicillin has never been seriously disputed, nor has his early belief that it might be clinically useful for local application to infected wounds. The vital discovery at Oxford, which receives little emphasis in the book, was that even exceedingly impure penicillin could cure generalized and life-threatening infections when introduced into the blood stream. It was this that gave penicillin its outstanding medical importance. All that is arguable is whether Fleming could have demonstrated this property in mice if he had thought of trying to do so.

This book contains several interesting anecdotes which may not be widely known. Appropriately, it describes in some detail the striking success in Sheffield of Dr C. G. Paine, whose penicillin-containing culture filtrates from Fleming's *Penicillium* were used for local treatment of eye infections in about 1930. Paine never published these results, but later he sent notes on the cases to Florey. These notes (not mentioned by Wainwright) were reproduced in 1949 in *Antibiotics* by Florey *et al.*.

Wainwright provides simplistic and slightly misleading accounts of the chemistry of penicillin and the semi-synthetic penicillins and cephalosporins. Because all these compounds have a four-membered β-lactam ring it might have been more appropriate to have placed them in the same section of the book.

The discovery of streptomycin was reported in 1944 by Schatz, Bugie and Waksman at Rutgers University; this antibiotic was later found to be effective in the treatment of tuberculosis. This book describes how all was well between Waksman and Schatz until Schatz discovered that Waksman was receiving money from Merck and began a lawsuit for a share of royalties. The case ended with a partial victory for Schatz. However, when a Nobel prize was awarded to Waksman alone, Schatz could not bring himself to remain inactive but, predictably, he gained nothing from his activity. Wainwright states that he has tried to redress an historical imbalance, "this time in favour of Albert Schatz". Whether the balance needed redress is at least open to question. Perhaps Waksman was ungenerous to Schatz and too secretive. But it seems that Schatz failed to appreciate that he was a research assistant to a man who had opened a wide field of investigation that had already led to the discovery of streptothricin. What is beyond doubt, however, is that misjudgements by Waksman and Schatz brought them both a great deal of misery.

Fleming — "embedded in the public mind".

This book is well produced. But some readers would find a more detailed index more useful and others might appreciate the addition of a few primary sources to the author's suggestions for further reading — to redress its balance. □

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A way through the jungle

Colin Gough

Physics of High-T_c Superconductors. By J. C. Phillips. *Academic: 1990. Pp.393. $55, £36.*

ALMOST four years after Bednorz and Muller's Nobel prizewinning discovery of superconductivity in the layered cuprate compounds, the unexpectedly high transition temperatures of these materials remains unexplained. It is frequently claimed, with some justification, that there are as many theories for the layered cuprate high-temperature (or HTC) superconductivity as there are groups working on the problem. Keeping abreast of the literature remains a daunting task for even the most experienced researcher.

A book designed to summarize and explain the physics of HTC superconductors is therefore specially welcome, particularly when the writer is J. C. Phillips, who has made many significant contributions to the theory of the electronic and phonon properties of solids including conventional superconductors.

In aiming "to cut a well-marked path [through a literature] as forbidding as the darkest jungle", Phillips has selected a rather special path, carefully chosen to support his view that HTC superconductors are really no different in kind from previously known superconductors. He is sufficiently confident to state "there is no room for doubt that it is lattice instabilities and not magnetism that produce high-T_c superconductivity just as much in cuprates as in intermetallic compounds". Relatively little attention is drawn to other dangerous animals lurking in the jungle in the guise of theoreticians with diametrically opposed views.

The original Bardeen–Cooper–Schrieffer (BCS) model successfully accounted for superconductivity in terms of an indirect attractive electron interaction leading to superconducting pairing via lattice vibrations. This mechanism appears to place an upper limit for superconductivity of around 40 K (−233 °C) — well below the current record for HTC superconductors of 125 K (−148 °C). However, Phillips emphasizes that the layered cuprate HTC superconductors are much more complex structures than the theory was originally developed to describe. Matthias, who spent a lifetime in the quest for higher temperature superconductors, would have claimed that the cuprate superconductors were "tricking nature" into circumventing the apparent boundaries of conventional BCS theory.

To support this thesis, Phillips first presents an extensive background to electron-