

phore complex develops from a single zygote into a ciliated larva, and later into a primordial polyp, forming, as it grows, a stem from which the other polyps branch. After a reproductive period its planktonic existence ends, and it dies as an entity. Perhaps it is not in every sense one individual; but can its state of organisation properly be equated with that of the higher societies on any of the other pinnacles—societies composed of separate, potentially competing, genetically different, sentient individuals, bonded together by sensory recognition and appetite, constrained by conventions

and by traditions handed down from forbears to descendants as the generations pass. Once more I must doubt it, and whether indeed the author could claim (which of course he does not) yet to have found the keys to this black box.

Ultimately these questions are important, but for the present I think they will worry most readers not at all, nor detract from the pleasure and profit to be found in this remarkable book. They do nothing to diminish its new horizons, but remind us only that we are not at the end of the road.

V. C. Wynne-Edwards

## Superconductivity

*The Superconducting State.* (Graduate Student Series in Physics.) By A. D. C. Grassie. Pp. vii+135. (For Sussex University Press; Chatto and Windus: London, September 1975.) £8.00.

THE author, in his preface, excuses the appearance of yet another book on superconductivity by claiming that "It corresponds to the level of the experimental physicist who needs to follow theoretical papers in order to analyse his results adequately . . .". Having on many occasions suffered restrictions imposed by a lack of theoretical understanding, I approached this volume with eager anticipation. It is with regret that I report that after reading, and indeed re-reading, the book my hopes remain unfulfilled.

The first chapter, an introduction to the phenomena of superconductivity, sets the historical perspective. The second, dealing with the microscopic Bardeen, Cooper and Schrieffer (BCS) theory of superconductivity requires fairly advanced quantum mechanics, and will severely tax most experimental physicists. A less mathematical treatment of BCS is probably not possible, but a closer attempt to relate formulae to physical reality would be helpful. The strong-coupling extension of BCS, which is needed to discuss the technically interesting, high critical temperature superconductors, is dismissed in two paragraphs. The limitations of the theory, for example in its ability to predict new superconductors, are ignored.

The following two chapters cover the Ginsburg-Landau phenomenological theory, and the magnetic state of type II superconductors. The treatment is on a par with those to be found elsewhere, and offers no new insight. The latter section is incomplete in that it ignores the temperature dependence of  $\kappa$ .

The reader is entitled to expect more technological bias from chapter 5, en-

titled "The Current-Carrying Capacity of type II Superconductors". The main reason for using superconductors in large electrical devices is their ability to sustain very high current densities, but the pinning of flux lines, which is directly responsible for the magnitude of the critical current, receives one paragraph. It is true that "the origin of pinning forces is still a subject of detailed research", but then so are many of the other phenomena described. There is sufficient agreement among workers interested in flux-pinning for the author to have given some indication of the physical nature of pinning forces. The discussion of flux instabilities is better, though in one of the all too rare numerical calculations the author arrives at the incorrect value of 0.042 cm for the critical half-thickness of a stable conductor. Using the author's formulae and quoted values for parameters, the correct answer should be 0.003 cm, a value which looks less out of place with the accompanying photograph of a multifilamentary conductor.

The final chapter is concerned with Josephson effects, and the devices which use them. This is the best chapter in the book, not only because it is the most original. But at six pence a page, the book must be regarded as expensive.

David Dew-Hughes

## Insect biochemistry

*Insect Biochemistry and Function.* Edited by D. J. Candy and B. A. Kilby. Pp. xii+314. (Chapman and Hall: London, May 1975. Distributed in USA by Halsted Press.) £8.50.

THOSE expecting a comprehensive textbook of insect biochemistry will be disappointed. This book is in fact a collection of four review essays describing the biochemistry of certain functions in detail, and the authors assume the reader to have a good basic knowledge of biochemistry. The

greater part of the book is devoted to aspects of insect flight, with one chapter on the utilisation, and another on the sources of fuels for flight. The first describes the metabolic pathways for the release of energy from carbohydrates, fats and amino acids. Emphasis is placed on the complex interactions resulting in the breakdown of muscle glycogen as an immediate source of energy, the importance of certain metabolites (especially  $\alpha$ -glycerol phosphate, proline and acetyl carnitine) for penetrating mitochondria, and the mechanisms responsible for controlling mitochondrial metabolism, which may increase by as much as 100 fold on the initiation of flight. The nature of these fuels for flight, and the sites for their storage are described belatedly in the second chapter. The importance of the various energy sources for both short and long periods of flight are discussed, and attention is drawn to the central role of the fat body in synthesising and storing these fuels.

The diversity and origins of excretory materials produced by insects is the subject of the third essay which dispels the firmly entrenched generalisation that insects are primarily uric acid excreting organisms. Many nitrogenous compounds are excreted, including ammonia which, despite its great toxicity, is now recognised as a major excretory product in some terrestrial insects. The accumulation of uric acid within the insect body has until recently been thought of as excretion, but evidence is reviewed that this metabolite is mobilised in times of dietary stress, possibly by intracellular symbionts within the fat body.

The final contribution is a concise assessment of our current knowledge of synaptic transmission in insects. After a general outline of the structure of the insect nervous system, cholinergic transmission is summarised very briefly, and the remainder of the chapter is devoted to a discussion of the evidence for glutamic acid,  $\gamma$ -amino butyric acid and biogenic amines as excitatory and inhibitory transmitters both peripherally and in the central nervous system.

Although the editors draw attention to the importance of comparative aspects of biochemistry in achieving selective toxicity in chemicals used for pest control, little emphasis is placed on these, even in the most relevant chapter on synaptic transmission. The book provides, however, good reviews of the three topics, and these have comprehensive bibliographies (the chapter on excretion being especially notable in this respect). It should prove useful reading for both undergraduates and research workers in insect biochemistry. A. L. Devonshire