stimulating effect desired by Dr. Beer, which makes the work so much more than a 'Handbuch'.

It was inevitable that a collective work, with each author freely choosing his own subject, should present some gaps. Some are undoubtedly fortuitous, but others are due to progress in certain branches of astronomy made between the preparation and publication of the articles. Dr. Beer should not regard this as a criticism but rather an invitation to produce a sequel at some future time.

The care with which the book has been printed and the skill with which the figures have been reproduced are in the best British tradition. This fine presentation is not the least attraction of "Vistas in Astronomy". ANDRÉ DANJON

PHYSIOLOGY OF INVERTEBRATES

Recent Advances in Invertebrate Physiology

A Symposium sponsored by the National Science Foundation; the Tektronix Foundation; and the University of Oregon. Edited by Bradley T. Scheer. Pp. vi+304. (Eugene, Oregon: University of Oregon Publications, 1957.) 5.50 dollars.

THIS volume contains sixteen papers that formed part of a symposium held in the University of Oregon in September 1955. It gives a well-balanced survey of selected topics which have been notably developed in recent years and most of the contributions are well written and readable.

The mechanism of the nerve axon does not come in for consideration, but the neuromuscular mechanism is discussed from different angles by several authors. The review by C. A. G. Wiersma, which ranges over the main invertebrate phyla, brings out very clearly the great differences in the observable reactions to stimuli that result from slight changes in the characteristics of neuromuscular transmission, and such differences do not fall neatly into phyla. The same lesson is to be got from the account of the nervous control of insect muscles by G. Hoyle. Here there is no evidence of the inhibitory nerves familiar in Crustacea. The conception of 'fast' axons responsible for twitch-like contractions produced by single impulses, and 'slow' axons which produce a mechanical response only when a chain of impulses passes along them, is well established. These two sorts of fibres share the same end-plates, and a single axon always supplies numerous end-plates in one fibre. It is this distributed end-plate supply which enables the insect muscle to function in the extraordinary mineral environment of the insect body fluid in which the propagated action potential of vertebrates would be paralysed.

Studies on the physiology of flight muscles in insects, described by J. W. S. Pringle, have led to a satisfying picture of the possible evolution of insect flight. A large insect develops thoracic expansions, used for gliding. They can be inclined by muscular action and later folded. More powerful muscles give them a slow flapping movement to aid flight, each contraction being evoked by a nerve impulse of conventional type. Then a 'click' mechanism develops in the thorax (it is described in full in the article by E. G. Boettiger) and this leads to a sudden release of tension in the contracting muscle, causing instant relaxation, while the antagonist that is suddenly stretched instantly contracts. It is this mechanism, evolved many times independently, which makes possible the intensely rapid wing movements of the higher insects.

It is nice to have a clear account in English by H. Mittelstaedt of the 'feed-back' mechanism which ensures the accurate capture of flies by praying mantids. This makes an interesting companion piece to the review by L. M. Passano on the recognition of prey and predators by cœlenterates the co-ordinated responses of which occur in the absence of a central nervous system. 'Neurohormones' as defined by J. H. Welsh embrace both the 'neurohumors' responsible for immediate and often local reactions, and the products of neurosecretory cells which often have a prolonged hormonal action. Since the two classes of material merge into one another this is perhaps the most logical treatment.

There are many other contributions of much interest and value. For the general reader one might commend the final review by F. A. Brown, which describes the fascinating advances made by his group in recent years in defining the properties of the 'physiological clocks' by which so many living organisms regulate their lives.

V. B. WIGGLESWORTH

ELECTRO-TECHNOLOGY

Electro-Technology for National Certificate Courses

By Dr. H. Buckingham and E. M. Price. Vol. 2. (Technical College Series.) Pp. 298. (London: English Universities Press, 1956.) 12*s*. 6*d*. net.

THIS is the second volume in a series of books on electro-technology intended mainly for those students who attend the part-time National Certificate courses in electrical engineering. The general arrangement follows the same plan so that the text of each chapter not only comprises a number of fully worked examples where this is desirable, but is also supported by a set of appropriate problems to be solved by the reader. In all there are 142 well-selected problems, with answers to these in an appendix at the end of the book. The authors have included in the text a description of fifteen important laboratory experiments.

There are, however, two new features. In the first place, it is wisely based on the MKSμ_0 system of units, and secondly it contains more material than would be, or could be, covered in the *S*.2 year.

The ten chapters deal successively with units, magnetization, self-induction, mutual induction, electrostatics, generators and motors, alternating currents, resistors, reactors and capacitors, measuring instruments and illumination. There is also an appendix containing nine tables of data. The text is well illustrated with 183 figures and diagrams, with some of the illustrations depicting essential details of equipment and apparatus: a very good feature.

It is evident that this is a well-thought-out text-book based on a thoroughgoing treatment within the limitations imposed by the nature of the student for whom it is intended. Although almost all the symbols, units and abbreviations are those now generally accepted, there are still anomalies. An example of this is that although illumination is based on the candela, the foot-and-candle disease still persists, with the foot-candle as a unit of light intensity.