

sensory physiology and mechanisms of nervous integration; it also includes a brief but worthwhile digression into the realm of insect behaviour. The third section is devoted to reproduction, development and neuroendocrinology, and section four is entitled, somewhat grandly, "Aspects of Physiological Ecology". Here the temperature and humidity relations of insects have been elevated above their place in more traditional volumes—understandably so because they constitute an important research interest of the author. The possible effects of temperature and humidity on population dynamics are examined in some detail, but the interest of the section lies in the emphasis placed on the difficulties of extrapolation from laboratory conditions to the natural environment, and indeed of the seeming impossibility, with present techniques, of performing experimental biology on field populations of insects.

The task of condensing such a large subject into 276 pages is a daunting one but, as the introduction points out, the method adopted has been to consider the physiological consequences of those features which characterize the insects as a group. Such features are terrestriality, small size, capability for flight and possession of an exoskeleton. Well aware of the difficulties of such a task, the author is at times over-apologetic; the frequency of introductory and concluding remarks is at times tiresome, although their value in reinforcing points made is undoubted.

The text consists of generalizations, illustrated with well chosen and, for the most part, very up to date examples and brevity has not destroyed the sense of critical approach and scientific currency which help to sustain interest. As one might expect from the price, this is a glossy book, much in the vein of other Academic Press publications, and the excellent text figures are almost entirely drawn from source literature.

Here then is a genuinely introductory account which is informative, concise, and about as readable as any account of the subject can be.

JOHN A. PATTERON

The Opossum Brain

The Brain of the Opossum (Didelphis marsupialis): A Cytoarchitectonic Atlas in Stereotaxic Coordinates. By E. Oswald-Cruz and C. E. Rocha-Miranda. Pp. 99 + 45 plates. (Instituto de Biofísica, Universidade Federal do Rio de Janeiro: Rio de Janeiro; Livingstone: Edinburgh, 1968.) 280s.

This work is a useful addition to others now available providing illustrations of a standard series of brain sections together with stereotaxic coordinates

based on the Horsley-Clarke orientation system. Their chief value is to neuro-anatomists and physiologists for the accurate placing of small lesions or the positioning of electrodes with minimal operative interference. They have a secondary value in providing a standard atlas and terminology for the particular brain dealt with which can be helpful in any neurological investigation requiring the identification of nuclei or of anatomically defined groups of nerve cells.

The present work, like most of the others, is limited to the illustration of cytoarchitectural features, although the positions of a number of important fibre systems are indicated and fibre-stained preparations were studied by the authors. It deals with two subspecies of *Didelphis marsupialis*, *aurita* and *virginiana*, the opossums of South and North America respectively. Anatomically the brains are so alike that both are adequately illustrated by the series of 45 transverse sections which are reproduced from the one sub-species, *D. marsupialis aurita*. A simple method for the correction of the given coordinates, necessitated by differences in animal sizes, is fully described. In preparing the illustrations of the standard brain, every care appears to have been taken to apply further corrections for errors introduced by shrinkage during fixation, compression during sectioning and small variations in plane of section.

Some 200 cytoarchitectural areas, nuclei and the like, are labelled, and a synoptic description is given of each. These descriptions are limited to relatively simple features such as cell size and form, and comparatively few references are given to more detailed descriptions in the literature. A bibliography which is comprehensive for the species under study is provided. Although the chief areas of the cerebral cortex are indicated in some of the sections, they are not described. Principal attention is given to subcortical features, as is natural in a work intended primarily for guidance when stereotaxic methods are being employed and the direct visual placement of lesions or electrodes in the brain is impracticable.

Obviously, this work will be of great value in North and South America where the opossum is readily available as an experimental animal. Its secondary value as a well illustrated atlas of an important primitive mammalian brain, to which much neuroanatomical attention has been directed, is not negligible. From a descriptive point of view, however, it adds little to what can be learnt from accounts in well known and easily accessible neurological journals. Although a useful illustrated introduction to such literature, it is doubtful if the cost could be justified for this purpose alone.

F. GOLDBY

Elastic Waves

Crystal Acoustics: Introduction to the Study of Elastic Waves and Vibrations in Crystals. By M. J. P. Musgrave. Pp. xv + 288. (Holden-Day: San Francisco, 1970.) 230s.

EXPERTS on the theory of elastic waves are not greatly to the fore as writers of textbooks. Apart from Kolsky's monograph *Stress Waves in Solids* (first published in 1953 and concerned only in part with elastic waves), there is little in the way of systematic expositions suitable, say, for final year undergraduate and postgraduate students. Yet the interest of the subject is widespread, solid state physics, geophysics, various branches of engineering, and theoretical mechanics being only some of the disciplines drawing upon existing knowledge of elastic wave theory and, in varying degrees, adding to it.

A text of modest scope has little chance of satisfying all these varied needs and Dr Musgrave has wisely planned his book within clearly defined limits. The central topic is the theory of elasticity as applied to wave motions and vibrations of anisotropic materials with symmetry properties representative of crystal structure. Effects associated with non-linearity, thermo-mechanical and acoustic-electromagnetic interactions and non-elastic behaviour receive only passing mention, and the theory of elastic wave propagation in isotropic materials is treated as a degenerate case meriting no special emphasis. Experimental results are freely reported but there is no discussion of experimental methods as such.

Part one consists of sixteen shortish chapters developing the theory of elasticity for small deformations, collecting together relevant facts from crystal physics, and then providing a well-organized account of basic properties of small amplitude waves propagating in anisotropic materials with particular reference to media possessing symmetries appropriate to the most commonly encountered crystal classes. Embedded in these chapters is a connected account of the important contributions to elastic wave theory which the author has himself published.

Part two, made up of four chapters on the dynamics of lattice vibrations and its application to the construction of models for cubic crystals, reflects Dr Musgrave's interest in the physics of crystalline materials. This is an attractively written introduction to a subject which will be unfamiliar to readers whose approach to crystal deformation has been exclusively from the viewpoint of continuum mechanics. The book as a whole fills a gap in the textbook literature; one regrets that the financial deterrent to would-be purchasers is so severe.

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