

age and dominated by electronics and communication engineers who do not know the far from exhausted possibilities of control and information theory at many levels of life's organization.

A distinguishing feature of the book is that such basic concepts as signal transmission, feedback control, information and its storage, noise, redundancy, data process and many others are mostly introduced using examples either from sensory-motor skills or from language, that is from general or easily acquired experience. The emphasis on the biological aspect of cybernetics has led the author to develop graphic symbols, which in some ways differ from those usually employed in technology.

Some useful cybernetic concepts such as "efference copy" or "learning matrix", which are current in the German literature, may be new even to the advanced reader only familiar with English language publications. The biological systems in which cybernetic principles have been found to be most conspicuously operative naturally provide most of the examples illustrating them; they are on the level of functional organism (the neuromuscular system, the brain, the endocrine glands) and on the developmental level (the genetic code). Social and economic applications of cybernetic concepts are mentioned, but not further pursued.

The last pages of the book are particularly useful for the novice in the subject, which is a heady one and has in the past generated more heat than light. Hassenstein emphasizes the importance of a neutral terminology for cybernetic deliberations, rather than the mere transfer of special concepts developed in one field to another. In his opinion it is not useful to speak of "electronic brains", "artificial intelligence" or "thinking machines". The words brain, intelligence, thinking, pertain to human psychology and cannot simply be transferred to machines. In neutral terms it can, however, be stated that these three devices can, like the human brain, process information.

This book is well translated and reads easily. There is, however, one slight ambiguity on p. 73, where the word "letters" could at first glance mean sheets of paper and not symbols. There are many line drawings, a good subject index and a useful list of more advanced books and papers in biological cybernetics.

H. KALMUS

Plain Man's Geophysics

Restless Earth: a Report on the New Geology. By Nigel Calder. Pp. 152. (British Broadcasting Corporation: London, February 1972.) £1.90.

NIGEL CALDER'S book is claimed to be

written in plain language in order to bring reports to the layman from the very forefront of scientific research. He certainly does this and he does it with the verve, enthusiasm and understanding which have characterized his previous books. The book is lavishly illustrated with colour, black-and-white plates and numerous diagrams which, with virtually no exceptions, add both to the appearance and comprehension of the topics which are discussed. These topics are vast and numerous, concentrating on the acceptance of the new version of continental drift, that is, plate tectonics, but using this to range over most aspects of the Earth from its origin to man's present depredation of its resources. In this way, Nigel Calder puts an essential background to the present polarization of views on pollution, conservation, and so on.

As a book for the non-scientific layman, the praise must be fulsome and any adverse criticism arises mainly from the standpoint of the somewhat more scientifically minded layman or school reader, for which it is not really satisfactory. This is because a conventional journalistic technique has been used in which the theme jumps discontinuously from topic to topic, each section being in itself logical, but there being no coherent pattern running throughout the book or even in individual chapters. To take only one example, earthquakes are discussed on every tenth page, or so it seems. This discontinuous style gives a liveliness to the text and the reader certainly gets the feeling that everything is on the move (as it is!) but if "man is by nature a scientific animal" (p. 44), then a more logical development would have been more suitable. There is an understandable overplaying of the newness of the concept of plate tectonics. After all, geologists (people "studying facts in search of a theory") were only pushed against continental drift by geophysicists who now demonstrate its reality. This human interplay is sadly neglected—but does this really matter for the non-scientific layman? Perhaps it does to the extent that it would have led Nigel Calder to be much less dogmatic about our present day knowledge—is it really true that there is no longer uncertainty about the origin of earthquakes and volcanoes (p. 17) and can high mountains only be created by horizontal movements (p. 23)? Many ideas which are, at best, hypotheses are presented as facts and surely a healthy degree of scepticism should be presented to all levels of readership? A more continuous, logical theme would reduce some factual errors, but the number of these are incredibly few and the claim for up-to-dateness is clearly justified when several aspects have yet to appear in academic literature. For the non-scientific layman, the book is most

highly recommended and the BBC must be congratulated on an excellent production; it is a pity that it cannot be so acclaimed for a higher level of readership.

D. H. TARLING

Insect Development

International Journal of Insect Morphology and Embryology. Edited by A. P. Gupta. Pp. 97. Vol. 1. No. 1. (Pergamon: New York and Oxford, 1971.)

BIOLOGISTS do not find themselves short of mediocre reading material. Those planning a new journal, such as *Intern. J. Insect Morph. Embryol.*, should therefore examine their motives critically. In the Editor-in-Chief's words this new journal "marks the fulfilment of a dream which took over a decade to materialize". Can we share his enthusiasm? It seems reasonable to ask that any new journal should either provide a forum for a new field or raise the standard where quality is lacking. Haven't we enough journals covering embryology and morphology? Do we want to provide a receptacle for those insect papers that other biologists might read if they were in a general journal but certainly won't read if they are in a specifically entomological journal?

If we examine the contents of the first issue it may help us assess the benefit to biology of this new journal. There are two papers on ultrastructure, one on sperm maturation and one on nerve: both would receive a more general readership if published in an ultrastructural journal. There are three papers dealing with the structure of the insect gut and a couple on comparative morphology of two organs that are only found in insects. It is true that these latter five papers are only likely to be of interest to entomologists, but many descriptive papers are only of interest to specialists, and this fact does not constitute an argument for devoting a morphological journal to every large taxonomical group. These papers might find a home in the *Journal of Morphology*, for example.

Even in the first issue the standard of the papers, and their presentation, is mixed so that the journal seems unlikely to justify itself on grounds of excellence. One example: in a series of poor half-tones depicting scruffy sections through a wasp's head, it is hard to distinguish the pulverized bits of wasp from the dust on the microscope.

I think we can do without this journal, and it would therefore be better if we did. It remains of course to be seen whether authors flock to publish in it, but I hope the page charges put them off.

P. A. LAWRENCE