

quantitative measures of task performance, with the computer based studies he reviews. This is perhaps not unrelated to the fact that the computer programs cited are almost all drawn from the field of artificial intelligence. In these studies the question being pursued is more like "how is it possible to recognize so many versions of an *A*?", rather than the psychologist's formulation "how long does it take to recognize an *A*?". Among research workers active in this area (and, unfortunately, Mr Apter is not) there are very few who find it relevant to simulate models intended to account for the results obtained from such recognition tasks.

Apter's review of these programs and of their conceptual and technical basis is extremely superficial. Genuine inquirers would be well advised to read a good introductory text on computing, write and run a simple program, and then address the literature of artificial intelligence directly. Among the misleading glosses which the author puts upon this literature is to suggest (p. 30) that it has "emerged as part of a new and exciting discipline—cybernetics". The intellectual gap between artificial intelligence and cybernetics is large precisely because the kinds of programs one is interested in cannot be usefully represented as control systems. The components of a control system, comparator, reference signal, error signal, and the like, must be represented in terms of simple variables if the mathematics of control theory (the central plank of Wiener's thesis) is to be applicable to an analysis of the behaviour of the system. But the notions of comparator and reference signal in, say, pattern recognition cannot be represented in a program in such a way if the program is to achieve an interesting level of performance.

There is little doubt that artificial intelligence provides a new way of formulating and rigorously testing theories of human behaviour and of thinking about the mind. Unfortunately this book does little to illuminate that fact.

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## AMERINDIAN PREHISTORY

### New World Prehistory

Archaeology of the American Indian. By William T. Sanders and Joseph Marino. (Foundations of Modern Anthropology Series.) Pp. viii+120. (Prentice-Hall: Englewood Cliffs, New Jersey, August 1970.) \$4.95 boards; \$1.95 paper.

THE literature on the prehistory of the New World is now extremely voluminous. This includes not only a large number of books on the general or regional history of Amerindians, but also a wealth of journals of general or restricted outlook—often difficult to find in European libraries. For those wishing to refer to, or recommend to students, a short general appraisal of this research on the early cultures of the Americas the literature is a problem. For this reason, this brief but meaty survey by Sanders and Marino is very welcome. If all other volumes in the "Foundations of Modern Anthropology Series" are as worthwhile as this, then it is going to be an important series of readers for students in anthropology, and to some extent for those concerned with certain other aspects of the social and biological sciences.

*New World Prehistory* succeeds in reviewing in surprising detail the emergence and changing culture mosaics of the Amerindians during the past 10,000 years (though acknowledging the possibility of earlier populations extending back to 40,000 years). The ecological and evolutionary aspects of early settlement and culture variation are emphasized. Associated with the text there is a chronological chart with culture change indicated on a regional basis, and there is also an extremely valuable set of maps outlining the changing patterns of environmental adaptation and social evolution occurring in these prehistoric groups.

After the introductory chapters, the authors begin with the earliest hunting and collecting level of economy and follow with chapters indicating the multilineal evolution of early agriculturalists and thence of tribes, chiefdoms, states and empires. The final chapter is a discussion of the general significance of culture change in the early New World, and to what extent the variation to be seen through time is the result of innovation (cultural evolution) and imitation (cultural diffusion). The authors discuss these fundamental questions briefly but well. They are clearly not in favour of the introduction of "new" cultural traits by trans-Pacific movements.

For those wishing to extend their reading beyond the text, there is a select series of references. This is a well produced and valuable reference work.

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## PACKAGED EVOLUTION

### Evolution

By Theodore H. Eaton jun. Pp. xi+270. (Nelson: London, August 1970.) 40s.

IN this book the author sets out on a round trip of evolutionary theory. Chapters range from a short history of the idea of evolution through the concept of species and speciation, heredity, populations in evolution, adaptation and natural selection, to the bearing of behaviour on evolution and the relevance of geographical distribution. Later chapters treat the geological record, the origin of life and aspects of vertebrate evolution including man. So much in a comparatively small space has meant a brief and superficial treatment of each topic. This raises the question: for whom is the book intended? The blurb states that the author assumes in the reader an understanding of the range of the animal kingdom and the principles of genetics, but the book has neither enough detail nor enough bibliographical references for most third year undergraduates. Nor does it give any leads to the most modern and controversial aspects of evolutionary theory in spite of the claim on the cover that it is a thoroughly modern textbook. For instance, there is no mention of recent ideas on neutral mutations and the possible consequences to evolutionary theory. There is no analysis of the use of statistical methods in taxonomy although the author discusses problems of taxonomy at some length. Modern mathematical approaches to biogeography are not discussed in a chapter on geographical distribution.

*Evolution* is not for the specialist, but it can be recommended as a quick guide to conventional aspects of evolutionary theory for undergraduates at an early stage of their university career.

WILMA GEORGE

## ENERGETIC JOURNAL

### Journal of Bioenergetics

Vol. 1, Nos. 1 and 2. Edited by John Avery. Bimonthly. (Plenum: London, 1970.) 210s; \$26 per volume.

AT this time when all scientists are concerned with the difficulty of assimilating the published literature, there should be some justification for the creation of another journal. This new *Journal of Bioenergetics* is an example of the move away from the "general" journal to those dealing with more specialized subjects. In the present case, although "bioenergetics" could embrace a very wide range of topics the first two numbers contain 70 per cent of their space devoted to experimental work with mitochondria. If this trend continues we shall have specialization at its most extreme.

The detailed mechanism of the process whereby energy derived from some oxidation-reduction steps in the respiratory chain may be used to move ions or to synthesize ATP is unknown. This field of research is one