

book providing an introductory discussion of each topic and its relationship with the other factors involved. The first half of the book is concerned mainly with processes. After a broad history of ideas in the two opening chapters, aspects of physical glaciology and glacial geology occupy the next six before the author moves on to topics such as aeolian features, fluctuation of sea level, glacial-isostatic deformation and pluvial features. Basic methods of stratigraphy and geochronology are discussed in principle before the presentation of detailed results of such studies on a regional basis. These studies, which occupy some 250 pages, cover North America in most detail, followed by Europe and then other parts of the world. A relatively short chapter on stratigraphy of deep sea floors is of importance, then follow two chapters on Quaternary fossils, bringing in the biogeographic approach in relation to land bridges.

As a broad survey the book is excellent, although on the treatment of individual topics any reviewer is likely to suggest that too little attention is given to his own field of interest. Chapter 3, for example, deals summarily with glacier mechanics, devoting only two or three paragraphs to each major topic of interest to glaciologists today. Although this is typical of most books on glacial geology, it seems a pity, as a more thorough understanding of physical glaciology could be of considerable benefit to students of glacial geology. For example, in the discussion of fluctuations of sea level, too much caution is shown towards use of glaciological knowledge when considering problems such as the volume of ice sheets at the maximum glaciation, or the behaviour of ice sheets during interglacial periods. In other respects the chapter on fluctuation of sea level provides an excellent introduction to a complex and confusing subject; and the treatment of problems connected with movement of the Earth's crust beneath ocean basins draws attention to an important factor which is usually neglected.

In the final chapter—"The Problem of Causes"—the author considers the broadest aspects of the subject. The general problem is first set out in terms of the relation of climate to solar heat. Reliable data on climate over the past few hundred years are considered in relation to sunspot cycles and in relation to ideas such as those of Milankovich. Theories are then grouped into six main types of process and each main idea is given some discussion. A few individual hypotheses are discussed briefly, such as those based on variations of circulation and ice cover of the Arctic Ocean (Donn and Ewing) and surging of the Antarctic ice sheet (Wilson), and pertinent reasons given for

not adopting them. This leaves the solar-topographic concept as outlined in Flint's earlier books as the effect likely to feature most prominently in the final explanation of ice ages. It must be a source of satisfaction to the author that the accumulating evidence still points to the basic importance of some type of solar-topographic hypothesis, since it has been emphasized consistently in his three successive major volumes on the subject in 1947, 1957, and 1971.

The book is well produced with relatively few mistakes; every student of the Quaternary will wish to possess it.

G. DE Q. ROBIN

## The Proper Study

*Comparative Genetics in Monkeys, Apes and Man.* Edited by A. B. Chiarelli. (Proceedings of a symposium on Comparative Genetics in Primates and Human Heredity, held at Ernice, Sicily, July 1970.) Pp. x+346. (Academic: New York and London, December 1971.) £5.50; \$16.50.

THERE is a natural tendency for grant-giving bodies to be particularly generous in supporting research that has some obvious relation to human problems. Unfortunately the obvious relations are not always the most interesting or productive. When there is more money, there may be less competition for it, a state of affairs that could serve to explain the curious correlation known as the Rothschild Inversion. It can briefly be summarized as follows: the nearer one approaches the subject of man himself, the higher is the proportion of scientific rubbish.

This book, alas, is a good example. Certainly we need to know more about our immediate relatives in the animal world; certainly the comparative method can be a powerful one; but there are pitfalls, and the authors of these essays fall into a lot of pits. In a book offered for general sale we may reasonably expect that reports of comparative studies should say more than: "Look, the orang-utan has got one too!" They should attempt some general conclusions. Only about half the essays make the attempt, and those that do so tend to go to the other extreme.

A good example is the paper by Weiss and Goodman, in which fifteen pages of speculative argument are based on a survey of protein variation in three samples of Asian macaques. Most of the argument concerns a difference in average heterozygosity between *Macaca* and *Drosophila* that is almost certainly statistically insignificant. Goodman and his colleagues also contribute a paper on the evolution of primate genes and

proteins. They claim priority over Kimura, King and Jukes for the theory that divergent protein evolution is largely due to the accumulation of neutral mutations. They also propose that evolution has slowed down in the primate line. The proposition is certainly untrue of intellectual and morphological characters, and their theory seems to be incompatible with what is known about the extent of enzyme polymorphism in man.

There are essays on dermatoglyphic traits, the tasting of phenylthiocarbamide, transplantation antigens, blood groups, and immunoglobulins. The final paper, by Chiarelli on comparative cytogenetics, contains a statement that deserves quotation without comment: "... meiosis represents a barrier which prevents exchanges between diverging genetic systems. Its function... is therefore to stabilize the genetic information defining a given species...".

Two essays, one by the Berrys on epigenetic polymorphism, the other by Sullivan on haemoglobins, stand above the rest. They have interesting things to say, and say them with clarity and reason. Two good papers, however, are not enough.

The book can be recommended to rich librarians and Lord Rothschild, but to the latter only as a warning.

BRYAN CLARKE

## Electromagnetism

*l'Energie Electromagnetique Materielle et Gravitationnelle.* By R. L. Vallee. Pp. vi+138. (Mason et Cie: Paris, 1971.) 50 francs.

MANY scientists will read this book with pleasure and even with excitement; others may be sceptical, but all should read it with interest and benefit. The author deplores the abstract nature of modern physical theories such as relativity and quantum mechanics, and suggests that if we are to control our environment we must understand it, and if we are to understand it we must have a more concrete physical model of phenomena even on a microscopic scale. He regards it as a grave fault of existing theories that they accept the mathematical fiction of empty space whereas space in the real world is filled with fields of various kinds. He therefore postulates the existence of an energy propagation medium and assumes further that the energy it contains can be expressed as electromagnetic energy. A stationary frame of reference can be defined in terms of the state of the momentum in the medium. It is then argued that if the electric field is never to become infinitely great there must be