Desert Landscapes

Geomorphology in Deserts. RONALD U. COOKE and ANDREW WARREN. University of California Press, Berkeley, 1973. x, 374 pp., illus., + index + plates. $15.

Serious interest in the peculiarities of desert landscapes dates from the opening of the American West and found its first synthetic expression in J. Walther's *Gesetz der Wüstenbildung* (1900) and W. M. Davis's conception of the arid geographical cycle (1905). Interest remains unabated, and the literature on eolian processes and, above all, pediments is prodigious. Consequently, Cooke and Warren, in attempting a general survey of desert landforms, soils, and geomorphic processes, have done students of geomorphology a service.

Their rigorous and terse presentation focuses on processes—weathering and pedogenesis, fluvial erosion and deposition, and wind. The efficacy of insolation in weathering is questioned (but the impact of pressure "unloading" is not explored). The treatments of frost and salt weathering are useful. Vertical migration of solubles is discussed, including various duricrusts, with attention to red desert soils (but none to clay mineralogy), pavement formation (by deflation, water sorting, and upward migration of coarse particles), patterned ground development by volume changes (including gilgai, subsurface salt, desiccation cracks, and piping). Slopes, stream channels, alluvial fans, and pediment and playa systems are described in terms of morphometry and observed processes, with discussions of alternative theories of evolution. Finally, there is an exacting, often mathematical treatment of eolian processes and forms.

The basic weakness of the book is epitomized by the absence of a synthetic or concluding chapter, just as each section and chapter lacks any overview or summation of results. Individual segments are excellent, but the beginner will find it difficult to assemble a landscape out of the bits and pieces. The preface calls the concept of parallel desert slope retreat a "march hare," but the text never confronts the issue, and the reader is ultimately left in limbo as to what the authors really think about the nature of composite desert landscape evolution. In their concern to do homage to the "modern," quantitative, process approach, Cooke and Warren remain largely oblivious to the impact of morphoclimatic "shifts" in arid lands, occasionally equating cumulative effects of time and unidirectional processes with the changing processual rates and trends due to climatic change. The significance of historical studies of desert geomorphology lies as much in isolating paleoforms as in establishing denudation chronologies. At fault here is the almost total neglect of the French and German literature (for example, "eolation" is a dead horse in the 1970's), and despite several citations, it is apparent that a standard such as Tricart and Cailleux's *Le Modèle des Régions Sèches* (S.E.D.E.S., Paris, 1969) has not been digested. These flaws, while not marring the technical aspects of *Geomorphology in Deserts*, will circumscribe its usefulness to those seeking a comprehensive and explanatory introduction to a fascinating field.

KARL W. BUTZER
Department of Geography,
University of Chicago,
Chicago, Illinois

Body of Water

North Sea Science. Proceedings of a conference, Aviemore, Scotland, Nov. 1971. EDWARD D. GOLDBERG, Ed. MIT Press, Cambridge, Mass., 1973. xviii, 500 pp., illus. $18.95.

Despite its small size and volume, the North Sea is one of the most important bodies of water in the world. Although it contains only .004 percent of the volume of the world's oceans and adjacent seas, it furnishes 5 percent of the world's supply of seafood. It also supplies large quantities of natural gas, sand, and gravel to surrounding countries and shows promise of large oil reserves. One of its prime continuing roles is as a dumping ground for large quantities of industrial and human wastes.

The risk of conflict among the various uses of the North Sea is increasing rapidly. At present, only the margins of the sea appear to be suffering from major pollution, but the potential for damaging the whole sea must be considered. The North Sea is very shallow. It takes almost two years for its waters to be completely renewed, and it is being subjected to a rapid increase in utilization, particularly for waste disposal.

Facts and a free exchange of data are needed to provide grounds for unemotional decisions by which a practical middle course between unrealistic preservation and careless exploitation of the North Sea can be charted. To determine current conditions and to recommend research that needs to be done a North Sea Science Conference was organized by NATO. The conference, as documented in these proceedings, has succeeded very well indeed in both its primary assignments.

The editor's preface and introduction clearly outline the importance of the North Sea to man and the needs for further study and exchange of information. Immediately following the editor's remarks are 12 pages of specific recommendations for research. The most important subjects for study are listed for use in setting priorities. Seven following sections, with a total of 23 papers, cover the general subjects of Physical Oceanography, Geology, Meteorology, Biology, Chemistry, Living Resources, and Non-Living Resources. The volume ends with the first attempt to provide a series of resource maps of the North Sea.

The book is valuable not only as a guide to future priorities. With its extensive, up-to-date list of references covering most of the subjects of interest concerning the North Sea it provides the long-needed reference book on the subject. It will be of use to national and international governmental agencies, research workers, and industry. It also may be used as a text for graduate seminars.

WAYNE BURT
School of Oceanography,
Oregon State University,
Corvallis

Economics and Bilharzia

Disease and Economic Development. The Impact of Parasitic Diseases in St. Lucia. BURTON A. WEISBROD, RALPH L. ANDREANO, ROBERT E. BALDWIN, ERWIN H. EPSTEIN, and ALLEN C. KELLEY, with the assistance of Thomas W. Helminiak. University of Wisconsin Press, Madison, 1973. viii, 218 pp., illus. $12.50.

Schistosomiasis, alias bilharzia, is a water-borne disease of complicated epidemiology and endemic in large parts of the tropical world. Its precise effects on human health are a matter of some controversy, but at least there is general agreement that it usually causes sub-

stantial, sometimes severe, debilitation in its victims. The main object of this book is to describe a serious investigation into the quantitative effects of this miserable disease on the economy of the small West Indian island of St. Lucia. The chief result the investigators report is, in effect, that they were unable to find any measurably nonzero consequences at all.

How is one to take these findings? First, it is possible that they were mistaken, that significant quantitative effects of bilharzia do exist but that the team's techniques of measurement were not refined enough to detect them. Second, even if the disease is demographically and economically insignificant for St. Lucia, that does not mean that similarly negative conclusions would apply to areas of higher endemicity, especially if the intensity of infection (as possibly measured by the number of the parasite's eggs per gram of stool) is also higher. In this respect the choice of St. Lucia as a parade ground for the group's methodological exercises was in some degree unfortunate, although understandable. The smallness of the area and the relatively low degree of endemicity make it difficult to obtain that amount of variation in the data which seems to be necessary for relatively clear-cut results. One would have thought that an area such as northeast Brazil, while in many ways much more difficult to investigate, would have yielded correspondingly more rewarding results.

Although the authors, and especially the writer of the dust-jacket blurb, are not unduly modest about either the novelty or the power of the research methods they used, in fact these methods were straightforward, and appropriate for the problems they faced. Many of the data used were obtained by sample surveys, the rest from government and business records; considerable efforts were made to check on the reliability of these data. They were analyzed by various techniques of regression analysis, including probit analysis, in an effort to control for other possibly varying factors and thus to isolate those effects that really were due to the variable under study, the degree of schistosomiasis. Although the results were not unambiguous in every case, essentially the authors found that schistosomiasis had no effects on fertility, or mortality, or academic performance of school children, or rural labor productivity (the ambiguity here is especially marked), or urban labor productivity.

A most interesting by-product of these analyses, and not readily explicable, is the apparently marked negative effect of the parasite *Strongyloides* on both fertility and rural labor productivity of females. This preliminary finding clearly warrants future research.

The book suffers from its multiple authorship. There are general chapters on the economic and cultural impacts of disease, on the economic and social background of St. Lucia, and on epidemiological aspects of schistosomiasis, but these are rather pedestrian and the whole of part 1 could have been omitted, or severely compressed, without serious loss. The reader is advised to begin with chapter 5, if only because the style noticeably improves once there is something concrete to discuss.

PETER K. NEWMAN
Department of Political Economy, Johns Hopkins University, Baltimore, Maryland

The Lower Eukaryotes

Lipids and Biomembranes of Eukaryotic Microorganisms. JOSEPH A. ERWIN, Ed. Academic Press, New York, 1973. xvi, 354 pp., illus. $19. Cell Biology.

The Protista, or unicellular eukaryotes, are a natural scientific resource that has not yet been exploited to maximum profit. Sometimes usefully and sometimes misleadingly divided into plants, animals, algae, yeasts, and molds, these organisms are a potential source of invaluable evolutionary and phylogenetic information and are useful experimental models of higher plants and animals. They can be grown in the laboratory and manipulated genetically with an ease approaching that of the culture of bacteria, and, since they share many of the biochemical and morphological properties of higher organisms, data derived from them are more directly applicable to multicellular organisms.

Lipids and membranes provide perfect illustrations. All higher organisms contain similar saturated fatty acids, monounsaturated fatty acids, and the diunsaturated fatty acid linoleic acid (although man, for example, is unable to synthesize linoleic acid). Otherwise higher plants and animals differ markedly, the former containing high concentrations of the triunsaturated fatty acid α-linolenic acid and the latter containing polyunsaturated fatty acids (the tetraunsaturated arachidonic acid is typical) derived from its isomer γ-linolenic acid, which has a different arrangement of double bonds. These fatty acid compositions are, of course, reflections of the enzymatic (genetic) competence of the organism. Among the Protista are examples of the animal type (amebae), of the plant type (yeasts), and of many other patterns (euglenoids, for example, which contain approximately 60 fatty acids including those typical of higher plants and animals as well as others generally restricted to algae). These fatty acid patterns provide the basis for a phylogenetic classification that agrees with and extends the arrangement derived by more traditional criteria. Approximately 30 percent of this volume consists of an able presentation of such material. Perhaps this chapter will stimulate research into the adaptive advantage conferred on each eukaryote by its particular fatty acid composition.

Similarly, cholesterol is the major sterol of higher animals. The major phytosterols, sitosterol and stigmasterol, contain the same ring structure but differ in their side chains. These three sterols and many others appear among the eukaryotic microorganisms, including in particular sterols related to ergosterol which contain a second double bond in the B-ring. The occurrences of the sterols are described reasonably well in this book, but I would have preferred a presentation (as with the fatty acids) that tried to group and interpret the data in a meaningful way.

Fatty acids function in cells primarily as components of phospholipids, which molecules, together with sterols, are exclusively components of membranes. It is in the study of membrane structure and function that Protista may find their greatest application, for, unlike bacteria, they share all the complex intracellular membrane systems and organelles of higher plants and animals. The ability to control genetically, nutritionally, and by other manipulations (of *p*H, temperature, and the like) the lipid composition of the eukaryotic microorganisms provides an excellent experimental approach to understanding the role of lipids in membranes. This receives relatively little attention in the book, possibly more because of a lack of available knowledge than because of a failure of