Pathfinding in Ecology

Perspectives in Ecological Theory. RAMÓN MARGALEF. University of Chicago Press, Chicago, 1968. viii + 112 pp., illus. $4.50. Chicago Series in Biology.

For the past 15 years Margalef has been concerned with proposing and exploring possible new ecological paths. His approach is frankly speculative and analogical. To some extent mathematical theories are invoked rather than analyzed. Cybernetics, systems theory, and information theory are picked up and tossed about and occasionally are made very useful—as for example, in his information-theory analysis of the spatial distribution of phytoplankton.

To a very large extent Margalef has worked and thought alone and developed his ideas without the abrasive intellectual contacts that we take for granted in America. This produces freshness and conviction but also leaves me with a feeling that sometimes the introspective conviction becomes more poetic than scientific. For example, Margalef is convinced that biological communities age or mature in a way more or less analagous to the maturing of an individual. He has set up certain criteria by which he distinguishes between mature and immature communities. These criteria are partially empirical—so that older individuals and more crowded populations are considered to characterize mature rather than immature ecosystems—but some of them are nonempirical and without any obvious derivation. The biomass preserved per unit energy flow is one such criterion, and this is speculatively extended to the idea that mature systems produce less entropy than immature systems in exchanging a fixed amount of energy. The usefulness of such speculation is not immediately apparent, particularly since precise measurement of entropy in any ecological context is yet to be made. Margalef also states with respect to maturity that "the structures that endure through time are those most able to influence the future with the least expense of energy," which sounds fascinating although I'm not clear exactly what it implies.

In short, there is a kaleidoscopic juxtaposition of specific theories, loose speculation, and fresh, insightful statements. I suggest that this book by all means be read by ecologists, but with an attitude of caution. The reader is in fact required to do the job the editors should have done. In his foreword Margalef indicates that the English was considerably improved by the "editors and colleagues." In fact, the English is fine. I wish that, in addition, Margalef had been required to argue his ideas against rather stiff opposition before the book went to press. This is the first volume in a prospective series with a distinguished collection of editors. I have the impression, which may be false, that these editors have considered their role as honorary with regard to this volume.

Ecology is in an overstrained and embarrassing position. After years of neglect and underfinancing, during which courses in ecology consisted largely of misidentifying local beetles and research in ecology consisted of amassing mason jars full of mixed offal and detritus to be somehow "quantified" later, ecology has recently become fashionable, and the publication of this book is related to this new fashion. For the past five years or so government agencies have become increasingly concerned with problems of the environment or at least concerned with looking concerned. (Environmental research is an ideal thing for vice presidents to worry about, thereby solving at least one problem.) Ecology, after years of feeling itself rather homely, is being treated as a newly discovered beauty—and responding in the flustered and sometimes foolish way that one would expect of an adolescent beauty newly emerged from the cygnet stage.

This gives rise to foolish expectations on all sides. Ecology is not merely a "viewpoint" or an "attitude." If it were, then we might expect the answers to real questions to come from the attitude or viewpoint of its practitioners, in the same way that religious sages can on occasion produce answers when called on. But just as authentic religious leaders indicate the beginning of a path to answers and expect their disciples to walk with their own feet, only the charlatans offering instant salvation, so the authentic leaders of ecology are almost desperately looking for paths rather than proclaiming answers.

Despite the objections I have to certain aspects of the book it is clear that Margalef is a serious intellectual leader in ecology and that he has indicated at least the beginnings of several new and potentially exciting paths. That none of these paths is followed very far may be a virtue related to Margalef's insight and honesty.

L. B. SLOBODKIN
Ecology and Evolution Program, State University of New York, Stony Brook

Phycology

Algae, Man, and the Environment. Proceedings of an international symposium, Syracuse, N.Y., 1967. DANIEL F. JACKSON, Ed. Syracuse University Press, Syracuse, 1968. x + 554 pp., illus. $18.

This volume is not unlike other symposium volumes in its strengths and weaknesses. The title is ambitious and its broad coverage reflects the heterogeneity of the content. At best the book presents a sampling of some kinds of research dealing with algae, from the applied to the strictly basic. It will serve to bring to the attention of the reader the concern of individuals and governments in an increasingly studied group of microorganisms. However, it is very much a potpourri, the contents ranging from reviews of the recent literature in Russia and New York state to an exposure of taxonomic philosophy and to studies dealing with the engineering of sewage treatment in which the algae are scarcely mentioned at all. Most specialists would severely criticize the lack of cohesiveness in the selection of topics and an attempt to organize a symposium which focused so little on any segment of the subject. However, in this very fault the book provides the general reader with a selection of intriguing, and in some cases beautiful, papers dealing with certain aspects of phycology.

The book is entertaining. The reminiscences of Harold Bold, who provides an overview of both research and researchers, will undoubtedly stimulate phycologists to look with more perspective at their discipline, as it will acquaint the casual reader with the trends in research. Norma Lang has assembled a striking collection of electron photomicrographs which exquisitely dissect the ultrastructure of the blue-green algae. Especially suggestive to readers concerned with the mechanisms of suspension of algae in natural waters are the figures showing numerous static gas vacuoles in *Nostoc*. The Schwimmer brothers have summarized a fair portion of the literature on the medical problems associated with algae. Careful examination of this literature will undoubtedly make many readers wonder what has happened to Koch's postulates for establishing the causality of a microorganism in disease.

The book will be needed by phycologists because it provides an introduction to the literature of certain aspects of phycology not normally available