Book Reviews

Soviet View of Ecology

The Ecology of Animals. N. P. NAUMOV. Translated from the Russian edition (Moscow, 1963) by Frederick K. Plous, Jr. Norman D. Levine, Ed. University of Illinois Press, Urbana, 1972. x, 650 pp., illus. $17.50.

This book summarizes the state of animal ecology as viewed in the Soviet Union in 1960. It was published in 1963 as a text for the state universities of the U.S.S.R. and is a standard work on animal ecology in the Soviet Union. The author is one of the leading Soviet ecologists.

If ecology were a rapidly moving science, this book would be of historical interest only. But progress does not overwhelm us, and we are thus given an interesting glimpse of the state of the ecological art in a part of the world which is partly isolated from our English printing presses.

Naumov approaches ecology from a classical point of view, highly descriptive, largely nonquantitative, and nonexperimental. The first half of the book is devoted to the ecology of individuals and is a mixture of environmental physiology and natural history. The next quarter of the book covers the ecology of populations. Emphasis is placed on the structure of populations from the geographical to the local scale, the social organization of populations, and the variations among individuals in a population. One chapter covers population dynamics. The final part of the book discusses the ecology of associations. Predator-prey and parasite-host relationships occupy two excellent chapters. Food chains are discussed in one chapter, and the final chapter covers human activity as an ecological force.

Naumov's book is notable both for what it covers and for what it does not cover. There is no clear statement of the problems which ecology as a science is attempting to solve. Not a single controversy is discussed and there is no indication that alternative explanations might be provided for some observations. There is no discussion of competition theory; the word "competition" does not even appear in the index. Succession is dealt with in seven pages, productivity in two. There is little discussion of species diversity and only passing mention of biological control and the ecology of introduced species. Animal ecology to Naumov is clearly population-oriented.

One strength of this book is the use of numerous Soviet examples to illustrate the discussions. Naumov's preferences show through here. Of the 287 figures in the book 64 percent use vertebrate examples and 21 percent are from the rodents alone. About 13 percent of the examples are from birds and about the same proportions from fish, from insects, and from the other invertebrates. All in all, Naumov's choices will please the mammalogist, satisfy the ichthyologist, and dismay the entomologist.

The book is well translated and well edited, with only a few mistakes. Somehow David Lack has gone to the U.S.S.R. and returned as D. Lek. Ricker's discussion of stock and recruitment has come back as dealing with "supply" and "complement." But these are minor errors, and we should be grateful to Naumov for his effort in compiling this Soviet view of ecology, and to Norman Levine and Frederick Plous for making it available to us.

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Biological Process

The Chemistry and Biochemistry of Nitrogen Fixation. J. R. POSTGATE, Ed. Plenum, New York, 1971. xii, 326 pp., illus. $20.

The study of the nitrogen cycle and nitrogen fixation appears as a paradigm of the history of science, attracting some of the giants of classical science and displaying all the genius, the foibles, the pointless controversy, and the excitement attendant on the exploration of the physical and biological unknown.

Even the specter of power—that which would accrue to the individual (or organization) able to duplicate the methods used by living organisms in dealing with the activation energy of the dinitrogen molecule—appears in this history. (The comparatively high requirement for adenosine triphosphate in the biological fixation process now makes the attainment of power by this route unlikely).

Extensive progress of the past decade in sorting out the biological mechanisms of fixation, triggered by the development of active cell-free preparations, has been continued in this heroic vein. There have been occasional brilliant flashes of research production illuminating first one and then another detail, with large clouded areas between. This progress has continued the tradition of claim and counterclaim, hasty trips to the publisher, an overall gentlemanly dog-eat-dog arrangement among the principals, and a lot of sagacious scientists with just a little clay on their feet. To it all the Princes of Serendip have provided humbling counterpoint.

This volume—not truly a review, by intent of the editor—captures by both direction and indirection the excitement and excessively human nature of this history with emphasis on the explosive decade just completed—or at least that portion of it considered of import by the current generation of giants.

As is not unusual in a publication of this type, there is variability in style, organization, and emphasis from one chapter to another and some internal inconsistency. Some subject matter not appropriate to the title of the volume or the chapter is dealt with in detail and some more appropriate is omitted.

Perry Wilson, fortunately, could not simply be honored as intended but was required to contribute to the work, providing valuable historic background as well as literary quality. He does still insist on favoring ammonia with the whimsical crown of "key" intermediate but, after all, that is part of the history.

The titles of the chapters (and for that matter their content) do not represent a highly logical subdivision of subject material—the appendices even less. Why a separate review of the work of Soviet scientists?

There are some minor editorial in-

consistencies and an occasional infusion of laboratory jargon. These are not sufficiently frequent to be irritants and may even contribute to the sense of being there where it is happening that one gets from the overall treatment.

The volume throughout is colored with the bias of present thinking of the inner circle. This bias is not necessarily objectionable provided it is recognized, but it may mislead the innocent. For example, most of the authors tend to deemphasize the fact that the use of the acetylene-ethylene reaction as an indicator of nitrogen fixation is based only on presumption. There is no question of the value of this reaction for field and laboratory studies and as a tool in enzymology, but the calibration is not rigid.

Although admittedly not a complete report of the action in nitrogen fixation, this volume includes much of current thought and is indispensable for anyone interested in nitrogen. Everyone should be.

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Biodisciplines

Annual Review of Biophysics and Bioengineering. Vol. 1. MANUEL F. MORALES, WILLIAM A. HAGINS, LUBERT STRYER, and WILLIAM S. YAMAMOTO, Eds. Annual Reviews, Palo Alto, Calif., 1972. x, 590 pp., illus. $10.

Compendia are never easy to review, especially if they cover a very broad spectrum of interests as does this first volume of a new series. I doubt that any one person could write authoritatively or even persuasively on all the topics that have been subsumed under these two disciplines whose limits are notoriously ill-defined. Inevitably, therefore, this review will deal with the scope of the book rather than with its content, and, equally inevitably, the reviewer's prejudices are bound to show.

It is worth asking whether it is a mark of scientific respectability to profess a discipline which is a topic of an "Annual Review" and whether the announcement of this volume automatically legitimizes the bioengineer. If so, what of the partnership between biophysics and bioengineering? To pursue these questions too far is to become entangled in semantic snares (is biophysics a branch of biomathematics or vice versa?), but some discussion of the limits and overlaps of the fields is necessary and desirable. We should first ask if engineering is in any meaningful sense a science. The goals of science, it seems to me, are directed to the *understanding* of the world around us, and those of engineering are directed to *modifying* it. Because these goals are not always pursued in the appropriate temporal order, the heavy emphasis on theoretical concepts in this book may be salutary to engineers. They are warned, however, that parts of it will seem very hard going, and they are likely to feel they have less than equitable representation.

The editors say that the "marriage between biophysics and bioengineering . . . was by no means just a union of convenience." They prudishly refrain from mentioning that they have, in fact, established a *ménage à trois* with biochemistry as the dominant partner. At least half the papers could probably be considered in that category, and unless engineering curricula have changed a good deal since my day a critical reading of several of the surveys will be beyond the scope of the bioengineer. The foregoing should not be taken to imply that none of the theoretical papers are valuable to the engineer. Pecora's paper "Quasi-elastic light scattering from macromolecules" describes a technique just due to emerge into practice which will involve advanced engineering concepts. The same is true of the sophisticated computer graphics work of Katz and Levinthal.

There are excellent papers in neurophysiology—a topic of substantial interest to practicing engineers who have traditionally seen links between their networks and those infinitely more refined communication systems found in living things. Ehrenstein and Lecar discuss the mechanism of signal transmission in nerve axons with real authority, and Hagins's discussion of the primary processes in vision is a model of its kind. Both these papers are tutorial in nature rather than surveys of recent work. They are certainly none the worse for this.

In the expectation that other reviews of this volume will come from biophysicists, this bioengineer makes a plea for a broader base in future years. May we have some materials technology, some discussion of orthotic and prosthetic engineering, some details of biological power sources, and some wide view of developments in computer science? These are but a few of the scientific advances which are clearly ready to move from academia to the wider service of man.

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Geomorphology

Hillslope Form and Process. M. A. CARSON and M. J. KIRKBY. Cambridge University Press, New York, 1972. viii, 476 pp., illus. $19.50. Cambridge Geographical Studies, No. 3.

It is customary to bemoan the high cost of technical books, but in this case the contents of the work certainly provide good value for the money spent. The authors selectively consider not only geomorphic but also engineering and agricultural literature to produce a comprehensive survey of the diverse publications pertaining to slopes. Hillslopes have always been a major concern of geomorphologists, and there was a definite need for such a review and synthesis.

Hillslopes in this treatment are not just hillsides; they are taken to include any inclined surface that is composed of earth materials, ranging from short, gently sloping agricultural plots to the massive escarpments of the Colorado Plateaus. As the title indicates, the subject of the work is the form and evolution of slopes, but the major concentration is on the processes operating to cause their modification. In contrast, detailed mapping techniques and the increasingly esoteric theoretical models are given less attention; nevertheless, process-response models are developed, which are based both on physical principles and on the realities of field and experimental evidence.

Of especial value is the interdisciplinary approach, which is obviously necessary when dealing with such a complex subject. The huge body of descriptive literature is not considered except for some necessary examples. Instead, more than half the book is devoted to the pertinent aspects of physics, hydraulics, soil mechanics, rock mechanics, and rock weathering that are basic to the development of a better understanding of slopes. This makes readily available the essence of a very scattered literature. One problem is, of