

dures permit us to construct rather detailed models of how the rocky and icy components of Uranus are distributed. The visible atmosphere of the planet is so cold that everything but hydrogen, helium, and some methane is frozen out. Presumably the clouds we seem to see in the telescopic image are of frozen methane. Ideas about the nature of a possible magnetosphere and of the meteorology of Uranus are entirely theoretical, apart from analogies that can be drawn with other planets. Considerably more is known about the five satellites, at least four of which show the signature of fairly pure water ice. Their diameters seem to range from 300 to 1000 kilometers, if the inferred albedo (fairly high) is correct.

When we come to the rings, the quantity of information suddenly becomes much larger, for they can be studied by stellar occultation. The two chapters on this topic are satisfyingly detailed. One, by James Elliot, the discoverer of the rings, offers a nice complement to the paper by Herschel. Theories of strange behavior of the rings are discussed by A. Brahic. The theories tend to lean heavily on the idea that the rings are guided by a few relatively large bodies, as did theories of Saturn's rings between the two Voyager encounters. Let us hope that the observations at Uranus are as constraining as those of the second Voyager encounter with Saturn.

DONALD HUNTEN

*Lunar and Planetary Laboratory,
University of Arizona,
Tucson 85721*

A European Insect Species

Large White Butterfly. The Biology, Biochemistry and Physiology of *Pieris brassicae* (Linnaeus). JOHN FELTWELL. Junk, The Hague, 1981 (U.S. distributor, Kluwer Boston, Hingham, Mass.). xxvi, 536 pp., illus. \$98. Series Entomologica, vol. 18.

In a time when most of us are struggling to keep up with the literature in our own fields, a resource such as *Large White Butterfly* is of immense value. Feltwell has sifted through thousands of references on *Pieris brassicae*, the large white, and presents not only an impressive number of references discussed in the text but also an annotated set of additional references. Such a compilation is valuable both for specialists working on this species and for researchers interested in more general entomological subjects such as pest control or the physiology of development. Because *P.*

brassicae has been used extensively in Europe as an experimental animal, there are many disciplines into the literature of which this book provides an entry.

An attempt is made to consider all aspects of the biology of *Pieris brassicae*. There are chapters ranging in subject from nomenclature and life history to hormones, sensory systems, and biochemistry. Also included are chapters on distribution, breeding, food plants, development, morphology, physiology, and migration. There are especially good chapters on parasitic control, pathogenic control, predators, and chemical control. Each chapter is written like a review article on the role that *P. brassicae* has played in the research in a particular field such as development. Unfortunately, there is usually not much of an introduction to the field in general, and at times this can be a problem. Other chapters would have benefited from introductions such as that by M. R. Shaw to the chapter on parasitic control.

Although one of the strong points of this book is its massive literature review, this is also the cause of some of the problems. Too often a paper is characterized by a statement such as "Oogenesis was studied by . . ." (p. 140), with no information on what was found out. Or information from a paper is pulled out with no explanation, as in a reference to "a chemical repellent-tolerant hypothermia" that explains feeding in *P. brassicae* larvae (p. 113). At least the references are there, however. Another problem is a lack of evaluation for most of the papers. In particular, it is clear that some of the older papers are outdated, inaccurate, or wrong, yet the reader is not informed about these problems.

The choice of figures is sometimes a bit of a mystery. It would have been helpful, for example, to see the variation exemplified by some of the subspecies, or a series on the life history. Yet the only illustration of *P. brassicae* is a plate from 1815, which, although detailed, does not show the underside or give a very good picture of the larva. The figures were redrawn from original publications and have some imperfections, for example unequal spacing of numbers on the axes of graphs. The tables, on the other hand, are very helpful; they are well referenced and well put together and provide a succinct summary of work on a particular topic, such as host plants.

Feltwell has undertaken and executed a truly impressive piece of work. In general the problems are associated with the ambitious scope of the book. The success of the book lies in its immense list of references and the entry it pro-

vides into the literature and particularly, for readers in the United States, into the European literature. It provides an initial sorting of an immense volume of books, articles, and theses and is a source of information not only on *Pieris brassicae* but on the whole field of insect biology.

M. DEANE BOWERS

*Museum of Comparative Zoology,
Harvard University,
Cambridge, Massachusetts 02138*

Physiology: A Supplement

A Companion to Animal Physiology. Papers from a conference, Sandbjerg, Denmark, July 1980. C. RICHARD TAYLOR, KJELL JOHANSEN, and LIANA BOLIS, Eds. Cambridge University Press, New York, 1982. xvi, 366 pp., illus. Cloth, \$35; paper, \$13.95.

Knut Schmidt-Nielsen has been a leading figure in comparative physiology for approximately three decades. This book honoring him on the occasion of his 65th birthday aspires to be more than a mere conference summary. It does present the papers solicited for the Fifth International Conference on Comparative Physiology, which was convened to honor Schmidt-Nielsen, but it has also been designed to serve as a companion to his well-regarded textbook *Animal Physiology: Adaptation and Environment* (Cambridge Univ. Press, ed. 2, 1979), allowing students to pursue in greater depth some of the topics introduced there.

The contributors were asked to provide perspectives on what they consider interesting and important in their respective areas. Their papers have been organized into five groups: Oxygen; Food and Energy; Temperature; Water; and Movement and Structure. This organization is congruent with that developed by Schmidt-Nielsen, save for the last part, which in *Animal Physiology* is entitled Movement, Information and Integration. I have found Schmidt-Nielsen's book attractive for its coverage of the physiology and structural-functional relationships of invertebrates. In the companion volume, attention is especially directed toward these topics in papers by P. W. Hochachka on anaerobic metabolism, S. Maddrell on osmoregulation in insects, R. McN. Alexander on running and flight, and S. A. Wainwright on structural systems, but the emphasis is overwhelmingly on the vertebrates.

The 23 chapters constituting the companion volume include at one extreme an attempt by D. Bellamy to develop a