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 provides 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

conceptual framework linking development, nutrition, and aging and, in the process, provide a means of better understanding neoplasia and at the other extreme a tightly focused review by M. H. Bernstein of the processes by which flying birds maintain thermal homeostasis despite power inputs tenfold greater than those at rest. Parts of several papers look familiar, having been presented at other venues, but this does not seem inappropriate given that the book is intended partly for students. I enjoyed the opportunity to observe further the development of C. R. Taylor's ideas on allometry as they relate to energy metabolism, support systems for metabolism, and locomotion. At this point his conclusion that allometry is a powerful tool for design analysis seems scarcely controversial. Taylor's analysis is nicely complemented by that of E. R. Weibel on oxygen transport. Schmidt-Nielsen has been an eloquent advocate of the value of comparative studies in physiology, and I'm sure he appreciated M. Peaker's discussion of salt glands, which points out the particular utility of the comparative approach for facilitating understanding of what initially appear to be unrelated processes.

The companion volume effectively documents the role that Schmidt-Nielsen's research and writings have played in comparative physiology, particularly with respect to physiological scaling, energy costs of locomotion, temperature regulation, avian respiration, function of salt-secreting glands, and osmotic problems. He should take satisfaction in the number of productive investigators, many of whom were in attendance at the conference, who manifest his influence. Physiological adaptation to the environment has been a prominent theme in Schmidt-Nielsen's work, and I believe the value of the companion volume would have been enhanced by a more concerted effort to place this theme in evolutionary perspective. (K. Johansen's paper on blood, circulation, and the rise of air breathing and E. C. Crawford's on thermoregulation do attempt to introduce some evolutionary considerations.) An opening of a badly needed dialogue between comparative physiologists and evolutionary theorists would have served to commemorate Schmidt-Nielsen's birthday in grand style.

My views on the need for a companion volume to Schmidt-Nielsen's textbook are probably influenced somewhat by having been the recipient of college textbook bills for three Dawsons and by teaching at an institution where extensive journal holdings are readily available to students. The book does not fully supplement the original, and there is little sustenance for persons who wish to explore further topics in endocrinology or neurobiology. However, the first four parts do work well in enunciating current issues and approaches in certain areas of comparative physiology. I was also very much taken with R. Beeuwicke III's contribution, which beautifully illustrates how understanding proceeds in science, through tracing the development of successive models to account for the operation of the renal countercurrent multiplier. These positive features will lead me to arrange to place *A Companion to Animal Physiology* on library reserve for my course in comparative physiology. Assignment of the paperback version would seem an appropriate strategy for instructors who wish to require it in addition to *Animal Physiology* but share my concern about the burden of added textbook costs.

WILLIAM R. DAWSON
Division of Biological Sciences and Museum of Zoology, University of Michigan, Ann Arbor 48109

Books Received

Advances in Beta-Blocker Therapy II. Proceedings of a symposium, Venice, Oct. 1981. A. Zanchetti, Ed. Excerpta Medica, Amsterdam, 1982 (U.S. distributor, Elsevier North-Holland, New York). viii, 312 pp., illus. $72.

Advances in Child Development and Behavior. Vol. 16. Hayne W. Reese and Lewis P. Lipsitt, Eds. Academic Press, New York, 1982. xvi, 330 pp., illus. $34.

Advances in Heat Transfer. Vol. 15. James P. Hartnett and Thomas F. Irvine, Jr., Eds. Academic Press, New York, 1982. xvi, 352 pp., illus. $54.

Advances in Heterocyclic Chemistry. Vol. 30. A. R. Katritzky, Ed. Academic Press, New York, 1982. x, 408 pp., illus. $76.50.

Augmentin. Clavulanate-Potentiated Amoxycillin. Proceedings of a symposium, July 1981. D. A. Leigh and O. P. W. Robinson, Eds. Excerpta Medica, Amsterdam, 1982 (U.S. distributor, Elsevier North-Holland, New York). viii, 246 pp., illus. $51.25.

Behavioral Enrichment in the Zoo. Hal Markowitz. Van Nostrand Reinhold, New York, 1982. xii, 210 pp., illus. $24.

Behaviorism, Science, and Human Nature. Barry Schwartz and Hugh Lacey. Norton, New York, 1982. xiv, 282 pp., illus. $19.95.

Beyond Separate Spheres. Intellectual Roots of Modern Feminism. Rosalind Rosenberg. Yale University Press, New Haven, Conn., 1982. xxii, 288 pp. $19.95.

Biblical Games. A Strategic Analysis of Stories in the Old Testament. Steven J. Brams. MIT Press, Cambridge, Mass., 1982. xii, 196 pp., illus. Paper, $5.95. Reprint of the 1980 edition.

Cell Differentiation. Molecular Basis and Problems. Lutz Nover, Martin Luckner, and Benno Parthier, Eds. Springer-Verlag, New York, 1982. 650 pp., illus. $55. Revision of German edition (1978).

The Cenozoic Era. Tertiary and Quaternary. Charles Pomerol. Translated from the French edition (Paris, 1973) by Derek W. Humphries and Evelyn E. Humphries. Horwood, Chichester, England, and Halsted (Wiley), New York, 1982. 272 pp., illus. $67.95. Ellis Horwood Series in Geology. British Micropalaeontological Society Series.

Chemistry. Experiment and Theory. Thomas L. Allen and Raymond M. Keefer. Harper and Row, New York, ed. 2, 1982. xxii, 742 pp., illus., + appendixes. $27.50.

Chloroplast Metabolism. The Structure and Function of Chloroplasts in Green Leaf Cells. Barry Halliwell. Clarendon (Oxford University Press), New York, 1981. xii, 258 pp., illus. $45.

Chromosome Damage and Repair. Proceedings of an institute, Bergen, Norway, May 1980. Erling Seeberg and Kjell Kleppe, Eds. Plenum, New York, 1982. xiv, 624 pp., illus. $69.50. NATO Advanced Study Institutes Series A, vol. 40.

Chronobiologie—Chronomedizin. Papers from a symposium, Halle/Saale, July 1978. J. Schuh, K. Hecht, and J. A. Romanow, Eds. Akademie-Verlag, Berlin, 1981. 884 pp., illus. Paper, 198 M. Abhandlungen der Akademie der Wissenschaften der DDR, Jahrgang 1979, Nr. 1 N.

Climatic Change in Later Prehistory. Papers from a conference, Durham, England, Mar. 1981. A. F. Harding, Ed. Edinburgh University Press, Edinburgh, 1982 (U.S. distributor, Columbia University Press, New York). viii, 210 pp., illus. Paper, $18.

Coastal Landforms and Surface Features. A Photographic Atlas and Glossary. Rodman E. Snead. Hutchinson Ross, Stroudsburg, Pa., 1982 (distributor, Academic Press, New York). xxii, 250 pp. $40.

Cocarcinogenesis and Biological Effects of Tumor Promoters. Papers from a symposium, Schloss Elmau, Bavaria, Oct. 1980. Erich Hecker, N. E. Fusenig, W. Kunz, F. Marks, and H. W. Thielmann, Eds. Raven, New York, 1982. xxxii, 664 pp., illus. $69. Carcinogenesis—A Comprehensive Survey, vol. 7.

Developments in Antibiotic Treatment of Respiratory Infections. Proceedings of a conference, Scheveningen, Netherlands, June 1980. Ralph van Furth, Ed. Nijhoff, The Hague, 1981 (U.S. distributor, Kluwer Boston, Hingham, Mass.). viii, 252 pp. $39.50. New Perspectives in Clinical Microbiology, 4.

The Dictionary of Space Technology. Joseph A. Angelo, Jr. Facts On File, New York, 1982. viii, 384 pp., illus. $19.95; after 1 January 1983, $24.95.

Digital and Microprocessor Engineering. S. J. Cahill. Horwood, Chichester, England, and Halsted (Wiley), New York, 1982. 514 pp., illus. $89.95. Ellis Horwood Series in Electrical and Electronic Engineering.

The Effects of Polymers on Dispersion Properties. Papers from a symposium, London, Sept. 1981. Th. F. Tadros, Ed. Academic Press, New York, 1982. viii, 424 pp., illus. $39.50.

An Electoral Atlas of Europe 1968–1981. A Political Geographic Compendium Including 76 Maps. John Sallnow and Anna John. Cartography by Sarah K. Webber. Butterworth, Boston, 1982. x, 150 pp. $49.95. Butterworths European Studies.

Electronics for the Modern Scientist. Paul B. Brown, Gunter N. Franz, and Howard Moraff. Elsevier, New York, 1982. xii, 496 pp., illus. $29.95.

The Enchanted Ring. The Untold Story of Penicillin. John C. Sheehan. MIT Press, Cambridge, Mass., 1982. xvi, 224 pp., illus. $15.

Energy and Development in Latin America. Perspectives for Public Policy. Nazli Choucri. Lexington (Heath), Lexington, Mass., 1982. xiv, 226 pp., illus. $23.95.

Finite Simple Groups. An Introduction to Their Classification. Daniel Gorenstein. Plenum, New York, 1982. x, 334 pp. $29.50. The University Series in Mathematics.

Fishes of the Minnesota Region. Gary L. Phillips, William D. Schmid, and James C. Underhill. University of Minnesota Press, Minneapolis, 1982. x, 250 pp., illus. Cloth, $25; paper, $12.95.

Flavins and Flavoproteins. Proceedings of a symposium, Ann Arbor, Mich., June 1981. Vincent Massey and Charles H. Williams, Jr., Eds. Elsevier/North-Holland, New York, 1982. xxiv, 890 pp., illus. $140. Developments in Biochemistry, vol. 21.

Food Policy and Farm Programs. Don F. Hadwiger and Ross B. Talbot, Eds. Academy of Political Science, New York, 1982. x, 254 pp. Paper, $6.95. Proceedings of the Academy of Political Science, vol. 34, no. 3.

Fourier Transform Infrared Spectroscopy. Techniques Using Fourier Transform Interferometry. Vol. 3. John R. Ferraro and Louis J. Basile, Eds. Academic Press, New York, 1982. viii, 216 pp., illus. $29.

Fracture Problems and Solutions in the Energy Industry. Proceedings of a conference, Winnipeg, Canada, Sept. 1981. Leonard A. Simpson, Ed. Pergamon, New York, 1982. x, 252 pp., illus. $50.

Free Radicals in Biology. Vol. 5. William A. Pryor, Ed. Academic Press, New York, 1982. xx, 284 pp., illus. $48.

Geoelectromagnetic Investigation of the Earth's Crust and Mantle. I. I. Rokityansky. Translated from the Russian edition by N. L. Chobotova, G. M. Pestryakov, M. N. Pristay, and B. G. Shilman. Springer-Verlag, New York, 1982. xvi, 382 pp., illus. $70.50.

The Geological Sciences in the Antebellum South.

(Continued on page 189)