lation. This volume assembles by quasi-systematic group accounts of the responses of aquatic invertebrates (Vernberg and Vernberg), terrestrial invertebrates (Cloudsley-Thompson), fish (Fry and Hochachka), amphibians (Brattstrom), reptiles (Templeton), and birds (Dawson and Hudson). The contributors have avoided a review format and have generally written authoritative statements reflecting the status of understanding of the temperature responses of nonmammalian organisms. Their procedure is a familiar one. The authors cast descriptions of the responsiveness of organisms to temperature, sometimes teleologically, into an ecological or energetic-cost context. In this setting we are shown the variety of adaptation to temperature and the remarkable suitability of an organism to its environment. This volume will serve, as the editor hoped, as a useful comprehensive reference.

In a broader perspective, I find a disconnectedness general in the field of thermoregulation that is uncharacteristic of surveys of other animal functions. There seems to be no unifying theme—no consistent basis for comparison of the thermal responses of organisms. The unanswered central question is, How do organisms, from motile microorganisms to mammals, recognize predetermined temperature levels? The thermal selectivity of *Paramecium* and the functioning of the mammalian thermostat depend upon this ability. Yet we seem no closer to understanding the mechanism underlying thermal responsiveness than Herter or Crozier and many others of a generation or two ago. Meanwhile, the present authors have managed thoughtful essays on their subjects without consensus on first principles.

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Plant Compounds

Chemistry of the Alkaloids. S. W. PELLETIER, Ed. Van Nostrand Reinhold, New York, 1970. xxii, 796 pp., illus. $24.95.

I brought to this book my usual skepticism about multiauthored textbooks but came away from it convinced that most of the usual defects in such productions had been avoided. The dividing line between text and reference is not a sharp one, but I would classify this book as an advanced text in that it is selective rather than encyclopedic and balanced rather than indiscriminately inclusive. In level and length it falls between the treatise of Manske and Holmes and the shorter text of Swan.

Aside from two chapters on, respectively, biosynthesis and taxonomy of alkaloids, this is a book of organic chemistry dealing in separate chapters with the different structural classes of alkaloids, their characterization and synthesis. Two aspects that are neglected are procedures for the separation and the analysis of alkaloids. Although specific alkaloids are chosen, there is usually excellent attention paid to the generality of synthetic and degradative methods. One learns not merely that such and such a reaction has been applied to a particular compound but also that it is useful for certain structural types and fails with some that appear similar. The structural formulas are well placed with regard to the text and used unstintingly. In a marked improvement over Manske and Holmes, compounds are identified by Arabic rather than Roman numerals, and the correct structure of an alkaloid is given at its first mention rather than after presentation of all the data and arguments used in establishing it. The reading is enlivened by brief historical remarks about some of the best-known alkaloids.

If the text is well planned and executed, the greatest praise is reserved for the indexes, which I must describe enthusiastically as the finest I have seen in any comparable book. In addition to author and subject indexes that are as thorough as one could ask, there is also a unique "Reaction and Reagent Index" which masterfully gathers together scattered information; so that, for instance, one can look up "Hofmann degradation" or "sodium borohydride reduction" and find a list of applications of these methods with their relevant page numbers.

In most chapters there are references to some literature as late as 1969, although one chapter lists nothing later than 1964. Any errors I found were trivial. It is too bad that the editor was unable to reconcile opposing views about which way up the morphine structure should be drawn, but that discrepancy only makes evident his attention to integration of approach that otherwise welds the book together. Libraries must have Manske and Holmes available for consultation; beginning students of alkaloids will probably be happier with Swan's book; but serious workers in the field of alkaloids will want Pelletier's book on their desks.

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Shellfish Phylum

Living and Fossil Brachiopods. M. J. S. RUDWICK. Hutchinson University Library, London, 1970, and Humanities Press, New York, 1971. 200 pp., illus. Cloth, $6; paper, $2.50. Biological Sciences.

Each of the shellfish phyla has its unique mode of life, attachment, and feeding, reflected by and dependent on the morphology of the shell. The ways in which morphology functions are a natural part of neontological studies of bivalves, gastropods, and echinoderms, but are more difficult to grasp for extinct or relict phyla such as the Brachiopoda, in which many structures have no modern analogues. There is no way of witnessing how such structures work. As a consequence, the reason for the structures tends to get overlooked by paleontologists eager to find the age or evolutionary meaning of fossil species.

Martin Rudwick has filled this gap in knowledge by making a special study of functional morphology in fossil and living brachiopods. His series of unique and excellent papers is crowned and summarized in this text, which relates the biology and evolution of brachiopods to their functional morphology. It is an exquisite work, concise and clearly written, logical, and coherent. Text figures are numerous, and adequate. Perhaps the most impressive aspect is the way the author deals with the entire phylum, smoothly changing the focus of attention from Ordovician to Permian to Recent genera to knit the brachiopods into a closely related unity.

Naturally there are a few mistakes—the Strophalosiaceans did not all lose their teeth after the earliest Devonian (p. 54), for example. Some might cavil at the simplified treatment which discusses only one viewpoint, especially over debatable questions of function, but those with better ideas are free to write their own texts. In fact they would be well advised to do so, for it is difficult to agree with Rudwick's interpretation of Lyttoniacea, for example.