Although this volume undoubtedly bears evidence that a number of different disciplines and techniques have contributed and are continuing to contribute to our understanding of the insect integument, the claim that it covers those areas which have developed most rapidly in the last few years does not entirely stand up. Understanding of waterproofing has advanced little, and in his treatment of the subject Nemenz fails to consider some of the recent work on the structure of osmoregulatory organs, for example rectum and anal papillae, which supports the importance of epidermis in water balance. There are several obvious omissions: the lipids in the cuticle are considered only histochemically, and glands, of which there are a great variety producing a very large number of different substances, are not considered at all.

Perhaps the most intriguing idea posed is Karlson's suggestion that the reason why insects develop in discrete moulting steps "should be sought elsewhere, not in the molecular organization of the cuticle."

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Algal Genetics

The Genetics of Algae. RALPH A. LEWIN, Ed. University of California Press, Berkeley, 1976. x, 360 pp., illus. $26.75. Botanical Monographs, vol. 12.

The algae, a peerless group of organisms that are nutritious, esthetically pleasing, and amenable to laboratory experimentation, have been remarkably neglected by scientists in search of superior organisms for fundamental biological research. Perhaps the old institutionalized split between botanists and zoologists, further rigidified in medical research, has effectively kept the algae out of the minds and the hands of most research scientists. Still, the neglect is surprising if one recalls that genetics was initiated by plant breeders and developed in a lively interplay between *Drosophila* and plant geneticists. Thus the science of genetics led the way in showing that phylogenetic boundaries are irrelevant in the investigation of fundamental principles of cell and molecular biology, but that lesson is still incompletely learned, as is evidenced by the withholding of National Institutes of Health funds from plant scientists.

The Genetics of Algae, edited by Ralph A. Lewin, presents the current status of research in algal genetics: which species are under investigation, and more or less what sort of knowledge is extant. Most of the chapters have struck what I take to be the right note: clear, informative, and interesting. The blue-green algae, valuable organisms for the study of nitrogen fixation and photosynthesis, are included, although as phage-carrying prokaryotes they are more similar to bacteria than to the eukaryotic green algae. There are a thoughtful chapter on approaches to the genetics of *Acetabularia* and a helpful synthesis of recent genetically oriented studies in *Euglena*. Other chapters introduce the reader to genetic studies, mostly rather primitive, of marine algae, filamentous algae, desmids, and charophytes.

Approximately half of the book deals with *Chlamydomonas*, an alga whose attributes for genetic analysis were first noted in a 1916 paper by A. Pascher, a foremost European botanist of the time. Appendix A contains translations of two of Pascher's fascinating short 1918 papers on the advantages of *Chlamydomonas* and other algae for genetic research. On a less felicitous note, Gowans performs a valuable service in Appendix B by reviewing the partially fictitious publications of Franz Moewus, warning the unwary against this tragic melange of fact and fancy.

The six chapters that discuss various aspects of recent genetic research with *Chlamydomonas* are all informative, but are somewhat uneven. Some are too brief, such as those on flagella and on cell wall synthesis, and leave the reader thirsting for more details, and others, such as the chapter on plastid inheritance, are too detailed and include some material that is inappropriate for a book of this kind. Nonetheless, this set of chapters does introduce the reader to some of the many areas of the cellular and molecular genetic research now in progress with this increasingly popular and versatile organism.

All in all, Ralph Lewin has given us a book that is useful, readable, and attractive. I recommend *The Genetics of Algae* to anyone who desires an overview of the present state of the field, though I would have liked to see a final chapter in which the special assets of the algae were evaluated within the framework of present and future directions of genetic research.

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Mollusk Biology

Marine Mussels. Their Ecology and Physiology. B. L. BAYNE, Ed. Cambridge University Press, New York, 1976. xviii, 506 pp., illus. $49.50. International Biological Programme 10.

Organisms useful for food and those useful for research have some attributes in common: abundance; availability; ease of gathering; and hardiness, which facilitates shipment, maintenance, and cultivation. Thus, edible species are often widely used experimental objects as well. *Mytilus edulis* is such an organism. It has a circumpolar distribution in the boreal and temperate zones and has been cultivated and eaten for hundreds of years. Mussels have also been "cultivated" in biological laboratories, and the scientific "harvest" has been large; the selective bibliography in this volume contains over 1300 references—most of them published since 1950.

Thus, it is not surprising that *Mytilus edulis* was chosen as one of the themes of the International Biological Program. The results are summarized in this volume, a critical review of the ecology and physiology of *Mytilus* and other mussels. The emergent goal of the book is to describe, in as full detail as possible, the interaction between mussels and their environment. A broad synthesis has resulted, including all levels of organization, from subcellular to population. The individual chapters were meant to be "prospective rather than retrospective," and this goal has been achieved.

The heart of the book is contained in three chapters on physiology and physiological integrations, written by Brian Bayne (the general editor) and two of his co-workers, R. J. Thompson and J. Widdows. In two of these chapters, the authors describe the structure and function of organ systems concerned with feeding and digestion, respiration and circulation, excretion, ionic and osmotic regulation, and nervous control. The sections on neurosecretion and the nervous system are sketchy; in the latter, the focus is, appropriately, on the sensory apparatus. However, the limits of toleration and the adaptability of feeding, respiratory, and circulatory functions to such environmental variables as temperature, oxygen partial pressure, food ration, salinity, and season are thoroughly discussed. Some complex relationships are developed; for example, the responses of respiration to temperature fluctuations are considered in the light of simultaneous effects on feeding, gametogenesis, and maintenance metabolism.

In their third chapter Bayne *et al.* analyze the integration of the component systems in terms of quantitative indices which describe, far better than the performance of individual organs, the compensatory physiology of whole mussels challenged by environmental change. A most valuable index, dealt with at length, is the scope for growth, a measure of energy balance. This index, among others, describes the condition, or health, of mussels and is, therefore, a useful indicator of stress. The results of the stress would be expressed as a loss of fecundity or a decrease in larval survival, a matter also considered by Bayne in his review of larval biology.

In summary, these chapters constitute a complete "operating manual" for *Mytilus edulis* and other mussels performing under any conditions; and, as in any good manual, directions for diagnosing malfunction under stress are included. Moreover, since the physiological approaches and techniques employed are carefully described and the technical pitfalls and sources of error laid out, these chapters constitute a protocol for producing a similar set of data for other organisms—molluscan or not.

The discussion of physiological ecology is extended in two additional chapters. First, Bayne's review of larval biology suggests, again, that a thorough functional understanding of these transient organisms can elucidate such complex phenomena as growth, behavior, the timing of settling and metamorphosis, and, ultimately, the reproductive strategy of mussels. Second, aspects of energy metabolism of both adults and larvae underlying physiological ecology are discussed by P. A. Gabbott. Of particular interest are the seasonal changes in biochemical composition and metabolism accompanying the reproductive cycle of mussels. Gabbott also reviews, critically, anaerobic metabolism in bivalves, a subject currently under wide investigation.

Ecology is discussed by R. Seed, and two ecological subareas—pollution and cultivation—are reviewed by D. Roberts and J. Mason, respectively. That future work in these areas will be influenced strongly by data from physiological and biochemical experimentation is a clear message of the book. Population genetics is another, newer, source of data for understanding ecological processes, and this area is reviewed by J. S. Levinton and R. K. Koehn. Finally, the book contains a reiteration by C. M. Yonge of his notions about the origin of the heteromyarian condition and the development of byssal attachment. Stanley's recent interesting analysis of this subject is considered but briefly and then discarded.

The material in this volume is remarkably well integrated; but then half of the reviews were written by Bayne and his associates. The editorial work was scrupulous. The book is well illustrated; the graphs and tables are clear; the indexing is useful; and the bibliography that follows the chapters is complete and up to date.

Since *Marine Mussels* considers principles, approaches, and techniques of a general nature, it should be valuable to a much wider range of biologists than the title suggests and should serve graduate students in ecology and environmental physiology as a model for their own endeavors.

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Work on Relativity

General Relativity and Gravitation. Proceedings of a conference, Tel-Aviv, June 1974. G. SHAVIV and J. ROSEN, Eds. Halsted (Wiley), New York, and Israel Universities Press, Jerusalem, 1975. viii, 344 pp., illus. $38.50.

Three major themes have pervaded recent work on general relativity: the prospect of astrophysical applications, the employment of global concepts from mathematics, and the exploitation of new experimental methods. The 14 invited papers that make up this book survey the field as of 1974. The coverage is uneven: global results are barely mentioned, whereas astrophysics and experimental results are much talked of. Over half the articles are broad reviews, generally very readable and copiously referenced; in these lies the lasting value of the book. The rest of the articles are a mixed bag.

Modern cosmology is treated by Criss, Matzner, Ryan, and Shepley. This paper is really likable in that the authors discuss together physical or observational cosmology on one hand and mathematical or "general relativistic" cosmology on the other, and every attempt is made to demonstrate that they are two aspects of the same subject; this fact is too often not apparent in the original literature.

W. Kinnersley surveys the known exact solutions to Einstein's equations in a lucid paper that should become a standard reference. This is another subject in which the primary literature too often ignores the forest for the trees; Kinnersley's group-theoretic classification of transformational "tricks" does much to organize the material. Similarly useful technical reviews include papers by J. Goldberg on the canonical method, J.-P. Richard on solar-system experimental tests, Deser, van Nieuwenhuizen, and Boulware on quantum gravity, and J. Ehlers on statistical mechanics.

The astrophysical connection is supplied by M. Rees in a brief and stimulating topical review of observational effects of black holes; this of course is a rapidly changing subject. W. Press mentions some exotic aspects of black holes.

A long panel discussion by gravitational-wave experimenters is intended to air the controversy surrounding Weber's experiments and the failure of others to reproduce his results. Not many answers are forthcoming, but the transcript is somewhat more enlightening than the spotty original literature on this subject. Finally, a summary and appreciation of general relativity by J. Wheeler can be read with benefit by everyone from high school students to senior researchers.

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Books Received

Annual Summary of Information on Natural Disasters. Earthquakes, Tsunamis, Volcanic Eruptions, Landslides, Avalanches. No. 8, 1973. Unesco Press, Paris, 1975 (U.S. distributor, Unipub, New York). 102 pp. Paper, $5.95.

Aquatic Weeds in South East Asia. Proceedings of a seminar, New Delhi, Dec. 1973. C. K. Varshney and J. Rzóska, Eds. Junk, The Hague, 1976. xviii, 396 pp., illus. Paper, Dfl. 110.

Arroyos and Environmental Change in the American South-West. Ronald U. Cooke and Richard W. Reeves. Clarendon (Oxford University Press), New York, 1976. xii, 214 pp., illus. $18.75. Oxford Research Studies in Geography.

Claude Bernard's Revised Edition of His Introduction à l'Etude de la Médecine Expérimentale. Paul F. Cranefield. Science History Publications (Neale Watson), New York, 1976. xii, 323 pp. $30; prepaid, $25. The History of Medicine Series, No. 48.

Coastal Vegetation. V. J. Chapman. Pergamon, New York, ed. 2, 1976. viii, 292 pp., illus. Cloth, $17.50; paper, $9.50. Pergamon International Library.

Cocaine. A Drug and Its Social Evolution. Lester Grinspoon and James B. Bakalar. Basic, New York, 1976. x, 308 pp. $15.

Conventional and Non Conventional Proteins. Proceedings of a workshop, Capri, Oct. 1975. R. Ferrando, M. Ganzin, and P. R. Payne. Il Ponte, Milan, Italy, 1976. 206 pp., illus. Paper, $40. Folia Veterinaria Latina, vol. 6, supplement 1.

Coronary Heart Disease. Clinical, Angiographic, and Pathologic Profiles. Zeev Vloda-

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