

Drama of environmental physiology

Environmental Physiology of Animals. Edited by J. Bligh, J. L. Cloudsley-Thompson and A. G. MacDonald. Pp. viii+456. (Blackwell Scientific: Oxford, 1976.) Cloth £18; paper £9.50.

THIS book is a multi-author text for degree-level students who have at least some knowledge of physiology and ecology. Its scope is very wide for, as the editors state in a postscript (p434) "Between a mutation and the resultant marginal benefit detectable in a population there lies an enormously complicated drama acted out by individual organisms in an environment which is certainly indifferent and often hostile. Environmental physiology is this drama, and is thus the central subject of biology. It embraces the intracellular molecular biology which accounts for the occurrence of mutations, as well as classical unicellular and multicellular morphology, physiology, biochemistry and ecology. It demands the ability to think at different levels of analysis—at those of molecules, of cells, of organisms and of populations, because organisms adapt in different ways at these different levels".

The text is divided into four main sections, and there is also an editorial introduction (part I) and postscript (part VI). Apart from the editorial contributions, the main text consists of a short section (part II) of two chapters on the origin of life and the evolution of the oceans and atmosphere. This is followed by a major section (part III) of seven chapters on adaptive mechanisms which have resulted from long-term evolutionary changes. It includes excellent reviews on ionic and osmotic regulation in aquatic animals, water balance and excretion, gas exchange, and reproduction. Part IV on acquired adaptations contains a well-coordinated and stimulating series of chapters on non-genetic adjustment to change in environmental conditions. This is followed by a section (part V) on immediate homeostatic or sensory responses. The latter contains chapters on sensory physiology, buoyancy, colour change, and temperature regulation.

A feature of this book is the contributions by the editors to coordinate the text so that contributory chapters can be placed clearly into the context of the framework of the book as a whole. It is a praiseworthy attempt to overcome some of the problems associated with multi-author texts, and some of the prefaces and introductory chapters to each section are quite outstanding. Chapter 11 introducing

the concept of acclimatory adaptation and chapter 16 on rapid responses of organisms to environmental change, are especially clear in introducing later chapters in each section. Other chapters are, however, less successful in this respect and are in places even slightly ludicrous in attempting to unite environmental concepts with those of physiology. After identification of the principal terrestrial environments in chapter 6, for example, the reader is informed (p102) that "The topography of the land and variations of its climate represent the same part in the make up of the environment, figuratively speaking, as morphology and physiology do in the life of an animal (12). Thus irrespective of climate, the mammalian fauna of desert, savanna, steppe, tundra and high plateaux have certain features in common". I was unable to fully understand either the precise meaning of the analogy attributed to Haveland (1926), or the logic of its relationship with the statement that follows it.

It was a little disappointing to find that there was no chapter on sense organs in the section on evolutionary aspects, and that no detailed consideration was given to topics such as acoustic interactions between bats and their prey in chapter 17, a topic which would surely have fitted in

well with the concepts underlying the theme of this book. It was also slightly surprising to find in the chapter on locomotion that there were no diagrams of how fishes, quadrupeds and flying animals actually conform to Newton's three Laws of Motion, despite the excellent prelude to chapter 8 stating these as underlying principles. Perhaps these were assumed to be well-known from other texts, but it would surely have been well-worth illustrating them in a comprehensive book designed for the undergraduate level.

The contributions overall are of very high quality, and are remarkably free of mistakes. The book has been well compiled and conscientiously edited so that, in general, individual chapters are well-balanced reviews which fit the stated theme of the book. The continuity is greatly aided by the editorial contributions, some of which are exceptionally stimulating. This book will be a welcome addition to the shelves of the physiologist and ecologist. It is enjoyable to read and is to be highly recommended for courses in environmental physiology at university level.

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Nematodes

The Organization of Nematodes. Edited by N. A. Croll. Pp. viii+439. (Academic: London and New York, 1976.) £15; \$32.75.

THIS multi-author volume contains fourteen chapters which describe various aspects of the structure, physiology and biochemistry of nematodes. The controversial topic of nematode taxonomy is discussed in the first chapter and is followed by chapters which review, to a greater or lesser extent, energy metabolism; the functional organisation of the head; the development and organisation of skeletal structures; sense organs and their secretions; nitrogen excretion, osmotic and ionic regulation; nematodes as models for ageing studies; respiratory physiology; hormones; neuromuscular physiology; the mechanics of feeding; behavioural coordination; the use of mutants to analyse the sensory system; and survival strategies.

The individual chapters of this book are of a high standard, and some are excellent. In a book with this title, however, one would expect complete coverage of all fields of the organisation of nematodes, but the alimentary system, with the notable exception of the oesophagus, and the reproductive systems, with the exception of the spicules and the egg-shell, are not included; yet these are major systems in nematodes.

The reviews are also not grouped in a logical manner. This may be deliberate policy to emphasise the individual nature of each chapter, but one would, for example, expect to find energy metabolism, respiratory physiology and nitrogenous excretion dealt with in adjacent chapters. There is also overlap of subject matter in several chapters. This is inevitable in a multi-author volume, but sense organs, for example, are described in chapters 3, 5 and 13, with no cross references. It is unfortunate that the authors of these particular chapters were apparently not given access to each other's manuscripts. Several chapters are comprehensive reviews of the subject, whereas some others deal with a smaller number of examples or topics in greater depth. Some chapters include important work which has not previously been published. It is a matter for regret that the plates, especially the electron micrographs, do not occupy more of the page, as certain details have been lost as a result.

This book is a significant contribution to the literature on nematodes, and will be extremely useful to those who teach and carry out research on these important animals. It will also be heavily used by students who wish to pursue, in depth, the various topics dealt with in the book.

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