

## Book Reviews

# The Origins and Relationships of Lower Invertebrates

Edited by S. Conway Morris, J.D. George, R. Gibson and H.M. Platt

The Systematics Association Special Volume No. 28  
Published by Clarendon Press, Oxford  
397 pp.  
Price R232,00

This book contains contributions from some 26 authors, most of whom are recognized authorities in their respective fields. It covers phylogeny and related topics, from the evolution of the Porifera to the affinities of the annelid worms and deals not only with major groups such as Cnidaria, Platyhelminthes and Nematoda but also finds space for the Gnathostomulidae, Gastrotricha, Priapulida, Sipuncula and Pogonophora. There is some overlap between chapters but, far from being irritating, this both enhances continuity and allows different authors to express somewhat different points of view, an important consideration in a field which remains highly speculative and at times tenuous.

What struck me most forcibly was the extent to which phylogenetic studies have progressed in recent years. What was not long ago frequently considered a boring, dry topic, particularly by ecologists and physiologists, emerges here as vital, exciting and intellectually stimulating. It is, of course, not just that the subject has progressed but also that ways of presenting it have changed; full marks to the authors and the editors in this regard. Naturally, some chapters are more readable than others, but all are well considered and carefully written, and there is a minimum of unnecessary jargon. I particularly enjoyed reading P.J.W. Olive's account of covariability of reproductive traits in marine invertebrates and its implications for phylogeny, Elaine Robson's 'Speculations on coelenterates' and the review by Conway Morris of non-skeletalized lower invertebrate fossils. Neither would I want to be without the brief but penetrating summing-up by Robert Barnes which is the final contribution to the volume. However, different readers will take special delight in different chapters, according to their own interests and preferences. All the chapters are short and appropriately divided by headings and sub-headings, so that it is easy to find one's way around, and the illustrations, while not particularly numerous, are all relevant and add greatly to the text.

I was slightly disappointed that the presentation ends with the annelids, when my own special interest is the Mollusca, but one can't have everything. More serious was my feeling that biochemical evidence had been underplayed. I could, for example, find no reference to DNA sequencing or electrophoretic studies on enzyme constitution, both of which are now important tools in the study of animal relationships. However, one cannot please everyone and, given this single limitation, I can recommend this book to all those to whose

interests invertebrate phylogeny is germane. It should also certainly be acquired (or at least, in view of its price, borrowed) by all those who lecture on the lower invertebrates, for not only is it up-to-date in all but biochemical considerations, but I know of no other volume which discusses current concepts with equal authority, clarity and insight.

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## Aphid Ecology

A.F.G. Dixon

Blackie, Glasgow

Aphids have always been a small and polymorphic horror to all but the aphid specialist. It is not easy to recognize, much less remember, the characteristics of brachypterous and macropterous alates, the fundatrix and fundatrigenia, exules or even males for a single species of the about 4000 described thus far. Nonetheless, Professor Dixon has carefully sifted through the morass to present a well-balanced and fascinating general account of the ecology of this important group of terrestrial animals.

A brief introduction covers the distinguishing features of aphids, their possible origins, their classification and world distribution. The text proper begins with plant host selection and gradually progresses through life histories to reproduction and dispersal and finally to a consideration of population dynamics and community structure. The author reviews the use by aphids of visual cues in the initial stages of host selection and settling, followed by the tactile and chemical sensory probing that signals the complexity of aphid-plant interactions. Both groups have sophisticated chemical defenses against one another, aspects of biology which are treated quantitatively.

The small size of aphids, since the Permian, belies the fact that individuals of the same species vary in size by an order of magnitude. Size is of great importance in many ways and is affected and effected by temperature, day length, and the quality of food ingested. Size, in turn weighs heavily on aphid locomotion and potential fecundity — robust aphids are actuarially more successful than small and lean ones.

The life cycle of aphids consists of a sequence of morphs, as many as eight, which are highly specialized into a division of labour. By the same token, this polymorphism and polyethism are finely tuned to the status of the host plant: diminution of food quality leads to crowding and the production of winged forms. The animals reproduce sexually and asexually. The latter takes the form of cyclical parthenogenesis in which the cone expands. The former is triggered by environmental cues. In both cases, aphid biologists are now assessing the genetic structure of aphid groups in terms of their adaptability.

The patterns in the life histories of aphids are presented with examples in an exceptionally clear manner: the alternation of host plants goes hand-in-hand with changes in the plants as well as the aphids. Fecundity, growth, expansion and reproduction are placed in a seasonal context and analysed

in terms of resource partition strategies. A major strategy in the aphid armoury is dispersal, an adaptation related to total habitat quality and around which the life histories unfold.

The dynamics of aphid populations, with their overlapping generations, morphs and varied plant hosts are not easily studied, but certain species have been investigated in quite considerable detail. The principles underlying population dynamics are mainly drawn from a small handful of species: the green spruce and peach aphids as well as the lime, sycamore and black bean aphids.

Enough has been learned of aphid ecology over the last two decades to write of community structure and species diversity, if briefly. These broad headings include comment on ant-aphid and plant-aphid mutualism, the flow of energy and nutrients between plant and aphid and a parting shot as to the relative scarcity of aphids in tropical regions.

This compact little book is an excellent introduction to a diverse and difficult group of animals. The author has summarized a great deal of literature, presented it and his arguments in digestible form, and carefully given the reader well-chosen and quantitative examples to illustrate the ecology of aphids.

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## Locomotion of Animals

R. McNeill Alexander

Blackie, Glasgow & London  
163 pp

This book concerns the mechanisms of animal movement on land, in water, and in the air, its limitations and its energetic requirements. Some muscle physiology is presented in Chapter 1, more as an aid to the discussion of mechanisms and energetics than as a comprehensive study of muscle biology. The chapters that follow are grouped to cover locomotion in water, flight, and locomotion on land. For those readers with little knowledge of mechanics, a summary of the necessary information is given in an appendix which is cross-referenced in the text for easy usage.

A variety of methods of movement in aquatic environments is discussed, from undulation in spermatozoa to jet propulsion in squid and swim bladders in teleost fish. A summary of the relative advantages of buoyancy aids and other techniques of maintaining depth closes this comprehensive look at locomotion in water.

Flight is covered next, moving from the mechanisms of gliding and soaring to the more complex methods of powered flight and hovering. Comparisons are made between the techniques employed by various species, such as hovering in passerines, pigeons, humming birds and dragonflies.

An investigation of terrestrial locomotion completes the discussion of locomotory mechanisms. Walking, running, jumping, crawling and climbing are covered using examples from such animals as camels, elephants, fleas and leeches.

The final chapter is devoted to comparisons between running, swimming and flight and among animals of different sizes. It also considers predator-prey interactions and the possible advantages of movement in groups are discussed.

This book is designed for undergraduate students of zoology and biology, and reflects a somewhat rigorous engineering approach to the study of animal movement.

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## Mammalian Odours and Pheromones

D. Michael Stoddart

Edward Arnold (Publishers) Ltd  
60 pp.  
Price R19,80

Published in 1976 this book is number 73 in the Institute for Biology's 'Studies in Biology' series. Like the rest of the series it is a short, authoritative summary of its particular topic. Chapter 1 touches on the physics and chemistry of odours, the anatomy, histology and neurology of olfaction and the histology of odiferous glands. The important question of the pheromone status of mammalian odours is discussed. Chapter 2 considers the control of odour production and leads into Chapter 3 on the role of odour in reproduction. Odours are classified as signallers or primers and the Lee-Boot, Whitten, Vandenberg and Bruce effects are described. The fourth and fifth chapters treat the role of odour as a recognition signal at all levels between the individual and the species, and how it functions in social organization. Chapter 6 describes scent-marking behaviour and the final chapter deals with human odours.

The 'Studies in Biology' series is aimed mainly at advanced secondary and basic tertiary level students. '*Mammalian Odours and Pheromones*' fills an important gap; at this level it is the only authoritative summary of mammalian chemical communication. An important feature is the author's careful selection of sound examples from a field littered with inconsistencies and contradictions.

The book's emphasis on rodents and lagomorphs reflects both the author's interests and the state of knowledge when the book was written and inevitably it is less up-to-date now than it was 10 years ago. Work by the author has resolved some of the questions which he was then unable to answer; e.g. the responses of prey to predator odours (p. 47). The reference list (5 books and 21 articles) has aged less well than the text, several important works having appeared since the mid-seventies. Nevertheless the book remains a useful introduction to mammalian chemical communication.

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