THE BIOLOGY OF THE MOLLUSCA

Second Edition

PURCHON

THE BIOLOGY OF THE MOLLUSCA

SECOND EDITION

BY

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First-class illustrations are more informative and more stimulating than lengthy descriptions, and I have drawn freely on the rich supply of excellent illustrations in scientific journals; I wish to thank the Editors, Boards of Management, and Proprietors of many scientific journals, and all other holders of copyright, who kindly gave me permission to reproduce the large numbers of beautiful illustrations which had previously been published elsewhere. For each illustration I have cited in the legend the full details of its source.

I have greatly appreciated constant encouragement from my wife in the course of drafting the manuscript for this book, and assistance in correction of the proofs and preparation of the index.

I am particularly indebted to Professor Gareth Owen, Department of Zoology, the Queen's University of Belfast, who read the first draft of the whole manuscript, and who made many valuable suggestions and criticisms. The book is undoubtedly much the better for Professor Owen's advice, but I remain responsible for all residual errors and shortcomings.

INTRODUCTION

THE principal purpose served by this volume is to make readily available the interesting arguments brought forward, the illustrations, and the conclusions reached in a large number of authoritative papers on molluscs which have been published during the last 40 or 50 years. Outstanding among the pioneer works on the functional biology of molluscs are the papers of the late J. H. Orton on *Crepidula* in 1912 and 1914, and of C. M. Yonge on *Mya* in 1923 and on *Ostrea* in 1926. Subsequent to these there has been an ever-increasing flow of publications of absorbing interest on the biology of various molluscs, the principal contributors being C. M. Yonge, J. Z. Young, A. Graham, V. Fretter, and J. E. Morton. Important papers from these and many other authors are scattered widely in zoological journals where they are only likely to be studied by specialists who are pursuing a particular research interest. Yet many zoologists, conchologists, and naturalists who lack the compulsion to work their way laboriously through the *Zoological Record* in search of reading material will find the main conclusions of these papers to be of absorbing interest. For their benefit I have gathered together in this book the essential features of several hundreds of original publications in the form of eight essay reviews, using as many as possible of the original illustrations, and endeavouring to represent as fairly as possible the views of the original authors. The book is liberally studded with references to the original papers, so that any reader who wishes can check the validity of any statement or can pursue in more detail any subject in which his interest has been aroused.

According to the *Zoological Record* about a thousand scientific articles are published each year on molluscs, including those published in foreign languages. Thus in the period of time covered by this book about 50,000 papers have been published on the mollusca alone. It is obvious that I could not attempt to consult more than a small fraction of these. Many of these papers are not relevant in this particular context, e.g. papers describing new species, locality records, and the constituents of geological faunas. I have been obliged to exclude from consideration many papers which did not fit into my chosen essay topics and, in particular, I have not attempted to review papers which are essentially physiological in content. Except for a few very important papers in foreign languages, e.g. the paper by L. Tinbergen on the behaviour of *Sepia*, for which there is no equivalent in the English language, I have generally confined

my attention to papers in English: this enabled me to work more quickly in preparing the manuscript, and has the advantage that the reader can follow up any point by reference to the original literature without difficulty. I do not doubt that as a result of this policy I have missed many interesting and important publications on molluscs, but perhaps the general reader will agree that I have already provided more than sufficient references to support my subject-matter.

I have another important incentive in drafting this book. If a three-year undergraduate course in zoology is to include a general review of the animal kingdom together with introductory courses in genetics, physiology, ecology, etc., then the amount of time which can be allocated even to such an important phylum as the Mollusca is pitiably small. In such a short course it may be possible to include a few exercises on living material, but in general one is obliged to give adequate coverage to basic knowledge of classification and comparative anatomy without which any consideration of special cases would be pointless. Having completed these foundation studies, all too little time remains for consideration of adaptive radiation within the major classes, and yet it is here that the subject becomes so deeply fascinating. This is where the real interest lies, in the arena of current scientific investigation. I confess that I have no great interest in anatomy as such, and the anatomy of one particular species is no more important than that of any other example in the same group. The serious student should not set out to learn the anatomy of a selected and approved type species—and then be apprehensive of tackling the anatomy of another, fairly closely related example. Surely, instead of learning the anatomy of a selected type species he should learn how to investigate the anatomy of an unknown animal. After all, this is how the great anatomists of a previous century had to work. The best authority on the anatomy of a species is the animal itself, so I have offered in Appendix B a number of exercises in which the student investigates the anatomy of an animal, aided by a narrative description, or a questionnaire. In some cases I have deliberately provided descriptions of exotic species, so that the student has to look for points where the description fails to accord with his specimen, e.g. *Aspatharia brumpti* instead of *Anodonta cygnea*; *Aplysia winneba* instead of *A. punctata*; and, going a little further, *Achatina fulica* instead of *Helix pomatia*. By this device I am attempting to make the student think during his practical class work instead of abandoning himself to a solely mechanical activity; in using these descriptive accounts, the student should test the validity of each sentence—true or false?—and not take it all for granted. At the same time he should consider these descriptions as models of brief, lucid, scientific prose which he could profitably emulate in his own written work—it is not easy to write concise, meaningful descriptions of the anatomies of animals.

Finally, I venture to hope that this book may be of interest to many amateur shell collectors who would like to know something about the living animals which occupy the shells which they seek for their cabinets. One cannot do entirely without technical terms when writing on the biology of molluscs, but I have tried to keep these to a minimum, and to explain those which have to be used. To understand something of the processes of feeding and digestion, of reproduction, and of the adaptations to special habitats, and to know something of the problems which have to be met by a variety of molluscs should add greatly to the pleasures of possession of a fine collection of rare and beautiful shells. Modern students of the functional biology of molluscs owe a great deal to the patient work of amateur conchologists and naturalists of previous centuries, and it is desirable that the amateur should be able to reap the benefits of the endeavours of the professional. Moreover, much valuable work remains to be done by field workers in recording the feeding and reproductive habits of molluscs, and it is hoped that this volume will encourage such field-work.

I have not attempted to modernise or standardise Latin names used in this book, being doubtful whether those names in current usage will be any more lasting than those used 10 or 20 years ago. I have generally employed the name used in the publication cited, which has the slight disadvantage that one particular species may be referred to under different names in different places in the book; it has the advantage that a reader will not experience confusion when consulting original literature. In some places I have indicated a synonym where I have thought this to be helpful.

R. D. PURCHON

Otford, Kent
October, 1966

PREFACE TO THE SECOND EDITION

CHANGES incorporated in this second edition include the following recent developments: consideration of the time factor in investigations into feeding and digestion in bivalves, and recognition of the possible occurrence of cyclical patterns in the digestive process which may be linked to environmental variables, or to behavioural rhythms; development of the carnivorous habit in the Verticordiidae (Bivalvia) and the bearing of this on the origin of the Septibranchia; patterns of distribution of terrestrial molluscs on Pacific islands; the opportunity has also been taken to correct minor errors in the original text.

R.D.P.

Otford, Kent

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