

Book Reviews

The Physiology of Reproduction

Editors-in-Chief: E. Knobil, & J.D. Kneill

Raven Press, 1988

2633 pages

Price US \$362.50

It is seldom that a single book attempts to cover an entire area of biology, and, for example, in the field of reproduction, there are individual books on the ovary, the testis, the biology of the spermatozoon, structure and function of the placenta and so on. The authors and editors of *The Physiology of Reproduction* have successfully moved away from this trend and, in one book, cover most structural, functional and behavioural aspects of reproduction. As a consequence of the approach, this book is massive (about 2500 pages) and expensive, however, it has been excellently executed and deserves a place on the bookshelves of all who have a serious interest in the physiology of reproduction.

The book, which is in two volumes, comprises sections on gametes, fertilization and early embryogenesis, the reproductive systems, the pituitary and hypothalamus, reproductive behaviour and its control, and reproductive processes and their control. The sections are divided into a number of chapters, each written by an expert in the field. The list of authors is impressive and includes Yanagimachi, fertilization; Gore-Langton & Armstrong, follicular steroidogenesis; Niswender, corpus luteum; de Kretser & Kerr, cytology of the testis; Hall, testicular steroidogenesis; Bronson, seasonal reproduction in mammals; Knobil, menstrual cycle; and many others. The authors and editors are mindful of the enormous differences, both in structure and function, within the mammals, and where appropriate, have provided comparative information for the major mammalian groups.

It is neither possible nor profitable in reviewing a book of this size to read and comment on all chapters and one is naturally drawn to areas of expertise. In all cases the chapters are clearly written, thoroughly referenced, and copiously illustrated, providing excellent reviews.

In summary, the all encompassing approach adopted by the editors of this book encourages the reader to follow trains of thought from, for example, the cytology of the testis to the process of fertilization, and on to the role of the pituitary in the control of spermatogenesis, an approach which single topic books do not allow.

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Long-term Studies in Ecology: Approaches and Alternatives

Gene E. Likens

Springer-Verlag, New York, 1988

214 pages, 27 figures. ISBN 3-540-96743-5

DM 98,00

Edited by Gene Likens (present Director of the Institute of Ecosystem Studies in Millbrook, New York) this book contains 18 papers presented at the Second Cary Conference held in Millbrook, New York on 13 May 1987. The Cary Conferences provide a forum for ecological issues from a more philosophical point of view and the papers contained here would be of interest to those involved in the co-ordination and planning of medium and long-term ecological studies, as well as by those frequently labelling or discounting long-term studies as 'mere monitoring', as though it were unscientific. Most of the papers are well written with the reviews of long-term field studies making delightful and interesting reading.

The first paper deals with the importance and justification of long-term ecological studies. The author (J.F. Franklin, University of Washington) discusses various classes of ecological phenomena for which long-term studies are essential, and ecological concepts that require long-term validation. He concludes that the laissez-faire approach to long-term studies must change and that ecological scientists have a major responsibility in expanding, focussing, and stabilizing long-term research in ecology.

In a paper dealing with the objectives and experimental approach in long-term research L.R. Taylor (Ohio State University) attempts to convince the reader that experimentation is useful, but of limited value in long-term ecological studies. He based this on the 'fact' that an experiment's main function is to terminate while the long-term project's main function is to survive. Following an elegant review of several outstanding long-term ecological studies (Dunnet's Fulmar study; Coulson's Kittiwake study; the red grouse project; the Island of Rhum red deer project; the great tit studies, Dixon's sycamore aphid studies etc.) he concludes that long-term ecology should not be judged on the same 'experimental' grounds as used in short-term studies. This paper in itself makes the book worth reading.

Margaret Davis's (University of Minnesota) evaluation of the value of retrospective studies convinces the reader of the value of such studies to obtain baseline measures and to extend the time-frame of long-term studies. Retrospective studies are clearly also of significance in the calibration of paleoecological data, the identification of infrequent, rare events and the documentation of forest dynamics.

The role of ecological models in long-term ecological studies is considered by H.H. Shugart (University of Virginia) in a paper less readable to 'data-collecting' than 'computer-orientated' ecologists. It is stressed that

models (and microcosms) are complimentary to long-term ecological studies and provide an opportunity to develop theory and to co-ordinate long-term research efforts.

In a paper entitled 'Space-for-Time Substitution as an alternative to long-term Studies', S.T.A. Pickett (New York Botanical Garden) shows that these are not strict alternatives but rather complementary techniques used to study the effect(s) of the past on ecological systems (Space-for-Time substitution assumes that space and temporal variation are equivalent and extrapolates temporal trends from a series of samples of different ages).

D. Tilman (University of Minnesota) critically evaluates the potential contribution of experimentation to ecological understanding and emphasizes that short-term observations can not explain the causes of patterns observed in nature. He furthermore indicates that an experimental approach is essential to the understanding of cause-and-effect relations in ecology.

Chapters 7 to 14 provide motivation for long-term studies, evaluate National Parks as sites for long-term research, and deals with the analyses of information related to long-term research activities. Most of these chapters are rather superficial with titles promising more than is provided in the text.

However, this book does provide a goal for ecologists and convinces the reader of the importance of sustained long-term ecological research, not only from an academic point of view, but also from a practical point of view. I would like to recommend this book as of importance in the collection of all institutions involved in ecological research.

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Oceans of Life off Southern Africa

Edited by Andrew I.L. Payne and Robert J.M. Crawford and illustrated by Anthony P. van Dalsen

Vlaeberg Publishers, Cape Town, 1989
300 pp., numerous figures, tables and photographs

The oceanography around the southern tip of Africa is, to say the least, complex and the seas in this area are bountiful and specious. This is not really surprising considering that the southern tip of the continent is, in general terms, the meeting place of three of the world's major oceans, the Indian, the Atlantic and the vast Southern Ocean. As a consequence of the Agulhas current, which sweeps down the east coast of the subcontinent, a significant number of Indo-Pacific species are also found along our coast. In broad terms the east coast is characterized by a high species diversity and low productivity, while the west coast, on the other hand, has a low species diversity but is extremely productive,

owing to the nutrient rich waters of the Benguela Current system. Taken overall, this is an important and valuable heritage, which can be likened to the proverbial family silver. It should be used, but at the same time looked after and guarded jealously.

This complex and diverse treasure house forms the basis of the book reviewed here. This multi-authored book, edited by Andy Payne and Rob Crawford and amply illustrated by Anthony van Dalsen, for the first time takes the reader beyond the intertidal region and introduces him to the oceans and the biota around the subcontinent in a professional and concise manner.

At first glance one gets the impression that the book is largely intended for the layman. However, on closer examination the book far exceeds these first impressions. The authors of the various chapters, all specialists in their fields, provide an immense wealth of detail, facts and information and insight into the dynamic nature of the physical and biological oceanography around our coast. The book is thus also a treatise of infinite value for undergraduate, post graduate and professional students of oceanography and marine biology.

The contributions by all the 39 eminent marine scientists are well written, synthesizing some of the most recent findings of the South African marine science research community. The authors and the editors of this volume deserve praise for maintaining a high standard from the first to the last page. It is also particularly pleasing that the authors have included a short historical account of the research and / or the harvesting of a particular resource. This places present-day activities into perspective.

The book consists of 30 chapters, dealing with the physical oceanic environment and examines the various living resources, which form the basis of the various fisheries and marine resource related industries around the coast. To round off the story the editors have also incorporated a chapter on marine pollution, as well as a chapter on marine reserves and their important role in the conservation of habitats and biota.

After a short and cutting introduction by Roy Siegfried in which he highlights the problem of marine conservation in terms of the 'common property resource' problem, the chapters follow a logical sequence. The importance of estuaries to the offshore environment is highlighted by Allan Heydorn in Chapter 2. This chapter illustrates the degree to which the marine environment is influenced by processes, interactions and man's activities on land. Vere Shannon, in Chapter 3, provides an illuminative description of the physical and chemical oceanography around the sub-continent, which includes an account of the warm Agulhas Current, the complex oceanography of the Agulhas Bank (which forms an intermediate zone between the Agulhas current and the Benguela) and the driving forces of the cold and productive Benguela current system.

Stan Pillar and Larry Hutchings on planktons in Chapter 4, highlight the importance of these organisms as the basis of the marine food web, and provide a clear description of the composition of marine plankton, the interaction between phyto- and zooplankton, the impor-

tance of plankton to other forms of marine life and the attempts by man to utilize this resource. Most important, perhaps, is their conclusion that while man is seeking economical ways to harvest and process plankton (particularly krill), the primary concern, considering that it forms the base of the food pyramid, should be the conservation of this resource.

Marine pollution is a vast and complex issue not only in the seas around South Africa but on a global scale. Anton Moldan has in a few pages (Chapter 5) effectively summarized the sources (inclusive of land based sources, marine sources and atmospheric sources), and the direct as well as the indirect and long-term effects in relation to persistence and accumulation of chemicals, biocides and heavy metals. The sea has long been regarded as a dumping ground for the wastes of human civilization. Moldan in this chapter highlights the dangers and warns against complacency.

Chapter 6 by Andy Payne and Rob Crawford, introduces the major South African fisheries, provides an overview of landings in the major fisheries, briefly comments on the various fishing techniques employed in South African waters and provides a brief overview of how the varied marine stocks are assessed on a continuous basis and how these findings are used for the management of invertebrate and vertebrate resources. Essentially it sets the scene for the ensuing chapters.

The following chapters (7–16) deal with the fisheries for abalone (Rob Tarr), spiny lobster (Dave Pollock), shrimps and prawns (Tony Du Freitas), cephalopods (Johann Augustyn and Malcolm Smale), clupeoids (Mike Armstrong and Rod Thomas), horse-mackerel and saury (Rob Crawford), mesopelagic fish and some other forage species (Richardt Prosch, Butch Hulley, and Roy Cruikshank), Cape hakes (Andy Payne), other groundfish resources (Andy Payne and Awie Badenhorst) and mullet (Guillaume de Villiers). Prior to the descriptions of the fisheries for these resources the authors give an overview of the life histories and the ecological roles of the various species. These accounts are all highly readable and informative yet the reader is spared esoteric detail. The various chapters are all well illustrated.

Chapters 17 to 21 deal with the multispecies recreational fishery (Rudy van der Elst) and the commercial linefisheries (Andrew Penney, Colin Buxton, Pat Garratt and Malcolm Smale) and in greater detail with individual or species groups primarily associated with these fisheries, such as snoek and chub mackerel (Rob Crawford), tunas, bonitos, Spanish mackerel and billfish (Vere Shannon, Rudy van der Elst and Rob Crawford) and with sharks and the Natal Sharks Board (Len Compagno, Malcolm Smale, Beula Davies, Jeremy Cliff and Sheldon Dudley). The intricate nature of the South African linefishery in terms of the different user groups (rock and surf anglers, recreational ski-boat anglers, commercial fishermen, light tackle boat fishermen etc.) as well as the management of these fisheries in terms of the complex life histories of some of the species, particularly the sparids, (e.g. sex reversal, longevity, late maturation, etc.) receive excellent

coverage. Changes in the species catch composition and in landings over time are also well illustrated.

Moving up the evolutionary ladder, George Hughes, in Chapter 22, deals in some detail with the fascinating life history and fishery for marine turtles, in particular with the loggerhead, leatherback, green hawksbill and olive Ridley's. Although there is sufficient legislation in South Africa to protect these prehistoric creatures they have been heavily exploited in the island groups of the Seychelles, Mauritius, Reunion and Madagascar.

Chapters 23 to 25 deal with seabirds, including jackass penguins (Rod Randall), resident seabirds (Aldo Berruti) and migrant seabirds (Peter Ryan and Barrie Rose). These chapters give a concise overview of the present status of these birds, descriptions of their life history, conservation measures, the guano industry and their interaction with commercial fisheries. Notes on the natural history, inclusive of seasonal abundance, reproduction, geographic range and diet of over 90 seabird species are provided.

Marine mammals form the subject matter of Chapters 26 to 28. The first of these on seals by Jeremy David also provides a clear overview of the natural history of pinnipeds in general. Most of the chapter is devoted to the Cape fur seal, its ecology, population dynamics, the history of exploitation and the controversy surrounding this practice. Graham Ross and Peter Best describe the distribution of the smaller cetaceans along the South African coast and also provide an interesting insight into their biology and ecology. The subject of dolphin and whale exploitation is briefly mentioned in this chapter. The dismal and indeed shameful history of international whaling, and in particular South African and pirate whaling, is discussed in the following chapter by Peter Best. The author clearly shows how the stocks of these leviathan beasts had been drastically reduced before the control measures of the International Whaling Commission began to take effect in the early and mid 1970s.

The penultimate chapter by Roby Robinson deals with marine reserves and their role in the conservation of habitats, biota and processes in the ocean environment. He provides excellent examples of how marine reserves, particularly the larger reserves such as De Hoop, Tsitsikamma and St Lucia, have proven their worth for the conservation of several important species of fish. Of interest to the reader will be a brief overview provided by the author on recent developments in terms of coastal conservation areas.

In the final chapter the editors, Rob Crawford and Andy Payne, have attempted to put the foregoing massive assemblage of information into perspective and how the various species and or fisheries described in this book are intricately interwoven. This they achieve admirably. It also illustrates the complicated interdisciplinary and multifactorial nature of marine science and the responsibility of those that study the sea.

I am of the opinion that this book, together with Smith's Sea Fishes (Smith and Heemstra 1986, Macmillan Publishers, Johannesburg) and The Living Shores of South Africa (Branch and Branch 1981, Struik Publishers, Cape Town) form an important trilogy for the con-

ervation of our seas and its life. While the objectives of marine conservation mirror those on land in terms of maintenance of genetic diversity and of essential ecological processes, and the wise and rational utilization of resources, it is not an easy matter to communicate to the general public. The reason is simple: except for the privileged few, the majority of people only see a vast expanse of what appears to be a well-off system. The trilogy provides us all with a greater understanding of the largely unseen processes and biota and will go a long way towards the development of a conservation ethic of the oceans, which after all make up over 70% of the earth's surface.

The editors and the authors of *Oceans of Life* can all feel justly proud of this great achievement. The book is reasonably priced and affordable by all who share an interest in the sea.

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Biotic Diversity in Southern Africa: Concepts and Conservation

Edited by B.J. Huntley

Oxford University Press, Cape Town, 1989
380 pages, hardback edition

This book comes at a time of unprecedented interest world wide in the field of biotic diversity and, as the first of its kind in Africa, has made a timely appearance on the African conservation scene. Although it deals mostly with southern African problems, much of what is discussed has wider implications for the continent. It attempts, by way of 22 invited contributions covering a wide range of topics from genetic engineering and biotechnology to the importance of atlases in conservation, to sum up the current state of the art in southern Africa, and will hopefully highlight the obvious need for more, detailed studies. Many of the data presented were previously unpublished and are consequently now available for the first time, and most chapters appear to have an exhaustive bibliography.

The book has a striking cover and the overall technical quality is excellent. Very few typographical errors appear to have slipped through. The contributions are of a high standard and the book should quickly find its way onto the desks of serious conservationists internationally.

The book comprises six parts, with contributions by 36 authors arranged in 22 chapters. The parts are: (1) The dynamic nature of biotic diversity; (2) Human dependence on biotic diversity; (3) The survey, evaluation and monitoring of biotic diversity; (4) Conservation status of terrestrial ecosystems and their biota; (5) Conservation

status of river, coastal and marine ecosystems and their biota; and (6) Policies to protect biotic diversity.

In Part 1 the different methods of measuring biotic diversity in general are dealt with, an attempt is made to explain the richness of the southern African flora, and man's impact on the local environment is assessed.

Part 2 is introduced by an unorthodox and novel interpretation of conservation. This is followed by papers on the importance of native plants to rural communities in southern Africa, and the contribution of veld diversity to the agricultural economy. The section is concluded by a chapter on molecular mechanisms of diversity and horizontal genetics, genetic engineering and biotechnology.

Part 3 deals with the survey, evaluation and monitoring of biotic diversity by means of Red Data Books and atlases, and an assessment of animal diversity using molecular methods is presented.

Parts 4 and 5 deal with the conservation status of selected terrestrial (Part 4) and river, coastal and marine ecosystems (Part 5). Those dealt with are southern African nature reserves, fynbos and karoo systems, coastal and montane evergreen forests, continental and oceanic islands, wetlands, rivers, estuaries, coastline and pelagic ecosystems.

The book ends with a part (two chapters) on policies to protect biotic diversity. The penultimate chapter deals with efforts by the Council for the Environment to develop an environmental conservation policy in South Africa, and the final chapter is on the environmental responsibility of large corporations and the private sector.

This book fills the need for a useful and up to date synthesis on the status of most biodiversity issues in southern Africa but what seems totally incomprehensible (and inexcusable!) is that a book which purports to deal with important issues in biodiversity in southern Africa can totally ignore the largest group of animals on earth, the insects. Since the book was the result of invited papers and one of the stated objectives of the book was to synthesize what is known about biodiversity in southern Africa, there appears to be no logic to this omission. The fact that insects are the most abundant animals, the most important food for many animals, primary pollinators of most plants, controllers of plant composition and the most important processors of energy in every terrestrial ecosystem, was overlooked. Many of the major papers referred to in the introduction were written by entomologists (such as E.O. Wilson) and in those works insects are very definitely given due recognition. Many entomologists will probably be surprised that Erwin's paper published in *Coleopterists Bulletin*, in which he speculated that there may be 30 million species on earth is considered 'obscure'.

In a country where apparently, at best, only lip service is paid to the importance of insects in natural ecosystems, it is a travesty that in a book purporting to be the first, and by implication an important milestone in the history of conservation in southern Africa, insects are virtually ignored.

Notwithstanding the above criticism the book makes

very interesting reading and can be highly recommended to anyone interested in the wide range of topics covered.

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Ecosystems of the World 14B, Tropical Rain Forest Ecosystems: Biogeographical and Ecological Studies

Edited by H. Leith and M.J.A. Werger

Elsevier, 1989

Price: US \$150,00

This is a further volume in the well-known *Ecosystems of the World* series and supplements *The Structure and Function of Tropical Rain Forest Ecosystems*, which was published several years ago. The objectives of the two volumes are to provide 'the most comprehensive coverage of information needed for someone visiting the tropical rain forest areas as an ecologist, or to prepare someone who is interested to work in tropical forest ecosystems in the future'.

The comprehensive nature of the work is reflected in its size and scope. Volume 14B contains 35 chapters covering 713 large format pages. First to be covered are the physical environments of rainforests, with chapters on climate, soils and hydrology. These are followed by separate descriptions of the South American, African, South-East Asian, Australasian and Pacific Island rain forests. A third group of chapters covers the plants growing between and on the trees — vascular epiphytes, mycorrhizas, lichens, bryophytes etc. Chapters on animals cover selected groups of vertebrates (primates, bats, rodents, birds and reptiles) and insects (moths, termites, leaf-cutting ants and perhaps surprisingly, dung beetles). There is also coverage of the vertical distribution of insects in rain forests. The volume is concluded by chapters examining the processes of herbivory and decomposition, and the exploitation of rainforests by man.

The contribution on African forests is by Alan Hamilton. After describing their extent and characteristic plant families he gives a commentary on their relative sparsity of species, compared with the other southern continents. This is a recurring theme in the volume as a whole, whether it is plants or animals being discussed. Within

Africa, areas of higher species richness and endemnicity are nonetheless identified, their refugia status being related to their long-term stability. There is a detailed examination of the characteristics and classification of African forests, with comparisons between the older subjective systems and more modern multivariate techniques. The bundle of conflicting and confusing (to a zoologist?) classifications is successfully unravelled and the chapter provides a convenient introduction to the many French language contributions on the subject.

Vascular epiphytes in African forests are covered by Dick Johansson. Unfortunately a rather strict classification is adopted and the numerous hemiepiphytic strangling figs and parasitic Loranthaceae are ignored. This is in contrast to the broader classifications adopted in the chapters on South East Asian and Neotropical forests. This lack of consistency is not typical of the book as a whole and the editors appear to have worked hard to maintain uniformity of coverage between continents.

The contribution by D.E. Wilson provides interesting comparisons between the bat faunas of different rain forests. African forests are shown to contain relatively small numbers of species and individuals, yet their larger average body size means that their biomass may be equivalent. Turning to trophic relationships, African forests are relatively rich in aerial insectivorous bats, but depauperate in fruit-eaters. The rain forests of the world are nonetheless considered to have ecologically similar faunas, despite the variation in the taxa that contribute to the various trophic groups.

The vertical distribution of insects in rain forests is a subject which has received considerable attention in recent years. Steve Sutton has been something of a pioneer in this area and his contribution provides a lively overview of the subject. There is a strong practical element. Techniques of getting to the canopy, from ropes to hot air balloons, are discussed in detail together with the problems of working with collections where 90% of the species are unknown.

Taking the volume as a whole, it achieves its objective of comprehensive coverage, at least for the more botanical themes. One problem is that there has clearly been some delay in its publication. Many of the contributions appear to have been written several years ago and consequently their contents do not reflect recent developments. It still represents a valuable asset for any library.

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