

Book Reviews

Sharks and Rays of Australia

P.R. Last and J.D. Stevens

Printed and distributed by CSIRO, P.O.Box 89 East Melbourne
3002 Australia, 1994
612 pages and 84 colour plates
Price: US\$95 which includes overseas postage

There are more than 950 species worldwide of sharks, rays and chimaeras, collectively known as cartilaginous fishes or chondrichthyans. Of these 296 have been recorded live in Australian waters and are described by Last and Stevens. This publication is the only major update of Australian chondrichthyans for 50 years and it is therefore not surprising that it includes 97 species not previously identified.

There is a definite need for a reference work on the rays of the world to complement the two-part FAO Species Catalogue on sharks of the world by Leonard Compagno published in 1984. This volume admirably fulfils this need for the Australian waters, where 28 of the 38 described members of the family Rajidae (skates) still await specific names.

The seas off Australia extend from a tropical 10°S to cold temperate waters over 40°S, providing a wide diversity of habitats. The authors stress the extreme richness of the Australian shark and ray fauna. By comparison in southern Africa there are 182 species listed in Smiths' Sea Fishes, while 174 species have been recorded from the Japanese archipelago.

Although over half (54%) of the 296 species described are endemic, the authors state that the Australian shark and ray fauna resembles that of southern Africa more closely than any other region. At least 60 of the 168 shark species and 19 of the 117 species of rays also occur in southern Africa. There are apparently no chimaeras common to both regions. This sharing of species is greatest in those families with large pelagic members, such as the Carcharhinidae (requiem or whaler sharks), of which 19 of the 30 species occur in southern Africa. Among the Scylorhinidae (catsharks), none of the 32 species, all small, bottom dwelling and slow moving, appears to occur in southern Africa.

The key to the 31 shark and 15 ray families and the keys to each of these families are profusely illustrated with explanatory line drawings and black-and-white illustrations. Each species is illustrated both in colour and black and white, and there are line drawings of the dentition, mouth or head of many species. A map depicting the worldwide distribution of each species is presented, a feature of particular value to readers from outside Australia. The accompanying text is divided into the following sub-headings: *Field characters*, *Distinctive features*, *Colour*, *Size*, *Distribution*, *Remarks*, *Local synonymy* and *References*. It is understandable, but unfortunate, that the references apply only to the Australasian region. *Remarks* include information on feeding habits, reproduction and movements and commercial value in Australian waters.

According to the authors *Carcharhinus limbatus*, the blacktip shark, and *C. tilstoni*, the Australian blacktip, can be reliably distinguished only on vertebral counts and enzyme systems. This provides a nightmare for managers of commercial fisheries, given the poor track record of most chondrichthyan fisheries. One can only hope that there will not be more species pairs or groups which can only be separated on such grounds.

My only criticism, although minor, is the manner in which the

tooth count is presented for sharks, such as the Carcharhinidae, in which it is a valuable identification feature. In these sharks there are 1-3 teeth in the centre of the jaw which are noticeably smaller than the lateral teeth. By convention the dental formula distinguishes the numbers of each tooth form. For example the formula of the bull shark *Carcharhinus leucas* is:

13 2 13
12 2-12

Last and Stevens combine the numbers of central and lateral teeth to give a tooth count for *C. leucas* of '25 27/25 [25-29/25 28 (usually 12 teeth on each side of the lower jaw)]'. In my opinion the authors should have adhered to convention.

Sharks appear to be extremely difficult to illustrate, given the poor representations which have appeared in many other reference works and field guides. In this publication the illustrators have excelled themselves in both the 84 colour plates and the black-and-white illustrations of each species. There is an extensive glossary and several illustrations are used to explain the morphological terminology used in the keys and descriptions.

Sharks and Rays of Australia can justifiably be described as a handsome work, of which the authors, illustrators and publication's financiers can be justly proud. It is a large format (302 x 225 mm), hardcover book weighing 3.1 kg. The text is large and easily readable; the contents follow a logical sequence and the book is well indexed. It will be a valuable reference, worldwide, for those with an interest in chondrichthyans.

GEREMY CLIFF

Natal Sharks Board, Private Bag 2, Umhlanga Rocks, 4320.

The Ecology of Mangrove and Related Ecosystems

Proceedings of the International Symposium held at Mombasa, Kenya 24-30 September 1990

Edited by Victor Jaccarini and Els Martens

Kluwer Academic Publishers, Dordrecht 1993

272 pages. Hardbound

Price: Dfl 300.00/ £116.00

ISBN 0-7923-2049-2

This book, Volume 80 in the Developments in Biology series published by Kluwer, includes 28 papers, two in the form of short abstracts. Twelve of these concern the East African coast, seven are from India and Sri Lanka, four from the Caribbean, two from Australia, two from Malaysia and one from the Philippines. It is divided into six sections: Status; Primary Productivity and Taxonomy of Mangroves; Seagrasses and Algae; Users of the Mangals; Coral Reef Ecosystems; Chemical and Physical Processes; Fishery Biology and Mariculture; and finally Exploitation, Conservation and Management Aspects.

The coral reef section stands on its own. The rest of the papers all refer to mangroves or the associated fauna except for one on seagrasses and one on microphytoplankton.

The first section (eight papers) covers the east African coast from Mozambique to Kenya and includes contributions from India and Sri Lanka. Some papers are very basic providing simply descriptions, species lists and areas, but aerial photographs and satellite imagery have been used and these provide the best information available at present. The papers from Sri Lanka provide comparative data on production under conditions of marine and fluctuating salinities which have some bearing on the present concern regarding reduced freshwater input into South African estuaries. Several papers include management suggestions, particularly in relation to Kenya and Tan-

zania where exploitation of mangroves and mangrove areas for various purposes appears to be significant.

'Users of the Mangals' (four papers) refers to associated fauna, not to human exploitation, and deals with meiobenthos, zooplankton and oysters in Kenya and the epibiota of the prop roots of *Rhizophora mangle* in Belize in the Caribbean. The latter situation has lent itself to some interesting possibilities for manipulation in order to assess physico-chemical effects on the community, the mutual effects of the biota and the effects, both adverse and beneficial, on the prop roots.

'Coral Reef Ecosystems' (two papers, one abstract) originates from Australia (one paper) and the Caribbean. Both papers are general but involve interesting discussions of long-term changes in reef systems in relation to factors resulting in switches between algal and coral dominated situations, and also the effects of storms, particularly hurricanes in the Caribbean. Long term weather records have posed intriguing problems in relation to succession and climax conditions in coral reefs and the time scales involved.

'Chemical and Physical Processes' (five papers) refers primarily to the current systems generated by tides in mangrove areas and the effects on stratification and water exchange between the mangrove systems and the neighbouring coasts. The papers referring to Australian and Malaysian examples as well as the work on the Rufiji delta in Tanzania (>1 000 km² of mangrove!) are particularly interesting, reflecting the ability of these particular systems to retain nutrients and to take advantage of the flow patterns that develop in these areas. To some extent they challenge the ideas of mangrove systems providing never-ending sources of detritic carbon to neighbouring marine areas.

The section on 'Fishery Biology and Mariculture' (four papers) had least impact for me, consisting of a repetitive paper on fish and prawns in Malaysia, oocytic atresia in rabbit fish in Kenya and carrageenan production in the Philippines, but also an intriguing suggestion from Kenya for integration of salt works with prawn production.

The last section 'Exploitation, Conservation and Management Aspects' (four papers) provided information on human users and their impacts, including a review of past management policies in India, management techniques in the Caribbean, particularly Jamaica, and the possibilities of regeneration in exploited areas in Kenya. The latter paper included an analysis of natural processes of propagule establishment under different conditions.

Overall the volume is akin to the curate's egg but it does provide some indication of what is going on in the Indo-Pacific region and an update on conditions as they existed 30-40 years ago in East Africa. It would be useful to be able to establish whether management and conservation suggestions for East Africa, with its greater local relevance, have been successful.

A.T. FORBES

Department of Biology, University of Natal, King George V Avenue, Durban, 4001

Rotifer Symposium VI

Proceedings of the Sixth International Rotifer Symposium, held in Banyoles, Spain, June 3-8, 1991

Edited by J.J. Gilbert, E. Lubzens and M.R. Miracle

Reprinted from *Hydrobiologia*, vols. 255-256, as *Developments in Hydrobiology* 83

Kluwer Academic Publishers, Dordrecht / Boston / London
572 pages

Price: US\$ 265.00; UK£176.50

It may come as a surprise to some zoologists, who regard rotifers as economically unimportant representatives of 'one of the minor invertebrate phyla', to learn that there is an international group of over 100 researchers, who devote their energies to the study of rotifers and who meet every three years to review advances in their field. The

state of rotifer research, as of 1991, is reflected in the 72 papers making up the present volume, which resulted from the meeting of 107 delegates from 25 countries. I was pleased to be among these rotifer enthusiasts who gathered in a former Benedictine Monastery in the small Catalan town of Banyoles, adjacent to a karstic lake of the same name, which is a major site of limnological research and rotifer community studies in Spain. The conference was organized by Dr Maria Miracle and her colleagues from the University of Valencia.

The book is introduced with three tributes to a much-respected doyen of rotifer research, Agnes Ruttner-Kolisko, who participated in the conference, celebrated her 80th birthday a month later and died shortly thereafter on a trip to Kenya. It had been at her invitation that the first rotifer meeting was held, on the occasion of her retirement as Head of the Biological Station at Lunz in Austria during September, 1976. Thirty-eight rotifer biologists from 15 countries attended that meeting and decided that, rather than marking the end of a chapter, the meeting was to be regarded as the *First International Rotifer Symposium*, and plans were made to meet again in three year's time in Ghent, headquarters of Henri J. Dumont. As Editor of the journal *Hydrobiologia*, he has facilitated the publication of all the subsequent conference proceedings in the series *Developments in Hydrobiology*.

It appears that the almost fanatical devotion shown by many rotifer enthusiasts has a long history. For almost three hundred years, amateur microscopists have derived pleasure from looking at microscopic organisms in drops of pond water; in such samples, rotifers are likely to be the most obvious of animals. They have captivated many a naturalist with their beauty, ubiquitous occurrence and ceaseless motion. In fact, much of the early work on rotifers was done by enthusiasts who observed their microscopic subjects, much as bird-watchers do on a macro scale, for pure pleasure. I have personally fallen under the spell of rotifers and I know that Agnes Ruttner-Kolisko had the same experience. I once asked her how it was that she chose rotifers as the subject of her life-long study. She looked at me in genuine astonishment and said: 'you don't choose rotifers, they choose you!' For her, the attraction of rotifers was very strong: She wrote 40% of her 67 papers on them after her retirement at the age of 65 years.

Although rotifers are extraordinarily abundant, the total number of known species does not exceed 2500, within three classes of the Phylum Rotifera, with by far the largest number placed in the class Monogononta. These rotifers show an alternation of parthenogenic and sexual reproductive modes and they attract the most attention from researchers, with 63 of the 72 papers in the volume being devoted to monogononts. The second most speciose class is the Bdelloidea, characterized by their leech-like creeping locomotion, their parthenogenic reproduction (males never having been reported) and their remarkable ability to dry out by a process of anhydrobiosis. Six papers were devoted to these animals while three dealt with the little-known Seisonidea, in which two species are known in the single genus *Seison*. These are marine rotifers which live attached to Crustacea of the genus *Nebalia*. They are remarkable in that both sexes are continually present and reproduction is invariably sexual; they may represent something of an ancestral archetype for rotifers in general.

Contributions to the volume were grouped under 10 headings: Biochemistry, Ecotoxicology & Histochemistry (seven papers); Aging, Development & Behaviour (seven papers); Reproduction, Population Dynamics & Culture (eleven papers); Genetics (five papers); Feeding, Trophic Webs & Behaviour (nine papers); Autecology, Interactions & Bdelloid Ecology (six papers); Community Ecology (eleven papers); Taxonomy & Biogeography (eight papers); Phylogeny (seven papers) and History of Rotifer Research (one paper).

Although rotifer studies were motivated initially by the curiosity of naturalists, they have recently acquired an applied aspect, through

the extensive use of rotifers as larval fish food in aquaculture facilities, now operating in many countries. For this purpose, rotifers are cultured in vast numbers, with appropriate technology having been developed to manage the process. Anyone interested in this, or other aspects of rotifer biology, will find a wealth of information in this symposium volume.

C.K. BRAIN

Transvaal Museum, P.O. Box 413, Pretoria, 0001

Identification Guide to the Ant Genera of the World

Barry Bolton

Harvard University Press, 1994
224 pages, 522 SEM photographs
Price: US\$65.00
ISBN 0-674-44280-6

The glossy, 10x12 inch front cover of Bolton's *Guide* bears a rogue's gallery of scanning electron micrograph portraits of nine species of ants. They are a foretaste of the bulk of the contents of this impressive catalogue: for every genus of ants in the world, there are two photomicrographs of a representative of the worker caste (which is often the only caste known); one of the body in side view, and the other of the head in face view. The pictures immediately bring out the fascinatingly sculptural qualities of ant morphology, so that they are not just a catalogue of variation, but also a portfolio of the sometimes bizarre architecture of this very successful group of social insects, which has been eulogised from the Bible to the works of Fabre and E.O. Wilson.

Some 10 000 species of ants have been named, and probably another 5 000 remain to be described. Despite this diversity, the evolution of their general body plan has been conservative, so that each species is readily recognizable to the layman as an ant. Combined with the frequently small size of ants, this has made the family a taxonomically difficult group, and that in turn makes Bolton's book a significant landmark in myrmecology.

The first of the three aims of this book was to marshal contemporary knowledge of the taxonomy of the ants, and the book has done this practically and handsomely. Apart from the illustrations, there are taxonomic keys to the workers of each of the 16 subfamilies and 296 currently recognized genera of ants. Each genus therefore contains an average of approximately 30–50 species, so that this taxonomic level provides a very practical summary of the diversity of this very large family. Several of the keys to large subfamilies are subdivided on the basis of geographical regions, which expedites identification, and an extensive diagnosis of each subfamily is also given so that one can verify one's identifications.

The second aim of the text was to provide a modern, synoptic classification and synonymy of the ants. Both the extant and the fossil genera and their synonyms are therefore listed under the appropriate tribes and subfamilies. Such a list has been long overdue. For example, the only comprehensive systematic treatments of the ants of southern Africa are those of George Arnold of the South African Museum, and William M. Wheeler of the American Museum; both of these tomes are more than 70 years old. Since then there have been substantial changes in the systematics of the ants, as reflected in the burgeoning of the number of recognized subfamilies from 5 to 16; the extensive synonymy of genera; and the obsolescence of the

use of trinomials. Many of these changes have come about following consideration of formicid diversity on a global basis, often for the first time. However, until the appearance of Hölldobler & Wilson's *The Ants* in 1990, there was no world-wide summary of the valid subfamilies and genera, and species still have to be identified by reference to a series of revisionary studies. Many of these revisions, as well as the taxonomic section of Hölldobler & Wilson's book, were written by Barry Bolton anyway, and it is therefore a great pleasure to see his expertise summarized and updated in this single volume.

Unhappily, our poor knowledge of the phylogeny of the ants has forced the alphabetical listing of subfamilies and genera, but the tribes have been placed in phylogenetic order wherever possible. Hopefully this will serve as a spur to this line of myrmecology. Extensive lists of taxonomic references, ordered by genus and with a note of the geographical region concerned, greatly complement the synopses.

The third aim of the *Guide* was to provide an overview of the faunistics of each subfamily, supplemented by a list of references to regional catalogues. Apart from facilitating re-search by summarizing our current knowledge of ant biogeography, the strength of this part of the book is to pin-point weaknesses that should promote future research on biodiversity. For instance, a third of the African ant genera are endem-ic, and yet there is no modern synopsis of the southern African fauna.

The book closes with an extremely useful glossary of anatomical terms illustrated by line drawings, eleven pages of bibliographic material, and an exhaustive index that innovatively also serves as a checklist. The printing was done on acid-free paper, so that the pages will not yellow with age. Scientifically and technically, the entire work is of extremely high quality, and I am very pleased to have my own copy. Perhaps the least of its achievements is to prove that one sometimes *can* judge a book by its cover!

MARTIN H. VILLET

Department of Zoology & Entomology, Rhodes University, Grahamstown, 6140

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