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BOOK REVIEWS

OTOLITH MICROSTRUCTURE EXAMINATION AND ANALYSIS. Edited by D. K. Stevensen and S. E. Campana. 126pp. Published by Research Journals (National Research Council, Ottawa, Ontario, Canada K1A 0R6) as Canadian Special Publication of Fisheries and Aquatic Sciences 117, 1992. Price $37.05. ISBN 0-660-14747-5.

Growth rings in scales, otoliths, opercular bones, fin rays and vertebrae have been used to age fish for a long time. The finding of Pannella in the early 1970s that many teleost fish deposit otolith growth increments with a 24 h periodicity, was a major step forward in assessing age and growth with greater accuracy and precision. Deposition of daily increments appears to be a universal phenomenon under all but the most severe conditions. The field of otolith microstructure research is now an accepted, and in most cases, a preferred tool for the study of fish. Applications of information derived from otolith microstructure are numerous and include: (i) age determination; (ii) daily growth rate estimations [population (integrated) and individual growth]; (iii) mortality and recruitment; (iv) migratory and environmental history; (v) life history events; (vi) condition and (vii) taxonomy and stock structure. The increasing importance of this technique is reflected in the number of publications reporting its use (the number of published papers has increased almost exponentially since 1979, and field applications represent most of the published studies).

This book represents a first attempt to compile and summarize all the techniques and procedures (collection, preservation, handling, mounting, preparation and observation) associated with the study of otolith microstructure. Previous attempts have been focused mainly on particular species and/or protocols. Most of the referred techniques are described in detail, and the various chapters are all written by authors with considerable experience in the field. The book is not (as it is pointed out in the Preface) a manual. Nevertheless, the seven different chapters give most of the information relevant for beginning investigators interested in using the otolith increment technique. More experienced researchers will also find a huge amount of interesting information published for the first time. The first chapter gives a good overview of the otolith increment technique. It also presents the majority of current applications of this technique as well as future guidelines. In the second chapter, most of the aspects related to collecting, handling and preserving fish for otolith microstructure analysis are discussed in considerable detail. The third chapter deals with the important issue of otolith removal and preparation for microstructural examination. The fourth chapter describes the principal techniques involved in the examination and interpretation of otolith microstructure as well as otolith measurements, and includes a brief discussion of image analysis systems (now a powerful tool in the study of the otolith microstructure). In the fifth chapter, the accuracy and precision of age estimations derived from otoliths using the increment technique are discussed in considerable detail. This is one of the most interesting and important sections of this book since data analysis and statistical techniques used in this field are as a rule poorly understood. Although most of the information included in this chapter has already been published elsewhere, the authors have compiled it in a very interesting and innovative way. The sixth chapter deals with one of the most important issues of otolith microstructural studies, the validation of daily otolith increment deposition. Finally in the last chapter the sources of error associated with these studies are discussed, and some guidelines are presented in order to prevent bias.

All in all this monograph is a very good collaborative work and should be very welcome to newcomers as well as experienced investigators dealing with information derived from otolith microstructural examination. I would have liked to see the use of image analysis systems described in more detail. Video-microscope-computer-based

image analysis systems can be used with excellent results to study otolith microstructure, mainly as an aid to otolith measurement and increment counts. Measurements of otolith radius, diameter and otolith area/volume can be performed with high degrees of precision using these techniques. Image processing (including manipulation, filters and fast Fourier transformation) can be used to improve increment contrast and increment counting accuracy.

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THE ROCKPOOL FISHES OF NEW ZEALAND (TE IKA AARIA O AOTEAROA). By C. Paulin and C. Roberts. xii 177 pp. Published by the Museum of New Zealand, 1992. Price $38.00 (including postage and packing: available from Fish Section, Museum of New Zealand, P.O. Box 467, Wellington, New Zealand). ISBN 0-908953-01-1.

The seashore has long been attractive to biologists, although the fishes found between tidemarks have tended not to receive such detailed study as the many more easily observed and sampled invertebrates. Around the British Isles, the shore fishes, defined very loosely, are varied in form but comprise not more than about 40 species in all intertidal situations. The present book deals with a much more speciose fauna of 83 fishes which occur in just the rock pools of New Zealand shores. Again, criteria for inclusion are broad, and some of these are transient species such as mullet, especially younger stages, as well as the more typical small benthic species which live and breed in the intertidal region.

Thanks either to isolation following intermittent dispersal, or to vicariant subdivision of larger areas of distribution (a local bone of contention), the New Zealand shore fishes show a high level of endemicity in comparison to the marine fish fauna as a whole, and, if not peculiar to New Zealand, most of the rest are confined to other Australasian waters. There are small admixtures of subantarctic and more widely distributed forms to the south and north respectively; at the northern end of the region, representatives of the rich tropical Indo-Pacific fish fauna tend to occur subtidally rather than in the littoral zone. Groups of particular interest among the shore fishes are the 20 species of triplefins (Tripterygiidae), the commonest rockpool fishes and a blennioid family for which New Zealand is a centre of diversity. Twelve endemic clingfishes, including generalized members of this highly modified order, fall into two ecological groups, some frequenting a rocky substrate and others living and breeding on seaweed. This diversity helps to relieve the disappointment that only two gobioids are listed, an Indo-Pacific derivative and a somewhat progenetic offshoot from local freshwater sleepers. Southerly sub-antarctic groups are exemplified by a notothenioid ice-cod, and a deeper water element by two roughies. Not all the rock pool fauna is exotic, since our familiar John Dory also appears.

The present book describes all these rockpool fishes in a comprehensive manner. There is a basic introduction to fish form, nomenclature, and methods for preservation and photography of specimens. A brief history of earlier studies emphasizes the need for much further research, including basic systematics. The New Zealand coastal environment is described and illustrated, and various biological attributes of shore fishes are discussed, including coloration and feeding. There is then a zoogeographical analysis, hydrography (not 'hydrology') and the special features of the islands to north and south of the main ones. Identification is helped by a key to every species which precedes the main systematic account, provided the family is already known. Each species is illustrated with a detailed line drawing and there is also a distribution map, as well as many colour photographs, not only of fish, but also of typical habitats. No synonymy is provided, but Maori names are given when available. To assist the general reader, there is an extensive glossary and a separate reference section, before the comprehensive bibliography and appendices of names, as well as a somewhat lonely map of New Zealand marine provinces.

Being interested in small fish diversity and biology, the reviewer found this in general a pleasing and informative book, although it is more of a 'coffee-table' volume than a