

Book Reviews

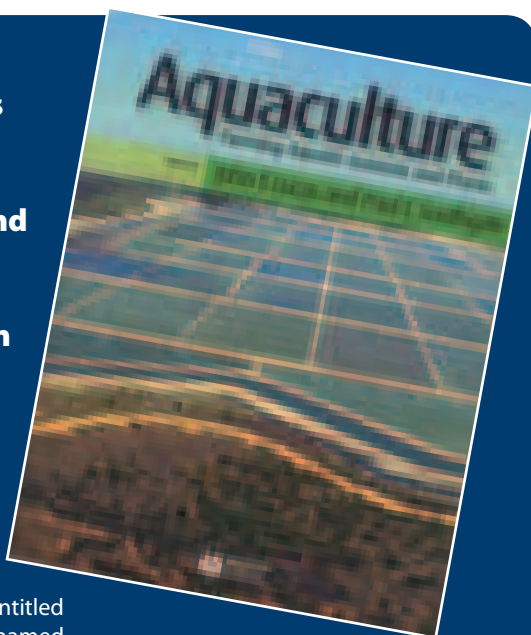
Aquaculture Farming Aquatic Animals and Plants

**Edited by John S Lucas and
Paul C Southgate.**

**Published by Fishing
News Books, 512 pages in
paperback, price £45.**

On lifting this book, I was immediately transported back a quarter century and reminded of the sense of exotic fascination I felt when first introduced to the aquaculture bible of my formative years – also entitled *Aquaculture and with a lead author named John (Bardach, Ryther and McLarney – Aquaculture. The Farming and Husbandry of Freshwater and Marine Organisms)*. A student from Malaysia on a work placement in the laboratory where I worked had a copy, astonishing me with the range of aquatic organisms that were already cultured (and eaten!) in the tropics. It was a few years later and as an undergraduate student myself that I excitedly found my own copy in a second-hand bookshop – missing 31 pages, but an absolute bargain at only £2.

This new volume will hopefully foster the same excitement in today's students. It spans the full breadth of aquaculture products from coldwater salmonids to tropical shrimp, and from freshwater algae to marine abalone. However, those looking for information on specific species may often be disappointed, as many new, and even well-established industries are not specifically mentioned. This is not therefore an encyclopaedia of aquaculture. The strength of the book is in the clear way it draws out the general principles of aquaculture practices around the world (albeit with a very slight but not necessarily unwelcome Australian bias). The first half of the book discusses general principles with sections on aquaculture systems, water quality, environmental impacts, reproduction, lifecycles and growth, genetics and stock improvement, nutrition, feeds and feed production, disease, post harvest processing technology and economics and marketing. A more unique inclusion here is a short section on desert aquaculture, drawing mainly on experiences in Israel. The second



part of the book examines the culture of selected species. Sections here are algae, carps, salmonids, tilapias, channel catfish, barramundi, marine shrimp, freshwater crustaceans, bivalves and marine gastropods. Having commenced with an overview of global aquaculture the book finishes with visions for future development.

There are 27 contributors to the book in addition to the two lead authors, which helps to ensure that each section, although relatively brief and introductory in style, is nevertheless authoritative and informative. The editors have also done an excellent job in ensuring a consistent readability and academic level throughout the text, and a list of references is provided at the end of each section. Overall, this is a classic introductory text for aquaculture courses, especially at higher education level. For everyone else with an interest in aquaculture, it provides a wealth of useful background material. I would be more cautious about recommending it for people planning to start an aquaculture enterprise. It is not a practical manual from the technical perspective, and although containing a very welcome section on economics and marketing, provides little guidance on actually establishing and managing an aquaculture business. However, as a general descriptive text on aquaculture principles and practices it should easily win a place on many students' and professionals' bookshelves.

John Bostock
Stirling Aquaculture

Bacteria from Fish and Other Aquatic Animals: A Practical Identification Manual. CABI. £65

by N.B. Buller



Bacteria from Fish and Other Aquatic Animals: A Practical Identification Manual published by CABI is sure to be a valuable asset to both researchers and diagnosticians involved in aquatic animal health. The manual focuses on the isolation and identification of bacteria from mainly wild, cultured and aquarium fish, but also includes bacteria associated with molluscs, shellfish, reptiles and some aquatic mammals. It covers nearly 400 bacterial species including pathogenic and environmental bacteria, normal flora through to potential probiotic bacteria, and describes biochemical, biophysical and molecular characteristics associated with these bacteria. The extensive reference list provided by the author allows the reader to expand their knowledge as required.

This spiral bound manual is easy to use and the text is supplemented by numerous comprehensive easy-to-follow tables. The forward by John Plumb sets the scene for the seven chapters which follow. Chapter 1 deals with the relationship between aquatic animal species and the bacterial organisms associated with it, as part of its normal bacterial flora or in relation to bacterial disease. The tables in this chapter are complemented by a brief outline on the more commonly found bacterial diseases of fish. The next chapter deals with bacteriological culture techniques; from specimen collection to culture and identification. Microscopic and cultural characteristics are detailed in yet another comprehensive table. Sixteen pages of coloured plates at the start of the manual help with this identification. This is followed by two chapters dealing with identification of bacterial species based on their biochemical characteristics, interpretation of biochemical identification tests and the use of biochemical identification tables (conventional biochemical tests and API kits). Chapter 5 provides some technical background for working with bacteria, while Chapter 6 concentrates on molecular identification of bacterial species. The author gives a useful list of specific primers available for the detection of bacteria by PCR and suggests protocols for their use. The final chapter provides recipes for general isolation and selective media, and also biochemical test media.

A significant increase in aquatic microbiology, due in part to increased aquaculture and international trade of live aquatic animals, has led to a rapid advancement in the isolation and identification of bacteria from aquatic animals. This comprehensive reference manual will undoubtedly contribute significantly to this work. The manual is highly recommended and a worthwhile investment at £65.

Dr Kim D. Thompson
Disease Group

Aquaculture and Fisheries Biotechnology: Genetic Approaches

By Rex A. Dunham. Published February 2004 by CABI Publishing. 372 p. ISBN 0 85199 596 9 Price £75/\$140.



Rex Dunham, from Auburn University, will be well known to many potential readers of this book, since he has a prolific publication record on many aspects of aquaculture genetics and biotechnology.

The first thing I noticed when skimming through the contents was the broad scope – not just the expected technical chapters on chromosome set manipulations, sex ratio manipulation, molecular markers, gene mapping, GMOs, etc, but also chapters on the history of genetic biotechnology, genotype-environment interactions, potential environmental impacts, food safety aspects, governmental regulation and commercial applications of genetic biotechnology in aquaculture and fisheries. Genomics approaches – including quantitative trait loci, marker-assisted selection, expressed sequence tags and microarray assays – are dealt with in detail, with examples from a range of species and traits. As I read through these chapters and reached the closing sections, I was also struck by the enormous glossary (over seven hundred terms defined) and reference list (over 1800 references). These alone will make a very useful resource.

Any flaws? As might be expected, there were some points where I might have interpreted the literature slightly differently, and I found a few minor errors, but nothing that detracted significantly from my overall impression of the book.

The publisher's information states that the target audience is "advanced students, professionals and researchers in animal genetics, fish biology and aquaculture". I would certainly recommend this book to postgraduate students and colleagues, and do not expect my review copy to sit for long on my bookshelf without being borrowed.

Further information can be found on the CABI website at: http://www.cabi-publishing.org/Bookshop/book_detail.asp?isbn=0851995969

Dr David Penman
Genetics Group

Book review – Culture of Cold-Water Marine Fish. Edited by Erlend Moksness, Elin. Kjørsvik and Yngvar Olsen. Published by Blackwell Publishing, Oxford, January 2004. 528 pp. ISBN 0-85238-276-6 Price £95.00.

With the recent upsurge in activity and interest in this area, 'Culture of Cold-water Marine Fish' is a well-timed and thorough review of current knowledge in this area. The subject is diverse, and much remains to be learnt, but this book presents an excellent and detailed introduction to the subject.

At first encounter the methods used in marine hatcheries can seem to rely more on sorcery than science, but the importance of understanding these complex systems in order to develop efficient and sustainable intensive rearing methods is widely recognised. This is part of the attraction for researchers, and the challenge for commercial producers, and this book will be a valuable reference for both audiences.

Cold-water marine fish are defined as those occurring within a temperature range of 0 to 20°C and salinity range 10 to 34 o/oo. Within this range, the species of interest include the current candidates for commercial aquaculture: Atlantic cod, halibut, turbot, and wolfish, and also haddock, hake and sole which are at an earlier stage of development. The book is divided into twelve chapters and presents plenty of original material on these species, and also background information derived from work on other species, including salmonids and warm-water marine fish.

The first series of chapters covers abiotic factors, microbial interactions, live feeding techniques, broodstock and egg production, larval development, first feeding, weaning and nursery rearing and ongrowing. The authors are all recognised experts in their field and this section provides a wealth of information on the background, practical techniques, and current research in these areas. It is difficult to single out particular highlights since the overall quality is very high and each page brings out something of interest. However, of particular interest was the discussion of microbial ecology in larval rearing systems, and the modelling of rotifer production kinetics, both of which shed some unique light on what goes on beneath the surface in marine hatchery systems.

Commercial producers have a need to quickly establish detailed rearing protocols suited to conditions at their own sites. The up-to-date descriptions of methods used

for egg collection and incubation, live feed production and larval development will help to establish best practice in new hatcheries, and the information on recent research findings may suggest changes to 'tweak' the system in the right direction.

The importance and need for research on the use of suitable feeds, at all stages of the production cycle, is highlighted throughout the book. Problems with egg quality from captive broodstock, poor survival during larval growth and weaning, and efforts to optimise growth, feed conversion and carcass quality during nursery rearing and ongrowing, are all discussed in detail and illustrate some of the many avenues where much more basic and applied research is required.

A final series of chapters deal with the current status and prospects for the various species, a short chapter on stock enhancement and sea-ranching, and a useful account of the economics of cold-water marine fish farming. These provide some useful figures and information, for example, an up to date review of haddock and hake cultivation, not readily available elsewhere

At 595 pages, the book is encyclopaedic. Fortunately, each chapter includes a bibliography, and the book is well indexed. At £95, the price will be outside the reach of many individuals, but the book will be an essential purchase for institutions active in this field.

In summary, the book contains a wealth of information of practical value to staff on commercial farms, as well as detailed reviews of interest to researchers in this field. It should be a key reference for producers, researchers and students, interested in any aspect of cold-water marine fish culture.

Bill Roy
Marine Environmental Research Laboratory



New Bioimaging Facility

This year saw the installation of the first component of the Institute's new Bioimaging Facility. The Bioimaging Facility, which builds substantially upon the capabilities of the old electron microscope suite, will see the completion of equipment installation in early 2005 and is to be managed by Linton Brown and James Bron. The first microscope, installed at the end of 2003, was a Wellcome-funded confocal laser scanning microscope (CLSM). The purchased machine is a multi-spectral Leica TCS SP2 AOBS running on an inverted microscope and equipped with 5 laser lines ranging from near UV (405 nm) to far red (633 nm). This machine, one of the best-specified in Scotland, allows researchers to carry out high resolution imaging of cells, tissues and whole organisms, bridging the gap between light microscopy and electron microscopy. In particular, it allows simultaneous imaging of multiple fluorescently-labelled targets, these targets representing, for example, different proteins (e.g. using antibody labelling) or simultaneously expressing genes (e.g. using *in situ* hybridisation). The microscope can also be used to capture time series (e.g. developmental changes) or follow physiological changes. Confocal work undertaken so far includes work on the structure of *Tetracapsuloides bryosalmonae*, the causative organism of PKD by Charlie McGurk and Dave Morris, *in situ* work on the myxosporean *Sphaerospora truttae* by Astrid Holzer, investigation of the portals of entry of pathogenic bacteria into fish eggs by Kim Thompson and Tom Wiklund, studies of viral infection in cultured cells by Kim Thompson and studies of rickettsial infection by Una McCarthy.

Over the following year the Bioimaging Facility will also see the delivery of a SRIF-funded high specification low vacuum scanning electron microscope with cryo-preparation and elemental analysis capabilities and a research grade transmission electron microscope with 3D-tomography capabilities. As part of the Bioimaging Facility, image analysis and image processing software required to support the microscopy capabilities will be installed in the Institute's new bioinformatics suite.



Confocal microscope image of an infective spore of the PKD organism *Tetracapsuloides bryosalmonae* showing the cellular components of the spore.



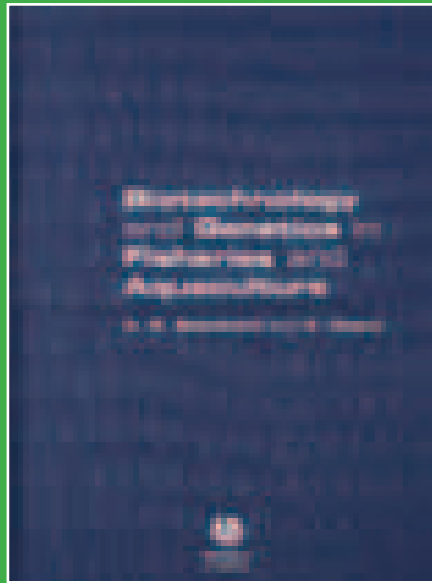
Diagrammatic reconstruction of the spore components of *Tetracapsuloides bryosalmonae* based on confocal microscope observations.

Biotechnology and Genetics in Fisheries and Aquaculture. A.R. Beaumont and K. Hoare Blackwell Sciences Ltd Oxford. 2003. 176 pages Price c. £40

Molecular genetics and biotechnology have undergone a revolution over the past decade. Novel approaches, largely developed to service and exploit the Human Genome Project and associated programmes, have been rapidly adopted by the wider scientific community. Fish science is no exception. The authors of this book aim to produce "an introductory-level text which can explain to both students and professionals in fisheries and aquaculture what the new technologies in molecular biology and genetics have to offer." How successful they have been depends, to some extent, on one's definition of 'new' technology.

This is a relatively compact book comprising 140 pages of text, together with a 13 page glossary and 4 page index. While each chapter concludes with some 'Suggested Reading' there is little cited material and no bibliography.

Chapter 1 competently outlines the basics of genetic biochemistry and variation. The second chapter, outlining methodologies employed for measuring this variability, is less accomplished. It would benefit from clearer and more accurate prose and a more consistent approach (e.g. provision of illustrations and examples of the successful application for each marker type). The third chapter, the only one dedicated to wild fisheries, is restricted to aspects of population structure as revealed by genetic markers and conservation issues. These are well explained but largely exemplified from an allozyme based perspective. Less emphasis is given to mitochondrial and microsatellite based studies. The strengths of these more modern approaches in, for example, phylogeography, behavioural ecology, analysis of archived samples and elucidation of reproductive strategies, receive comparatively little, if any, attention. Chapters 4-6 focus on genetic aspects of aquaculture; namely genetic variability in the hatchery, artificial selection and ploidy manipulations. These provide excellent coverage of well established ideas and practices within aquaculture. A notable omission is the topical issue of domestication selection and its relevance to supportive breeding efforts. Incongruously, chapter 4



also includes a succinct explanation of the methodology behind genome mapping, although the strategic importance of such maps in applied genetics is not established. Chapter 7 covers an overtly biotechnological issue; genetic engineering in aquaculture. This final chapter is well constructed and written, dealing with theoretical, practical and ethical aspects of this controversial subject. However, it is confined by the authors limited definition of genetic engineering as transfer of genes between species.

Despite the broadly scoped title and aims, the authors concentrate primarily on describing proven, practical technologies related to aquaculture. At this level, the book provides a competent introduction for the novice reader, although its value is undermined by the lack of a comprehensive bibliography. Apart from the final chapter, genetic advances within fish sciences in the past five or so years are not well covered. During this period the draft genome sequence for *Fugu* has been produced, zebrafish and medaka genome sequencing projects are well advanced and several genome linkage maps (e.g. tilapia & rainbow trout) and QTL mapping studies published. Other fish genome resources have been rapidly expanded (e.g. EST databases, BAC libraries), microarray and SNP (single nucleotide polymorphism) technologies embraced, and comparative genomics exploited to isolate and characterise fish genes. For an introduction to these and other advances, and their relevance to applied fisheries science, the reader will need to look elsewhere.

Dr John Taggart
Reproduction & Genetics Group