

## Fisheries Research and Developments in Asia

**"The First Asian Fisheries Forum,"** has been published by the Asian Fisheries Society, MC P.O. Box 1501, Makati, Metro Manila, Philippines, and was edited by J. L. Maclean, L. B. Dizon, and L. V. Hosillos. The Forum, held in 1984 in the Philippines, highlighted important regional fisheries developments in the last 40 years, and was large. The volume produced is also large, at 727 pages, but it well reflects the vast range of interests in the realm of Asia's marine fisheries.

The fisheries of Asia are important in and outside the region: Four of the top ten fish producing nations of the world are there; so are seven of the top ten shrimp producing nations. Fisheries research, as reflected in this huge volume, will no doubt help the industry to develop and grow.

At the Forum, some 230 papers were presented, with some eventually published elsewhere, others withdrawn or

not considered, and the remaining 167 papers are published here. It begins with three Plenary Reviews: An overview of the fisheries and aquaculture industries in Asia by Chua Thia-Eng; new developments in fish nutrition by Akio Kanazawa; and concepts that work: Some advances in tropical fisheries research by Daniel Pauly.

The remainder of the contributions are divided into eight sessions: Aquaculture Systems, Biochemistry, Biology, (developmental and general); Fish Health, Pollution and Toxicity (subdivided into bacterial diseases, parasites, pollution, toxicity, viruses, and general studies categories); Fisheries (subdivided into development and management, education, gear and methods, information, postharvest and marketing, and resource assessment categories); Nutrition and Feeding Habits; Physiology; and Reproduction.

The first thing that strikes the reader is

the breadth of scope of the contributions and the number of them. It makes an impressive reference which is priced in an effort to be available to many scientists in that part of the world. Many of the papers deal with tilapia and tilapia culture. Many others discuss various Asian shrimps and their culture, and problems associated with fish culture. Other articles describe methods developed for culturing tridacnid clams from seed size to maturity in a natural environment; milkfish, seabass, and oyster culture; and more.

More specific biological studies include gill development in the cichlid *Oreochromis niloticus*; early development stages of the red sea bream; ecology and biology of giant mantis shrimp; growth performance indices of 100 tilapia populations; feeding ecology of *Penaeus monodon*; biology and culture of *Ranina ranina* Linnaeus (variously called the spanner, frog, or kona crab); and a report on ichthyoplankton studies in the southern Java Sea.

The "Fish Health" section includes seven studies on bacterial diseases and five on pollution problems and its effects on various species; there are eight papers on parasite studies, including reviews of parasites of juvenile milkfish, parasites of the Nile tilapia in the Philippines; the

## Finding Environmental Data for the Chesapeake Bay

Publication of bibliographies and data sets seems to be waning, at least in part due to cost factors and the hope that such items will be found in database searches, etc. Too often, though, many materials are unused or at least underutilized, especially if not published or referenced in the formal literature. To remedy that situation for the Chesapeake Bay region, the University of Maryland Sea Grant College Program has published the **"Chesapeake Bay Environmental Data Directory,"** compiled by Dan Jacobs, Daniel Haberman, David Smith, David Swartz, Elizabeth Sigel, and Michael

Adams, as a cooperative project with NOAA and the Virginia Sea Grant College Program.

As Jacobs points out, much of that data is constantly collected through environmental satellites, oceanographic ships, weather stations, scientific studies, and management monitoring efforts, but locating specific data is both difficult and costly. Says Jacobs, "Potentially valuable data sets have gone unused because their existence is not widely known, they are poorly documented, or they are difficult to obtain." This new book, though, documents 826 sources of Chesapeake Bay environmental data, tells how and when they were collected, as well as information on usage limitations, data quality, and where they are available. It

contains 2,242 entries, a principle investigator and contact organization index, and a key word index.

Each summary provides enough information so researchers can decide whether a data set is relevant to a specific need. Data may be stored on paper, magnetic media, microfiche, charts, graphs, or maps, and as much information as possible is given about availability, charges, and restrictions (if any) on use of the data. Included is data on fishes, water temperatures, currents, aquatic ecology, water quality, and much more. The 926-page volume is paperbound, costs \$10, and is available from the University of Maryland Sea Grant Program, 1224 H.J. Patterson Hall, College Park, MD 20742.

parasite fauna of seabass, *Lates calcarifer*, in Malaysia and Thailand; and a brief review of toxic dinoflagellates in Japan, along with other papers on toxicity studies, viral studies, etc.

The theme of the Forum was "Traditional Practices and New Frontiers in Asian Fisheries," and the volume reflects that with papers on both current harvest and farming techniques and the latest developments in Asian fisheries research. The 727-page hardbound book has species and author indexes and lists Forum participants. Cost is US\$40 (surface mail), US\$60 (airmail in Asia), and US\$64 (airmail elsewhere).

## LIVES OF THE DINOFLAGELLATES

F. J. R. Taylor of the University of British Columbia has edited the new, large, and thorough Botanical Monograph 21 entitled "**The Biology of Dinoflagellates**," which has been published by Blackwell Scientific Publications, Inc., 667 Lytton Avenue, Palo Alto, CA 94301. Claimed by both botanists and zoologists (as algae and protozoans, respectively), and with their nomenclature regulated by both the International Code of Botanical Nomenclature and the International Code of Zoological Nomenclature, the dinoflagellates are an interesting group for study. They also have a long fossil record of about 220 million years and, unfortunately, a few of them are highly toxic, and can make certain fishes very hazardous to eat (see *Mar. Fish. Rev.* 48(4):1-59).

This new volume, authored by internationally recognized authorities, provides a comprehensive review of the biology and ecology of this group which will be an important reference work on them. About 2,000 living species and 2,000 fossil species had been described by the late 1970's and perhaps about half the living ones are photosynthetic. To avoid the "animal or plant" controversy, they may be referred to as "protists," unicellular eukaryotic organisms.

Taylor himself provides an introductory chapter on general group characteristics, special features of interest (such as

toxicity, luminescence, etc.), and a history of dinoflagellate studies, as well as the chapter on dinoflagellate morphology. John D. Dodge then reviews general ultrastructure, updating his own 1971 work, while C. Greuet reviews the complex organelles. Peter J. Rizzo then reviews the biochemical properties of the dinoflagellate nucleus and Barbara Prezelin discusses the photosynthetic apparatus and physiology of dinoflagellates.

About half the dinoflagellates are obligate heterotrophs, and Gregory Gaines and Malte Elbrachter discuss heterotrophic nutrition—types of heterotrophy, symbiosis, feeding organelles, and apochlorosis. Bioluminescence and circadian rhythms are reviewed by Beatrice M. Sweeney in Chapter 7 and then Yuzuru Shimizu presents a thorough discussion of the toxins of *Gonyaulax*, *Gymnodinium breve*, *Gambierdiscus toxicus*, and those of other species. Dinoflagellate sterols are outlined by Nancy Withers while M. Levandowsky and Pamela J. Kaneta discuss dinoflagellate behavior.

Taylor then reviews general considerations on the ecology of dinoflagellates and discusses their ecology in marine ecosystems, while Utsa Pollinger reviews their ecology in freshwater ecosystems. Additional chapters discuss parasitic dinoflagellates, dinoflagellates in nonparasitic symbioses, dinoflagellate reproduction, and dinoflagellate cysts in ancient and modern sediments. An appendix is also provided by Taylor on taxonomy, along with an outline classification of the living dinoflagellates. Each chapter carries extensive references, and the book has taxonomic and subject indexes. Hardbound, the 785-page volume is an impressive reference and is available from the publisher at \$180.00.

## How to Write and Present Technical Data

"**The Basics of Technical Communicat**ing" by B. Edward Cain, an ACS Professional Reference Book, has been published by the American Chemical Society, 1155 Sixteenth Street, N.W., Washington, DC 20036, and it provides

good and sound information for the scientist/writer.

The book is divided into three parts. Part one on "Improving your technical communication skills," has an introductory chapter defining just what "technical communication" is. Chapter 2 quickly gets to the meat of the topic, specifically detailing how writers can eliminate wordiness and jargon and presenting appendices of all-to-common phrases with unnecessary words, phrases which can (and should) be replaced by shorter words, tautologies, and "absolute" words that resist (or simply do not need) modifiers, such as "dead," "extinct," "rare," "vertical," and others. Chapter 3 reviews correct punctuation and chapter 4 makes some good points on selecting and using appropriate verbs.

Part 2, "Assembling your report," leads prospective communicators through outlining, gathering data, documenting (with footnotes, endnotes, and bibliographies), abstract preparation, and proofreading (recommending that the author read the proofs and a colleague read the paper). Chapter 10 provides suggestions on using computers and word processors to their best advantage. The author even recommends "the old fashioned art of making notes" instead of wholesale photocopying of a source (which may indeed be illegal).

The chapter on visual aids and graphic art is also excellent, pointing out common pitfalls and showing authors how to present their data clearly and simply. Discussed are charts, diagrams, graphs, tables, and photographs, and the author warns against "chartjunk" or cluttering up visual aids with unnecessary gimmicks or shadings.

Part 3 addresses the scientist's "Specific Needs," beginning with directions for preparing academic laboratory reports, industrial and business reports, grants, and proposals, and even business correspondence, resumes, memos, and short reports. Chapter 14, "Journal Publication" provides useful advice for those wanting to publish a paper, ranging from deciding where to seek publication, what type of communication to submit (article, note, review, letter, etc.), determining the proper format, organizing the mate-

rial, and then explaining the review process for the prospective author.

Communicating scientific thought and progress is not always easy, but this book should help smooth the road for potential authors. It presents important information in a clear, easy-to-read, straightforward manner. The 198-page volume costs \$29.95 (hardbound) in the U.S. and Canada and \$35.95 elsewhere; paperbound copies cost \$19.94 in the U.S. and Canada and \$23.95 elsewhere and is sold by the ACS Distribution Office, Dept. 390 (address as above).

Also published by the ACS is "Writing the Laboratory Notebook" by Howard M. Kanare which presents basic data on creating a proper record of their work studies and explains the role that a notebook should play in experiment planning, observation, and analysis of data.

### **Progress, Problems, and Potential in Aquaculture**

Review papers from the World Conference on Aquaculture, held in Venice, Italy, in 1981 have been published as "Realism in Aquaculture: Achievements, Constraints, Perspectives" (edited by Martin Bilio, Harald Rosenthal, and Carl J. Sindermann) by the European Aquaculture Society, Prinses Elisabethlaan 69, B-8401 Bredene, Belgium. Most of the articles are reviews of the results of scientific research, though some summarize and evaluate practical experiences and public regulations, and others assess the potential for future aquaculture developments. And in sum, the papers do a fine job of addressing the rationale of the conference—to evaluate as comprehensively and effectively as possible aquaculture research efforts, developmental trends, and commercial realization.

The keynote lecture, by O. Kinne, presents the views of a well-known ecologist on food production, ecological and other limitations on aquaculture, and his outlook on the future of aquaculture. That is followed by articles on the current status of aquaculture and developments in Japan and the Mediterranean region. In addition, recent advances in the culture

of molluscs and crustaceans, seaweed culture, and the use and production of microalgae as a food in aquaculture are presented. Other articles discuss brine shrimp and other organisms as foods in aquaculture programs, aquaculture nutrition, control of fish reproduction, mass rearing of fish fry, species transfers and introductions and the problems involved, the role of pathology in aquaculture, genetic factors in aquaculture, and stress and behavior in the culture environment. Additional papers are presented on culture system design and water quality criteria, application of aquaculture technology, economic aspects of aquaculture, pertinent legislation and regulations in various nations, and product quality criteria and quality control.

Unfortunately the volume is not indexed, for it presents some very good and authoritative reviews of important aquaculture topics. The 585-page paperbound volume is available from the Society (price not listed).

The Society's Special Publication 9 is "Pathology in Marine Aquaculture," edited by C. P. Vivares, J. R. Bonami, and E. Jaspers, and it constitutes the Proceedings of the First International Colloquium on Pathology in Marine Aquaculture held in 1984 in Montpellier, France.

The Proceedings is published in five parts: 1) Ecopathology (with articles on epidemiology, the influence of environmental factors on certain diseases, and the parasitofauna of the hosts), 2) Parasitic diseases (those maladies caused by protozoans, helminths, and crustaceans), 3) Infectious diseases (with papers on fungal, bacterial, and viral diseases), 4) Tumors, and 5) Immunology, Prophylaxis, and Therapy. A number of the papers are in French, but all include abstracts in both French and English.

Some papers of interest include a case history of the *Bonamia ostreae* control in the Dutch oyster culture, a summary and analysis of epidemiological knowledge on bivalve mollusks, a review of problems involved in research on protozoan parasites of marine fishes, aspects of the feeding behavior of *Carcinonemertes errans* (an egg predator of the dungeness

crab), histopathological effects of certain coccidia infesting certain Mediterranean fishes, viral infections in the crab *Carcinus mediterraneus*, and molecular biology of fish lymphocystis disease virus. Others relate aspects of ecology and histochemistry of rodlet cells of teleosts, review bacterial problems in oysters, review fungal diseases in marine invertebrates, and discuss organ distribution and morphology of antibody producing cells in *Sebastes marmoratus*, examples of neoplasia or neoplastic-like conditions in marine fishes from the Registry of Pathology at the Fish Diseases Laboratory in Weymouth, and more. The 428-page paperbound volume is available from the Society (price not listed).

### **The Design and Use of Small-Scale Fishing Gear**

The second edition of the FAO's "Catalogue of Small-Scale Fishing Gear" has been released by Fishing News Books Ltd., 1 Long Garden Walk, Farnham, Surrey, England, GU9 7HX. The book is edited by C. Nedelec, and was revised and enlarged by J. Prado. In format it is like the first edition, consisting primarily of gear designs and specifications, and indicating the uses of each pattern. The few pages of text are published in parallel in English, French, and Spanish.

The categories of gears included are: Surrounding nets, seine nets, trawls, dredges, liftnets, falling gear, gillnets, driftnets, traps, hooks-and-lines, and scoop-nets. This new second edition has added such new gear designs as a driftnet for shark (from Ghana), an elver scoop-net (from France), an Icelandic cod gillnet, and a Moroccan cockle dredge.

As with the original edition, the book covers a representative selection of the primary types of gears which are made, often, from such conventional materials as nets, ropes, and lines and which have proven profitable in commercial fisheries that operate from shore or from small boats of about 15 m length and with engines of up to 150 horsepower, and in nearshore or inland waters. This new edition stresses practical construction of the gear and its operation, utilizing drawings

or photos showing the layout and the boat and how it is maneuvered during fishing.

Also published are many useful tables and appendixes on equivalents and conversions, trade names of synthetic fibers, examples of common netting yarns, cutting rates and taper ratio, hanging ratio, and a glossary of gear terminology in all three languages, plus a guide to the abbreviations used for the gear designs.

Very well illustrated, the 224-page hardbound volume is available from the publisher for £16.00 or in North America from Bernan-Unipub, 4711-Assembly Drive, Lanham, MD, 20840 for \$25.25, and it will continue to be an excellent reference for students, fishermen, educators, and others involved with fishing gear.

## THE CARE AND REPAIR OF NETS

An updated second edition of the FAO's "**Mending of Fishing Nets**" by L. Libert, A. Maucorps, and L. Innes has been published by Fishing News Books Ltd., 1 Long Garden Walk, Farnham, Surrey, GU9 7HX, England. The original edition was a translation of a French handbook, and this new edition is much enhanced by a new chapter by Leslie Innes, a gear technologist from Fraserburgh, Scotland, which describes some of the specialized net repairs and techniques developed more recently ashore and on commercial fishing vessels.

As with the original, this edition is very well illustrated with 106 figures and begins by introducing the basic concepts and definitions and the materials utilized. Cutting, braiding, making single knots and meshes, inserting patches, and other net mending techniques are thoroughly described, and there is a chapter on notes on the making and mounting of net sections. The final chapter, specialized repairs on different nets, introduces commercial practices and describes repairs to gillnets, purse seines, trawls, and knotless nets. Techniques for quick repairs or net section replacement are also related. This very practical handbook is available from the publisher or, in the United States, from Bernan-Unipub, 4611-F As-

sembly Drive, Lanham, MD 20706-4391 for \$24.00. In the United Kingdom, the price is £9.50.

## The Movements and Migration of Fishes

"**Mechanisms of Migration in Fishes**," edited by James D. McCleave, Geoffrey P. Arnold, Julian J. Dodson, and William H. Neill, has been published by Plenum Publishing Corporation, 233 Spring Street, New York, NY 10013, as volume 14 in their NATO Conference Series IV: Marine Sciences.

The volume is divided into four primary sections: Migration in the open ocean, migration in coastal and estuarine waters, migration in rivers, and other "special" topics. A final chapter by McCleave, F. R. Harden Jones, W. C. Leggett, and T. G. Northcote summarizes various aspects of fish migration studies and makes several recommendations for future research on open-ocean, coastal, and riverine migration. Additionally, though, other authors in this volume have also proposed specific, testable hypotheses for additional research in their selected lines of research.

Considerable strides have been made in recent years in fish migration studies and in this volume, specialists from 10 North American and European nations present reviews, reports, and even some speculative views, on the mechanisms of migration in rivers and estuaries, on continental shelves, and in the oceans. Mechanisms discussed range from passive drift on water currents to behaviorally modulated drift, and active, oriented swimming. Orientation mechanisms considered include the responses of fish to temperature, food supplies, tides or ocean swell, and the earth's magnetic field. In addition, there is an interesting paper by H. G. Wallroff which reviews various long-distance orientation and migration mechanisms observed for birds and suggests that similar mechanisms of migratory orientation may be utilized by fishes, at least in cases where both classes refer to similar environmental clues.

Some topics of interest include the in-

fluence of stock origin on salmon migratory behavior, drift migrations of larval fishes in the ocean, the role of behavioral enviroregulation in fish migration, whether or how fish use inertial clues during migration, and magnetic sensitivity in the yellowfin tuna. Other papers provide a look at migration in coral reef fishes, northern Atlantic cod, and estuarine-dependent fish larvae and juveniles. Also discussed is migration and learning in fishes, modeling of migratory behavior, bioenergetic considerations in fish migrations, and measuring physical-oceanographic features relevant to fish migration. Mechanisms of fish migration in rivers are reviewed, while other papers treat homing and straying in Pacific salmon, chemical cues in salmonid homing, and physiological and behavioral determinants of chemosensory orientation. In sum, this is an excellent and thoughtful synthesis of current knowledge and work in the field which also proposes some speculative but perhaps useful avenues for future studies. The 574-page hardbound volume is available from the publisher at \$95.

## Reproduction, Biology, and Culture of Milkfish

The milkfish, *Chanos chanos*, is an important species which has been cultured in Asia for centuries and remains a very important source of protein. Traditionally, however, the industry has depended on stocking of farm ponds with fingerlings reared from wild-caught fry. Considerable research on the species is reflected in two recent volumes produced by the Oceanic Institute, Makapuu Point, Waimanalo, HI 96795, and sponsored by the U.S. Agency for International Development, Washington, D.C.

The first is "**Aquaculture of Milkfish (Chanos chanos): State of the Art**," edited by Cheng-Sheng Lee, Malcolm S. Gordon, and Wade O. Watanabe. Written primarily for a more general audience, it presents chapters written by milkfish experts who have worked with the species for many years. Each of the chapters was refereed and revised prior to final editing. The result is a thorough and

comprehensive 284-page volume that discusses milkfish biology, genetic variation within the species, reproduction, the traditional milkfish industry (including fry capture, distribution, rearing, and growth of the fish to market size). Descriptions are given of culture practices in different nations, including aspects of pond design and management, nutrition, and a review of common diseases, and economics of milkfish culture. A final summary chapter also suggests directions for future research.

The second book, copublished by the Tungkang Marine Laboratory in Taiwan and the Oceanic Institute, is **"Reproduction and Culture of Milkfish,"** edited by Cheng-Sheng Lee and I-Chiu Liao. Also sponsored by AID, it constitutes the proceedings of a workshop held at the laboratory in April 1985, and it specifically addresses current knowledge on milkfish reproduction and the research being done to improve spawning techniques in its 226 pages.

Topics reviewed include methods for exogenous hormone administration, techniques for induced spawning in finfish developed since 1983, current technology of induced breeding of milkfish, environmental factors affecting fish (especially milkfish) reproduction, nutritional factors in fish reproduction, techniques of larval rearing used in Japan, population structure of milkfish in the Pacific, Philippine milkfish farming and research, Taiwanese milkfish culture methods and broodstock management strategy, traditional milkfish culture methods, deep-water culture systems, and a procedure for implanting a slow hormone-releasing cholesterol pellet. The volumes are both paperbound (source and price not listed).

### **Caribbean Invertebrates and Baja Marine Species**

Publication of **"A Field Guide to Caribbean Reef Invertebrates"** by Nancy Sefton and Steven K. Webster has been announced by Sea Challengers, 4

Somerset Rise, Monterey, CA 93940. This colorful handbook is a special publication of the Monterey Bay Aquarium Foundation and provides color photos of about 200 of the most common and observable invertebrates (plus 14 algae and 2 seed plants) of the Caribbean region. Also included are data on the specific habitats where the species are found, along with information on their natural history. Where possible, the creatures have been identified to the species level. A glossary will be helpful for nonscientists.

The authors begin with a discussion of the coral reefs of the Caribbean Sea and the region's geology, and then discuss reef structure and zonation, and growth, reproduction, and nutrition of corals. That is followed by introductory information on each of the major invertebrate phyla: Porifera, coelenterata, ctenophora, bryozoa (ectoprocta), annelida, platyhelminthes, arthropoda, mollusca, echinodermata, chordata (tunicates), and members of the plant community—red, green, and brown algae, and the seed plants.

That section is followed by full-color photographs of the individual species themselves and a brief notations on their identification and natural history. The photographs are excellent and the manual should be of interest and use to those scuba diving or working in Caribbean marine environments with coral reefs. Indexed, the 112-page volume is sold by the publisher for \$19.95.

In addition, Sea Challengers has produced the second edition of **"Marine Animals of Baja California,"** subtitled "A Guide to the Common Fishes and Invertebrates," and authored by Daniel W. Gotshall. The volume describes 150 species of fish and 65 species of invertebrates commonly found in the shallow waters of the Baja California peninsula and Islas de Revillagigedo. It would also be useful for identifying shallow water fishes along much of the coast of Central America and the Islas de Galapago. Fishes excluded are the tiny ones like gobies, tube blennies, and clingfish that are

not often encountered by sport divers.

The author again stresses the use of the color plates and the pictorial keys to identify the fishes and invertebrates. The illustrations are excellent, and data is provided on their maximum known size, habitat, geographic range, plus identifying characters that are usually noted while underwater. Families added to this second edition include the requiem sharks, machetes, herrings, needlefishes, pipefishes and seahorses, and mullets. A bibliography is provided for those wanting further information on fishes of that area. Indexed, the 112-page paperbound volume is available for \$17.95 plus \$1.85 shipping.

### **Ocean Disposal and Marine Pollution**

Selected papers from the sixth international Ocean Disposal Symposium, edited by Douglas A. Wolfe of NOAA's National Ocean Service, have been published as **"Plastics in the Sea,"** a special issue of the *Marine Pollution Bulletin*, 18(6B):303-365, by Pergamon Press, Headington Hill Hall, Oxford OX3 0BW, England. Publication price is DM20.00 or U.S.\$10.00 in the Americas and £5.00 in the United Kingdom. The symposium was held at the Asilomar Conference Center, Pacific Grove, Calif., on 21-25 April 1986.

Contributions provide a very handy review of the effects of litter pollution from ships on such marine species as sea turtles, albatrosses and shearwaters, seals, gannets, and others. Discussed are the sources, quantities, and distribution of persistent plastics in the seas, patterns in the abundance of pelagic plastic and tar in the North Pacific, biological effects of lost and discarded plastic debris, and litter pollution from ships in the German Bight. The problem is international in scope and two of the papers address potential remedies (i.e., legal strategies for international action). Indexed by author and subject, the issue is available from the publisher.