

to a general reader and it is clearly on his probable degree of success in this venture that any estimate of this book must largely be based. Although aided by numerous black and white and coloured illustrations, one still wonders to what extent he will accomplish his purpose.

The sponges, to which he possibly devotes too much attention, emerge as much less organised than they really are. The coelenterates get more judicious treatment although there is confusion between the stinging coral, *Millepora*, and the very different blue coral, *Heliopora* and the plate opposite page 65 showing an unnamed green coral is mystifying. The only chlorophyll in corals is contained in the brown zooxanthellae. The mushroom coral, *Fungia*, cannot "move about on the bottom"; it can only (if small enough) be carried about by water currents, although it can right itself if turned over and uncover itself when buried under sand.

The author is clearly fascinated by ctenophores (comb jellies), describing not only British species but the glorious Mediterranean Venus' Girdle and even the exotic *Coeloplana* and *Tjalfiella*. But this is unfortunately balanced by a very inadequate treatment of the far commoner and vastly more important Crustacea and Mollusca, his accounts of which one feels would only give a confused idea to any previously un-instructed reader. There is no mention of the ubiquitous amphipods and isopods; moreover crabs, lobsters and shrimps do not have nauplius larvae.

The structure of a bivalve mollusc is only indicated by an inadequate diagram and indeed throughout there is little mention of benthic organisms generally (apart from fixed algae) in spite of their fundamental importance in marine productivity. Echinoderms are better treated although the arms of brittle stars are surely not "festooned with tube feet".

There is much better treatment of the fish where, of course, even an un-experienced reader can meet the author part way. The major forms and modes of life are well described in the text and illustrated in the figures. Dr Bellamy continues through marine reptiles and birds to sea cows (a pity he says so little about these, with only an uninformative photograph of a manatee) to the whales, and a very interesting account of the work of Gerald Kooyman on the Weddell seal. As to the Californian (rather than the "southern") sea otter, the story is now changing, with the protected animal devouring every available invertebrate, including worms!

The final chapters cover marine productivity, including coral reefs, with the extent to which this is being affected

by man (although whether man's activities are responsible for the current plagues of coral-destroying crown-of-thorns starfish is dubious). But here Dr Bellamy most fittingly emphasises the significance not merely of the evolution of diverse animal forms but of "an integrated living system that mirrors the potential of the environment". One also approves his description of "pollutants" as "enrichers, suspenders, cloggers and killers" and his discussion on the relative importance of these categories.

Criticism could be made of various statements including the strange confusion—at any rate to one of this reviewer's age—of Rider Haggard instead of Conan Doyle as the originator of the *Lost World*. The plumose anemone is repeatedly termed "plum-

rose" and has *Gonyaulax* now become "Gonyaulux"? A final criticism concerns the author's tendency to write down to a popular level, to refer to leeches (beautifully adapted animals) as "nasty, horrible, revolting", to edible Crustacea as "mouth watering", and the use of "mind boggling" elsewhere.

Nevertheless this book has the major virtue of enthusiasm, reflecting so much of what David Bellamy has personally seen and done. He makes admirable use here and there of statistics, and the illustrations, although inevitably varying in quality (the one claiming to represent a fiddler crab surely doing so in error), are generally both apposite and informative. And finally, this is a most pleasant book to read.

C. M. Yonge

Dynamics of fishing

Marine Ecology and Fisheries. By D. H. Cushing. Pp. xiv+278. (Cambridge University: Cambridge, London, New York and Melbourne, July 1975). £9.00; \$27.50, hard cover: £3.90 paperback.

Few attempts have been made in the past to bring together the population dynamics approach to fisheries science with the more fundamental aspects of marine ecology. Fisheries scientists concerned with heavily exploited stocks have, naturally, been pre-occupied with stock assessments, fishing mortality and recruitment and have thus been concerned largely with adult and juvenile fish.

Varying recruitment to individual year classes of fish has long been recognised as a factor of major importance. The events which lead to variations in recruitment, however, are of such complexity that they have understandably discouraged efforts to integrate them into models of fish populations. They, in fact, embrace virtually the whole of marine ecology. Nevertheless, if we are to reach any real understanding leading to an ability to predict, they cannot be ignored.

Dr Cushing's book embraces material he used in a series of lectures at Oregon State University and I, personally, am sorry I did not hear the lectures. His competence in presenting the subject in written form makes it readily assimilable, and the presentation is a pleasing example of the competence of Cambridge University Press.

The first four chapters are devoted to a useful condensation and appraisal of information, widely scattered in the literature, concerning the process

of organic production in the sea. Space and time variations in the broad ocean areas are dealt with first, then the production cycles in the highly productive but unstable upwelling and divergence regions. The role of nutrients is then considered and, finally, the various attempts which have been made to model organic production in the sea are reviewed.

The next three chapters assemble information about fish stocks and migrations, their growth and mortality, and population dynamics. Again, this is a valuable condensation of a great deal of material widely scattered in literature from all over the globe.

The author then embarks on an exercise integrating our knowledge about the stocks of herrings off northern Europe with the organic production cycles—establishing a convincing correlation. Herring are planktonic feeders but behind the simplicity of this statement, the true complexity of the foodweb which culminates in herring is perplexing. It is illustrated in a critical feeding path diagram and the author explores the approaches which can be adopted to express the relationships in terms which can be handled in models.

Temporal changes and the influence of climatic factors are considered in the two following chapters and the book concludes with a discussion of the interaction between fisheries research and marine ecology, carrying a clear message that they can be mutually beneficial.

Students will find the book extremely useful and marine ecologists and fisheries biologists will broaden their outlook by consulting it.

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