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Encyclopedia of Tidepools and Rocky Shores, edited by Mark W. Denny & Steven D. Gaines, by Malcolm Ebright

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BOOK REVIEWS

Encyclopedia of Tidepools and Rocky Shores. Edited by Mark W. Denny & Steven D. Gaines. Berkeley, CA: University of California Press, 2007. Pp. 735. $95.00 hardcover.

Rocky shores, loosely defined, are those coastal areas dominated by massive formations of "bedrock" (often accompanied by boulders and cobbles, but relatively free of sediments) in an uneven configuration of ledges, overhangs, crevices, and depressions where water accumulates (i.e., tidepools). More specifically, hard surfaces between high and low tide levels, usually referred to as the rocky intertidal zone (acronymically and affectionately called the RITZ by some), are the ones most visited because they can be accessed easily when the tide is out. For centuries, these tracts where land and saltwater meet have attracted scientists, photographers, poets, virtually everyone who is curious, with their craggy wave-swept beauty and the abundance and diversity of biota (seaweeds and animals) that can be found on their surfaces. The charisma of the rocky intertidal zone has, at the same time, been a catalyst for and a result of the many books that have been written about it, notably classics such as *Between Pacific Tides*, by E.F. Ricketts and J. Calvin (1939), Rachel Carson's *The Edge of the Sea* (1955), and *Life Between Tidemarks on Rocky Shores* by T.A. and Anne Stephenson (1972). More recently, as interrelationships (e.g., competition, predation) among the biological components were demonstrated by ecologists, based on experiments conducted not only in the laboratory but also on the shore, books of a more technical nature appeared more frequently, along with a wave of field guides (to identification). Among the plethora of books on this subject, as good as many of them are, I am not aware of any that contain such wide-ranging articles, in a single volume, until now, with the publication of this encyclopedia.

This massive work contains 186 articles, organized alphabetically (Abalones to Zonation), each title being a key word or short phrase, sometimes followed by a subordinate descriptor (such as "Dispersal, Measurement of"). The table of contents also contains some other entries, worded alternatively (e.g., "Red Tides: see Algal Blooms") or key words that might not have been included in a particular title (e.g., "Sea Slugs: see Nudibranchs and Related Species"). Common names of plant and animal groups are almost always used in the main text (e.g., "Snails" rather than Gastropoda), as well as in the index. More helpful to the reader who is primarily interested in being tutored in a particular aspect of marine science is another list of the contents arranged by subject area, as follows: Geology, Oceanography, Climatology, Plants (including algae and microbes), Invertebrates, Vertebrates, Ecology and Behavior, Physiology, Human Uses and Interactions, Research and Methodology. Essentially there are four

different categories of articles, roughly equal in terms of space: (1) those dealing with physical-chemical-geological matters (i.e., aspects of oceanography other than biological), (2) a survey of biota (kinds of organisms) found in near-shore rocky areas, (3) principles of ecology (including ecophysiology), and (4) a miscellany of articles oriented toward human impacts on rocky shores and ways in which they are studied.

Each entry normally contains an introductory definition of the topic and its significance, followed by additional text, often with subheadings, and terminates with reference to allied articles elsewhere in the book and a listing of other relevant publications (occasionally a textbook or two but mostly specific journal articles). However, sometimes important papers (e.g., R.T. Paine's demonstration of sea stars as keystone species) alluded to in the text (of "Competition," p. 157) are not cited in the bibliography. The glossary (at the end of the book), with more than 900 definitions of terms, will make it somewhat easier for the patient reader to translate some (but by no means all) of the technical terms found in the body of the article. Names of major animal taxa (phylum, class, etc.) were mostly not included here, or in the index. I found the latter to be far from complete and not very helpful in finding detailed information; only a scattering of algal genera and species are listed. As an example, a classic paper by J.H. Connell and R.O. Slatyer is discussed extensively (in "Succession," pp. 556–557), yet only Connell is listed in the index. The editors provide helpful advice to readers in how to use this resource, not only in their preface but also in a separate "Guide to the Encyclopedia." Here it is said that on the website (http://www.ucpress.edu/books/pages/10341.html) there is a list of articles and contributors, but as of the time of this writing (April 2, 2008) the site contains only some reviewer quotes, a description of the book, information about the editors, and a link to ordering.

The two editors are widely recognized experts who, between them, have written or coedited four books and hundreds of articles pertaining to many of the topics covered in this book. Denny is a Professor of Marine Science at Stanford University (Hopkins Marine Station) who, among other things, investigates mechanical design of intertidal organisms on wave-swept shores. Gaines is Director of the Marine Science Institute, University of California, Santa Barbara; his interests are similarly wide-ranging, recently focused on biogeography (distribution of species in relation to currents and other factors) and design of marine reserves. They have managed to gather together 202 colleagues, in academic and other institutions, to contribute to this work—no mean feat in itself. The names of many of the authors will be familiar to the cadre of marine ecology researchers and possibly some non-scientists as well (e.g., M.D. Bertness, author of *Atlantic Shores: Natural History and Ecology*). Over half of the writers are affiliated with institutions on the (U.S.) West Coast; most of the remainder are based overseas. Not surprisingly, then, most of the articles

are Pacific-centric, drawing on species that are native to western shores as examples. Thus, readers expecting a treatise on critters inhabiting the Atlantic and Gulf coasts may be disappointed. Also, the tropical limestone terraces seen in Florida and the Caribbean are essentially not covered. Perhaps inevitably, with so many individuals involved in this project (most of the articles are sole-authored), a certain amount of duplication is to be expected. For example, phoronids and echiurians, relatively minor groups of worm-like species (not usually even found on hard substrates), were presented as stand-alone articles even though they are also discussed extensively in a "Worms" article. However, these apparent biases and judgment calls do not diminish the value of this encyclopedia, which skillfully answers the fundamental and larger "why and how" questions specific to processes and interactions that are characteristic of rocky shores in general.

As the editors point out, it is difficult to cover this vast topic in detail, but they certainly tried, evidenced by the "heft of this tome" (p. xxvii). To be able to roll everything into one volume, it was presumably decided to use a small typescript font (especially in the 22 tables) and to diminish the figures. While the figures (which include 202 line drawings, 512 color photographs) are generally very attractive, the photographs, some of which are either panoramic or contain small invertebrates, would have looked better had they been larger. The average photo is only about 3 x 2.5 inches; there are some composite photos (e.g., p. 173) in which each image is about the size of a postage stamp. Some of the "oceanography" articles are mainly concerned with phenomena that are associated with pelagic (offshore) areas and biota (e.g., buoyancy, bioluminescence), or otherwise bear only a distant relationship to the rocky intertidal zone (e.g., beach morphology). Being an invertebrate zoologist, I was happy to see an 18-page "Invertebrates, Overview" article (arguably the longest of any of the articles). It is a truly excellent mini-course, but particularly considering that most animal phyla are given separate coverage as well, the combination might come off as an overdose of details to the non-specialist. I found 30 printing, spelling, and grammatical errors, but considering the immensity of this book they are comparatively trivial. The only major "oopsie" I spotted is in the "Arthropods, Overview" article, where Figure 5 (except for the absence of labels) is exactly the same as Figure 2; the legend of the latter figure describes the image that was meant to be displayed above it.

The editors state that the array of articles is "intended for students as well as the interested general public" (p. xxv). The casual naturalist might find some of the entries dealing with physical-chemical concepts and contemporary ecological theory to be a hard read, but many of them will likely prove to be useful supplementary resources for background reading in a variety of undergraduate and graduate-level courses. In particular, Dr. Denny's article on tides is the most lucid explanation of this important force controlling life on rocky shores, compared to those I have read elsewhere.

For readers with a general interest in natural resources policy, the following articles (in alphabetical order) are particularly a propos: Algal Economics (seaweeds of commercial importance, uses, products), Climate Change (then and now), Coastal Geology (landforms), Economics (coastal fisheries and their management), Food Uses (modern), Habitat Restoration (goals and processes), Introduced (invasive) Species, Management and Regulation (California style), Marine Reserves (goals and results), Sea Level Change (effects on coastlines). Additional entries that should be read by everyone who visits the rocky intertidal zone are "Collection and Preservation of Tidepool Organisms," "Ecosystem Changes, Natural vs. Anthropogenic," "Education and Outreach," "Habitat Alteration," and "Marine Sanctuaries and Parks." Within these articles are tips of practical importance (e.g., what equipment to bring, how to photograph tidepools), discussion of ways in which the rocky shore is an excellent venue for teaching basic concepts of science, and suggestions about treating these valuable areas well (i.e., minimizing human disturbances such as trampling). Some articles that should be particularly appealing to the lay reader include one on public aquaria (i.e., recreating the physical and biological components) and another describing the collaboration of Ed Ricketts, a collector-ecologist in the Monterey Bay area, with writer John Steinbeck (of *Cannery Row* fame), culminating in *Sea of Cortez*, their book describing an expedition to catalogue intertidal invertebrates in the Gulf of California.

Those who study and revere rocky shores and their inhabitants, each in his own way, should be much obliged to the authors who wrote and the editors who brought together this eclectic collection of essays in one volume. Indeed, this compendium is a treasure trove of up-to-date information about the rocky intertidal zone and more (i.e., some coverage of oceanography), a potpourri where everybody, from professionals to managers to admirers of things marine, can find something to their liking. You probably would not want to lug this book along if and when you explore a rocky shore—it weighs almost seven pounds, was not designed to be a guide to identification of biota, and is too attractive to be desecrated by wave spray—but you certainly will want to keep it on your bookshelf as a valued reference.

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