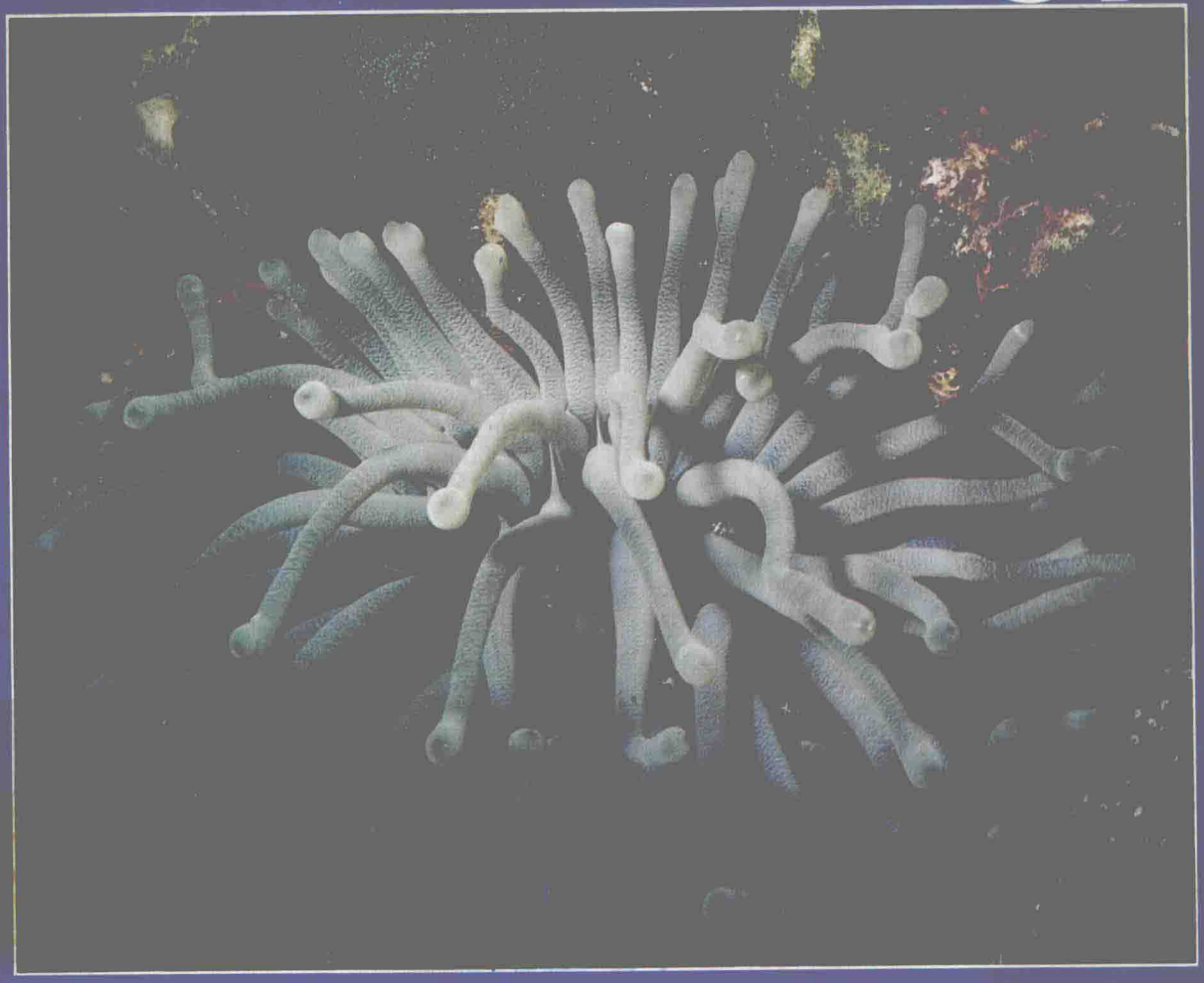
revised edition

marine biology



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marine biology

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reston publishing company, inc.
a prentice-hall company
reston, virginia

Library of Congress Cataloging in Publication Data

Reseck, John, date.
Marine biology, revised

Bibliography:
Includes index.
1. Marine biology. I. Title.
QH91.R47 574.92 80-18750
ISBN 0-8359-4267-8

A Prentice-Hall Company
Reston, Virginia 22090

10 9 8 7 6 5 4 3

Printed in the United States of America

marine biology

The coral reefs present an unlimited number of microenvironments for animals to live in.

Dedication

To my several thousand students over the last fourteen years who have formed my thinking on how marine biology should be taught.

John Reseck Jr.

Preface

This book is written in the simplest possible terms. Its purpose is to acquaint the student with the marine environment—not to create a marine biologist. The information is basic, and presented in a light readable style. The book is designed for the student to read and enjoy, not to serve as a reference text. There are many good reference texts in every school library. It is not logical to make the student buy one. The book the student buys should cover general principles of the field, major taxonomy, and basic ecology. It should cover these subjects in a manner which is easy to read and understand. It is hoped by the author that this book performs these functions in a way that makes it useful to instructors and students alike.

John Reseck Jr.

marine biology

Sponges are a major part of the filter feeding community of the coral reef regions.

Contents

Part I
Basic Understandings

The intertidal zone on a rocky shore is a fascinating place to study. When the tide is out, the entire area can be easily observed.

Chapter 1

Succession and a Few Other Basic Principles

DEFINITION OF TERMS USED IN CHAPTER 1

Algae: *A group of plants that in spite of their appearance do not have true roots, stems or leaves. Generally found in water, such as seaweed.*
Anguilla: *North Atlantic eel*
Balanus: *Acorn barnacle*
Climax community: *A well-established group of organisms which dominate a given area and remain stable inhabitants until some major environmental change takes place.*
Clupea: *White-bait*
Donax: *Bean clam*
Dynamic: *Used here to mean everchanging.*
Emerita: *Mole crab*
Evolving: *Undergoing a gradual generation-to-generation change in the heredity of an organism.*
Genetic: *Relating to the hereditary factors which control the makeup of an organism.*
Haliotis: *Abalone*
Impact: *Having to do with the effect of external factors on an organism, such as the wave impact (physical force) or the impact of DDT (chemical) on an organism.*
Larva: *Any early or immature form of an organism.*
Ligia: *Shore louse*
Littorina: *Periwinkle*
Mytilus: *Mussel*
Oncorhynchus: *Salmon*
Phyllospadix: *Surf grass*
Physiology: *The functions (mainly chemical) of a living organism.*
Postelsia: *Palm kelp*
Tivela: *Pismo clam*
Tolerance: *Range within which an organism can endure changes in any of the environmental factors, such as temperature, and survive.*

In the study of any biological science, which is, in fact, the study of life, one of the things we must come to grips with is death. In all living communities death is as important as birth because without it there would be no room for those that are born. Each type of living thing needs a special set of circumstances for

it to live in a healthy manner. Humans, for example, need food, clothing, and shelter (among numerous other things such as oxygen, water, etc.). Each of these needs has a level or optimum at which the individual functions best, as the need of a human for food illustrates. If someone gets no food, he dies. If he gets too little food, his physical form changes and he cannot function well. With just the right amount of food, he looks good and functions well; but with too much food his physical form changes, and again he can't function at his best level of efficiency. This relationship is true with all species and all factors which affect them.

Because the environment (that is, the total of all physical and biological factors which affect an organism) changes, some of the essential factors for each organism also change. As these factors change, they become either more nearly optimal or less nearly optimal for the organism. These changes will affect the health not only of an individual, but also of the entire population of like individuals—e.g. all the gulls, or all the abalones. Sometimes these changes in the environment are slow, like the coming of an ice age which takes thousands of years. Sometimes the changes are fast, like a rain storm that dumps fresh water and silt from runoff on land into a salt water tide pool. Whether slow and unnoticed or rapid and catastrophic, these changes have the same effect: they change the environmental factors. Whatever the change, it will be bad for some living things and good for others.

Because of our dynamic, or ever-changing, environment, living things

Figure 1-1 *Fresh water run-off from land cuts a route through the beach sand to join the sea. The resulting change in salinity is a major influence on intertidal life.*

Figure 1-2 *This small limpet has two types of barnacles and other limpets on its shell. Finding space to live is perhaps the greatest single competition among marine organisms.*

must also change. They do so in two ways. One way we call *adaptation,* or *evolution,* a slow process that occurs from generation to generation through the process of genetics or heredity. This type of hereditary process allows a species or population to adjust or evolve to slow changes in its environment. We have long known that a species must adapt to its environment to survive over hundreds or thousands of years. This type of change keeps the organism attuned to the slower changes and, because of its great complexity, is considered to be irreversible. As the organism becomes more adapted to a certain set of ecological factors, it will continue to adapt and become even more suited to that particular environment. Because of this trend to become specifically adapted to a particular set of circumstances, the entire population may become extinct if those circumstances change too rapidly.

The second type of change the ecologists call *succession.* Succession generally happens over a short period of time—sometimes days, sometimes years. The major difference is that a genetically adapting population may survive but in the case of major change, it may become extinct. In succession the population is replaced by another population for which the new environmental factors provide the newcomers' optimum living conditions and thus enable them to successfully supplant the original population. If one population were to be-