biological input, and so the experimentalist and the modeler must be brought together. This was clearly an important end result of the Marine Food Chain Symposium.

The scope of the papers is wide, covering marine organisms from bacteria to whales and the environment from the pelagic zone to the bottom and right into the spaces between the sand grains. The volume is not a comprehensive review of trophic ecology but rather a series of insights into current ecological thinking regarding the food web. As in most volumes of its type, the papers are somewhat variable in quality and idea content, but on the average they are topical and make important contributions to marine ecology.

The book is divided into six convenient sections each of which is introduced by a symposium participant and which are followed at the end by an overall summary by L. B. Slobodkin. A very valuable feature is the contribution made by a number of Russian scientists, whose work may be unfamiliar to many.

Part 1, Recycling of Organic Matter, gives considerable insight into some of the feedback processes whereby the whole production cycle would seem to be made more efficient. For instance, here Khailov and Finenko show how large surface-active organic compounds become adsorbed on detritus particles which provide a substrate for the bacteria which, at the same time, utilize these compounds for energy and increase the nutritive value of the detritus for other animals by their own presence.

The section Pelagic Food Chains includes papers by Mullin and Brooks and Reeve, who have used cultured organisms to yield important new knowledge about the biology of zooplankton. Here also Petipa and her colleagues combine field and laboratory observations to describe in considerable detail the food web of a Black Sea planktonic community. Other papers included under this heading discuss such diverse topics as the relationship between temperature and growth efficiency, the consequences of submergence in zooplankton, and the fitting of older population growth data to newer population models.

Under Feeding Mechanisms are papers discussing the functional morphology and nutritional physiology of bivalve mollusks, the striped mullet, and the baleen whales. Also included here is a discussion of the relationship between feeding types in the benthic community and their geographical distribution in northern European waters by V. I. Zatsepin.

In the section Food Requirements for Fish Production, Trevallion *et al.* nicely illustrate an example of biological feedback in which the depredations of young plaice feeding on *Tellina* siphons ultimately lower the fecundity of the bivalve to the point where different food sources must be sought by the predator. Under this same heading, Gulland relates the output of commercial fisheries to food chain studies, concluding that previous estimates of food chain efficiency may be too low.

The section Food Abundance and Availability in Relation to Production includes papers concerned with the detailed description of feeding niches in fish, the relationship between feeding behavior and survival in young herring, the consequences of different-lengthed food chains for the same species of fish, and the significance of food size in determining availability for different trophic levels in food chains.

The final grouping, Theoretical Problems, tends to be a catchall but includes important models on phytoplankton-zooplankton relationships by McAllister and on utilization of the environment by fishes by Paloheimo and Dickie. Both models actually are considered to some degree elsewhere in the literature but are not so well documented as in this volume.

So this book answers few important ecological questions, but goes a long way toward disposing of some ancient ecological dogma. It is rather a composite progress report and as such should be a source of stimulation to workers in the field.

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Immunology

Biochemistry of Antibodies. ROAL'D S. NEZLIN. Translated from the Russian edition (Moscow, 1966) by Michael C. Vale. Fred Karush, Transl. Ed. Plenum, New York, 1970, xiv, 382 pp., illus. $25.

Within the last decade, intensive studies of the structure of antibodies (or immunoglobulins) have had an enormous impact on our understanding of the immune response. Not only have fundamental concepts been brought into sharp focus, but most of the major problems have been reduced to the molecular level and are proving amenable to attack by the tools of modern molecular biology. The demonstration of marked heterogeneity in the amino acid sequences of antibody molecules has provided strong support for the view that the role of the antigen in the assembly of antibodies is selective, rather than instructive. Detailed analyses of the primary structure of immunoglobulins coupled with analysis of the biosynthesis of antibodies have confirmed the previous view that the immune response is the result of a very special biological system. Variations in the amino acid sequences of different antibody molecules are confined to the amino terminal portions of the constituent light and heavy polypeptide chains, and it is these portions of the molecule that are undoubtedly involved in antigen binding. The patterns of variation that have been observed suggest the possibility that unusual genetic mechanisms are required to provide this diversity, and there is probably a special process responsible for linking these variable regions with the remainder of each chain.

This overall picture of the biochemistry of antibodies does not emerge clearly from the translation of Nezlin's book. The account is presented in the style of a review of the literature and thereby lacks the necessary central theme and organization to make it useful as an introductory text. In considering theoretical aspects or controversial points, the author attempts to represent nearly every concept or argument —including some known to be incorrect. This attempt to be comprehensive seriously breaks up the flow of ideas. As a result the book lacks focus and appears as a collection of distinct chapters, rather than as a cohesive unit.

In addition, the book is outdated—undoubtedly a result of the time required for translation from the Russian and the tremendous speed with which the field is advancing. The major portion summarizes the studies of the biochemistry of antibodies to 1966. For this edition the book has been corrected and partially updated to about 1968. However, many important advances have been made since this time. For example, since this book was written the complete covalent structure of one entire immunoglobulin and the partial sequence of many others have been reported. It is now known that the variable regions of light and heavy chains are approximately equal in length, show

similar patterns of variation, and can be divided into distinct subgroups of amino acid sequences. These findings have had important consequences in considering the possible origins of diversity in antibody molecules and have also aided in understanding the function and evolution of these molecules.

Many of the descriptions of experimental results are unnecessarily detailed, and this often detracts from the main thought. Although some clarity is provided by subtitles throughout the chapters and by summarizing sentences, in many cases these are not sufficient or come too late.

The major value of this book is in its compilation of the results of studies of the structure and biosynthesis of antibodies prior to the most recent surge of activity in the field. The translation into English is good, resulting in an easily read text. The account is well documented and does present a description of the problems and ideas that had emerged prior to 1968.

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Early Carbonate Petrology

Carbonate Rocks. Limestones and Dolomites. LUCIEN CAYEUX. Translated from the French edition (Paris, 1935) and updated by Albert V. Carozzi. Hafner, Darien, Conn., 1970. xviii, 506 pp., illus. $37.50. Sedimentary Rocks of France.

This book, published originally in 1935, is one of the classics in sedimentary geology. Its author was one of the early pioneers in the field now generally labeled "carbonate petrology." This book is his legacy in that field.

The book shows the wealth of data that were already in existence about 20 years before this subject became recognized as an important field of activity in sedimentary geology. Cayeux was one of that rare band of scientists who have been well ahead of their times. He made his mark as a researcher and teacher many years before his subject blossomed out. Yet the impact of his research and teaching activity, of which this book is one of the most solid documents, was practically lost when carbonate petrology became an established branch of sedimentary geology. Researchers in this field started from scratch without appreciating the heritage of the past. In part this lack of continuity was due to the language barrier and in part to the unavailability of Cayeux's book.

Cayeux's book is organized in two parts, treating limestones and dolomites respectively. The limestones are considered under two separate headings, marine limestones and freshwater limestones. The marine limestones are further subdivided in terms of composition, textures, and structures. Descriptions follow of Recent carbonate sediments and ancient limestones. The treatment of dolomites, with many examples, is both descriptive and genetic. Most cited examples in this book are from France. Excellent photomicrographs illustrate the many fabrics this book discusses.

Hindsight reveals Cayeux as not only an astute and skilled observer but a giant in his field. The compilation of data in this book, especially the many interesting examples, can still serve a useful purpose today. Yet this book brings into sharp focus that it takes more than one man to develop a subject. Moreover it takes money. The sophisticated modeling of depositional environments and diagenetic patterns and sequences now almost taken for granted was the result of a massive infusion of funds by the world's major petroleum corporations. I wish Cayeux could have participated in that exciting period during the late 1950's and early 1960's.

Carozzi's translation comes out well and shows both author and translator as skilled writers. Carozzi attempts to update Cayeux's book by inserting in the text various remarks and references to show where the subject stands today. Although these comments are a useful adjunct to the book, they cannot really "update" Cayeux. The subject has developed in a different direction.

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