considered in only one chapter. Unfortunately, neural control of pigment cell activity is hardly mentioned. Immunologic features of pigment cells are not discussed. Despite the omission of some essentials of melanocyte biology, the book is good for the information contained and for bringing the reader up to date.

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Fish Populations

Fisheries Biology. A Study in Population Dynamics. D. H. CUSHING. University of Wisconsin Press, Madison, 1968. xii + 200 pp., illus. $7.50.

The fishery biologist has to deal with a rather complex system of processes of living organisms interacting with those of the aquatic environment. This book describes the past attempts, primarily of the author and his colleagues at the Lowestoft Fishery Laboratory, to define and quantify the more essential processes of the system and to apply this information to the management of commercially exploited marine fish stocks.

Cushing presents the processes of movement, feeding and growth, birth, and death primarily by reviewing the extensive studies on Atlantic eels, North Sea herring and plaice, and the arctic cod. These studies serve well to illustrate some of the behavioral patterns of fish populations which are the result of the physiological drive interacting with the marine environment, and which the fishery biologist must comprehend to describe the system adequately. A great deal of methodology is interwoven in these examples, notably the use of acoustic surveys for detecting fish concentrations.

The most important problems facing fishery biologists today are the measurement of fish abundance, which includes the subject of statistical distribution functions, and the mathematical modeling of the system, which includes the subject of dependence of the processes on population density. The author deals with these problems primarily by reviewing the theory developed by Beverton and Holt in their well-known 1957 publication "On the Dynamics of Exploited Fish Populations" (*Gt. Brit. Min. Agr. Food Fisheries, Fishery Invest.* ser. 2, vol. 19). The work of W. E. Ricker [*J. Fisheries Res. Board Can.* **11**, No. 5, 559–623 (1954)], which is the best formulation of the stock-recruitment problem to date, is also discussed. Beverton and Holt's theory, however, does not deal at all with the important statistical aspects of estimating fish abundance and distribution, nor does it treat adequately the stock-recruitment aspect. The author's opinion that recruitment of young fish to the fishable stock bears no relation to the numbers of spawning adults over quite wide ranges of the latter is based on the lack of direct correlation of the reported observations. Other factors which are not accounted for are quite probably the reason for the lack of correlation.

Management of renewable resources to provide the maximum benefits to man is a subject of both scientific and political interest. The book outlines Beverton and Holt's contribution, which has had wide application in the control of minimum size of fish caught through regulation of minimum mesh size in trawl nets. Contrary to what the author states, mesh regulations in the North Atlantic groundfish fisheries have not ensured that catches are well controlled. In fact, catches are not controlled at all. This is primarily because the total yield depends on the numbers of fish entering the fishable population, that is, the recruits, which can be regulated only through direct control of the numbers of fish caught, if at all. Mesh regulation is intended to maximize the yield per recruit, and it has never been shown that even this goal has in fact been obtained.

The author's exposition of these subjects reflects the lack of development of adequate theory, but the parochial view, which is confessed in the last paragraph, leads to the omission of some good beginnings published by American scientists.

The author concludes that "conceptually the dynamics of fish populations are not very difficult or complicated." I know he is not that naive, and his book, in spite of its limitation, belies this conclusion. The future of fisheries research depends more on improved conceptual models, which accommodate the statistical, or probabilistic, nature of events, than on obtaining larger quantities of data.

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Reactions, Agents, and Products

Microbial Transformations of Steroids. A Handbook. WILLIAM CHARNEY and HERSHEL L. HERZOG. Academic Press, New York, 1967. xiv + 728 pp., illus. $21.

Microbial Transformation of Steroids and Alkaloids. HIROSHI IIZUKA and ATSUSHI NAITO. University of Tokyo Press, Tokyo; University Park Press, State College, Pa., 1967. xii + 294 pp., illus. $16.50.

Microbial Transformations of Steroids by Charney and Herzog represents a remarkably successful fulfillment of a most challenging and difficult assignment. These authors have compiled, in a highly useful and interesting format, a very comprehensive treatment of their subject.

The introductory chapter includes a brief, informative history of the field and a discussion of new trends. The second chapter presents a chemical classification of the various microbial transformations, and includes brief discussions of the discovery of each one, as well as discussions of the enzymology, mechanisms, practical significance, and other pertinent aspects of the various reactions.

Chapter 3 describes and then presents table 1, a 139-page listing of microbial transformations arranged according to the empirical formula of the *product* of the reaction. Included for each listing is the name of the product, the type of transformation, the yield (where known), the name of the transforming organism, physical constants (melting point and specific rotation) of the product, and a literature reference.

Chapter 4 contains a taxonomic treatment of the subject. It includes the 411-page table 2, arranged alphabetically according to the genus of the transforming organism. The source of the organism, the substrate, the type of reaction, and a reference are presented for each entry. It is not often that one is confronted with a table of this length and finds it an occasion for pleasurable and informative browsing. The reader is struck both by the almost unbelievable versatility of the microorganisms and by the persistence of their human exploiters as he leafs through, for example, the 18 pages listing transformations by *Corynebacterium simplex,* the 14 pages