

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.

AARON B. LERNER

*School of Medicine,
Yale University,
New Haven, Connecticut*

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 con-

trolled 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.

RICHARD C. HENNEMUTH

*Bureau of Commercial Fisheries,
U.S. Department of the Interior,
Woods Hole, Massachusetts*

Reactions, Agents, and Products

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

Microbial Transformation of Steroids and Alkaloids. HIROSHI IZUKA 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

for *Septomyxa affinis*, or the 6- to 8-page listings for the likes of *Streptomyces roseochromogenes*, *Rhizopus nigricans*, and *Curvularia lunata*.

A very interesting summary of information, showing the taxonomic distribution according to genus for the various hydroxylations and for Δ^1 -dehydrogenation, is sandwiched between tables 1 and 2, but should not be ignored. It is most impressive that one can see at a glance the listing of no fewer than 77 genera that have been reported to carry out 11α -hydroxylation, or the listing of 41 genera, representing 14 orders in seven classes, that have been shown to Δ^1 -dehydrogenate steroids.

Unfortunately, the magnitude of the task forced the authors to limit their tabulations to information in the literature only through 1963. They counter this shortcoming, however, by including a remarkably effective annotated bibliographical appendix. The subject matter is updated well into 1967 by these 100 references and the descriptive comments made about each.

As is indicated by its title, *Microbial Transformation of Steroids and Alkaloids* by Iizuka and Naito has a somewhat broader scope. In addition to chapters on steroid hormones, bile acids, sterols, sapogenins, cardenolides, and bufadienolides (all covered by Charney and Herzog), it includes brief chapters on the steroidal, ergot, indole, and morphine alkaloids and nicotine. It is one of the few available sources that summarize information on microbial transformations of the latter compounds. Each chapter lists, by type of reaction, many of the microbial transformations that have been reported. There are helpful author, microorganism, and substance indexes.

Although the Japanese book purports to summarize data accumulated up to 1966, a great deal of information in American journals and patents between 1960 and 1966 is not represented. Moreover, there are inexplicable gaps in the coverage. For example, the authors refer to the 15α -hydroxylation of estrone and of estradiol by *Fusarium moniliforme* (*J. Org. Chem.* **29**, 2731) but they apparently missed an earlier paper in the same volume of the same journal (p. 1333) that reports the same reaction (with other organisms). Moreover, the latter paper also refers to 6β - and 7α -hydroxylations of estrone and estradiol, examples of which are not presented by Iizuka and Naito. The coverage of the A-norsteroids provides another ex-

ample. Although a few transformations are listed, others, several of which had been published earlier, do not appear. Many other gaps in their coverage could be cited, including some in the chapters on alkaloids.

A shortcoming common to the books is their inability to provide readily a listing of all the reported transformations for any particular compound. If one wanted, for example, to find references to all the known transformations of progesterone, the index of the Japanese book lists 49 pages that would have to be examined. The Charney and Herzog book does not have an index of substrates to turn to for this kind of information.

Although a few of the structures in Charney and Herzog's book have lost one angular methyl group or another somewhere along the line (see, for example, pp. 50, 57, 63), there are remarkably few errors apparent in either volume.

The Charney and Herzog book can be considered indispensable to anyone seriously interested in any aspect of the microbial transformations of steroids. For those whose requirements for comprehensive coverage are not stringent, or for those whose interests include the alkaloids, the Iizuka and Naito volume serves a useful purpose.

ALLEN I. LASKIN

Department of Microbiology,
Squibb Institute for Medical Research,
New Brunswick, New Jersey

Nuclear Instrumentation

Nuclear Structure. Based on lectures given at the International Seminar on Low-Energy Nuclear Physics, Dacca, East Pakistan, Jan. 1967. ANWAR HOSSAIN, HARUN-AR-RASHID, and MIZANUL ISLAM, Eds. North-Holland, Amsterdam; Interscience (Wiley), New York, 1967. xiv + 342 pp., illus. \$17.

In January of 1967, a seminar on low-energy nuclear physics was held at the Atomic Energy Centre in Dacca, East Pakistan. Many eminent physicists attended. The 16 invited papers are published in this book.

About half of these papers are descriptions of modern tools of experimental nuclear physics: cyclotrons, Van der Graaf accelerators, semiconductor detectors, time-of-flight apparatus, and the like. Each author is the type of experimenter who really understands how his equipment works, as opposed to the

fellow whose concern is only to use the equipment to do an experiment. I think this is a useful survey of the current state of nuclear instrumentation. It would serve as excellent supplementary reading in a graduate-level course in nuclear physics. However, it is misleading to give the title *Nuclear Structure* to a book so largely devoted to experimental technique.

Several other articles could be described as reviews of branches of nuclear theory related to the interpretation of nuclear reaction experiments. The remainder of the book consists of research papers on rather specific subjects. I believe that these papers would be more appropriate in the research journals. There they would be accessible to a larger audience, and would be more easily located in future literature searches.

At the seminar itself, the invited papers were followed by questions and discussion. It is unfortunate that none of these are included in this volume. Other papers contributed to the seminar will appear in a special issue of *Nuclear Science and Applications*, published from the Atomic Energy Centre in Dacca.

BENJAMIN F. BAYMAN

School of Physics and Astronomy,
University of Minnesota, Minneapolis

Books Received

Actualités de Phytochimie Fondamentale. Troisième Série. C. Mentzer, O. Fattianoff, and C. Deschamps-Vallet. Masson, Paris, 1968. vi + 336 pp., illus. Paper, 180 F.

Advanced General Microbiology. Laboratory Methods. Robert G. Eagon. Burgess, Minneapolis, 1968. iv + 85 pp., illus. Paper.

Advances in Catalysis and Related Subjects. Vol. 18. D. D. Eley, Herman Pines, and Paul B. Weisz, Eds. Academic Press, New York, 1968. xvi + 416 pp., illus. \$18.50.

Advances in Chemical Engineering. Vol. 7. Thomas B. Drew, Giles R. Cokelet, John W. Hoopes, Jr., and Theodore Vermeulen, Eds. Academic Press, New York, 1968. xiv + 413 pp., illus. \$18.50.

Advances in Communication Systems. Theory and Applications. Vol. 3. A. V. Balakrishnan, Ed. Academic Press, New York, 1968. xiv + 209 pp., illus. \$11.50.

Advances in Comparative Physiology and Biochemistry. Vol. 3. O. Lowenstein, Ed. Academic Press, New York, 1968. xiv + 416 pp. \$18.

Advances in Food Research. Vol. 16. C. O. Chichester, E. M. Mrak, and G. F. Stewart, Eds. Academic Press, New York, 1968. x + 461 pp., illus. \$17.50.

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