ticle by A. E. Ringwood, "The chemical composition and origin of the earth," and the one by Francis Birch, "Earth heat flow measurements in the last decade," are particularly successful in reducing to meaningful dimensions the teeming literature of recent years in these two fields, and it would seem unfair to pass them over without specific compliment.

Users of this expensive, 500-page volume will be disappointed to find that the articles are not provided with abstracts and that the book has no index.

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British Research Establishments

The Organization of Research Establishments (Cambridge University Press, New York, 1965. 281 pp., $11.50), edited by Sir John Cockcroft, is concerned with research in Great Britain. It draws on a wide range of fields, from agriculture through medicine to chemistry, physics, and engineering. To give perspective to the 11 case histories of British laboratories, two additional contributions are included, one on the Bell Telephone Laboratories by its president, J. B. Fisk, and the other on CERN by its former director general, J. B. Adams.

Sir John Cockcroft makes the following statement at the end of his introduction: "The objective of this book is to discuss the factors which make for creativity and productivity in a wide variety of research establishments. We hope that the varying experiences and ideas put forward will be of value to all those who have the responsibility for research."

The average length of each chapter is 19 pages. Because one must describe in some detail the specific aim and subject area of a laboratory in order to bring home to the reader some observations of a more general nature on the promotion of creativity and productivity, the book, in some places, appears to be more a historical account of British research than a handbook for those who seek an answer to a definite organizational problem in a research laboratory. However, most questions do not have a unique answer, and this approach may be a desirable one that will lead the knowledgeable reader to draw his own conclusions from the various cases presented. Great Britain and the United States—two countries where the government spends large amounts of money on research—vary greatly with respect to the channels through which the money is spent. In the United States the larger part is given to private industry in the form of contracts, but the fraction expended in this manner is much smaller in Great Britain. This is reflected in the contents of this book. Of 11 contributions on British laboratories, only one describes industrial research in a private organization, the other ten dealing with government establishments or cooperative research associations. (In the latter the control is in the hands of the relevant industry's trade association and the government's financial share usually is quite modest.) For this reason much space in the book is devoted to the pattern of governing bodies and representative committees needed for the proper executive function at the top. The opinion that, to retain its effectiveness, the organization of a laboratory should not transgress a maximum size is clearly dismissed by the contents of this book. On the other hand the well-known "critical mass" effect for a laboratory is apparently a rather "wild" function of the subject area involved.

The story of CERN, the European Organisation for Nuclear Research, contains a number of very worthwhile observations on the reasons for its success. Many of the later cooperative ventures in Europe seem to foster national chauvinism rather than to abate it. Adams writes that ". . . the danger for CERN lay in the Member States wanting to obtain a share of the contracts and a share of the staff posts in rough proportion to their contributions to the organisation."

The book ends with Sir Edward Bullard's delightful essay "What makes a good research establishment?" Here every director of research will find good counsel and a number of his own experiences, pointedly formulated.

Because the contributors are, without exception, very senior people with extensive experience in the direction of laboratories, the book will be a source of information and inspiration, direct or by comparison, for all those who are responsible for the administration of research.

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Marine Biology

Only a decade ago there were just a few references and texts on oceanography and a few more on marine biology. In the last few years we have been overcome with a tsunami of books covering every aspect of the marine sciences. Even formerly obscure areas, such as marine planktonology, are becoming as popular as freshman biology.

Planktonology is rather an anomaly today. Organized systematic studies began in the middle of the 19th century. Mostly taxonomic and distributional in nature, this work existed for its own sake first, and then later as a handmaiden of fishery biology. However, during the past 25 years, there has been a steadily growing interest in the ecology, physiology, and biochemistry of this miscellaneous assemblage of plants, animals, and in-betweens, which are so obviously related to each other and are so important to the marine economy. Today we have an enormous body of long-standing, well-organized, detailed, and extensive knowledge of "what" and "where," and another, largely unrelated but enormous body of recent, disorganized, conflicting, patchy, and intensive knowledge of "how" and "why."

The latest contribution attempting to combine and relate the old and the new work in some rational, general framework, is R. S. Wimpenny's **The Plankton of the Sea** (Elsevier, New York, 1966. 426 pp., $16). It is not completely successful.

The author's expressed purpose was to write a popular book, but, as other similar books appeared, Wimpenny shifted his orientation toward students and beginning professionals while attempting to retain a basic usefulness for the educated layman. The resulting unevenness is evident both in details and in the overall plan.

The book consists of 12 chapters, a glossary, a bibliography, figures of organisms, and an index. The style is conversational, informal, and occasionally witty. There are text figures but not nearly enough. This is a major weakness of the book. The author relies on long, complicated verbal explanations when a picture would have been sufficient or would have helped the explication.

One example, and perhaps the worst, is his discussion of the light and dark bottle method using either gas exchange or carbon-14. The explanation

of the method is confusing, detailed, and oversimplified. The simplifying assumption that autotrophs are making carbohydrate is invalid. The worked-out example of net and gross production ignores the fact that the light bottle, in the oxygen method, by itself gives us net production. There is no discussion of why net or gross values are required or of how they are used. A diagram, a chemical equation for photosynthesis of a hypothetical compound representing protoplasm, and a demonstration of the effect of various nitrogen sources on the photosynthetic product would have resulted in a clearer picture of what algal physiologists are doing, of why they are doing it, and of some of the problems involved in using these methods. The example brings up a more general criticism. The author claims a physiological bias which is largely lacking and which, when attempted, is often confused.

Wimpenny's stronger chapters are excellent, owing to his long career in plankton research. In "Hangers on" (chap. 4) symbionts and parasites (largely neglected relationships in plankton work) are discussed in a chapter that is all too short. In "Days and seasons" (chap. 7), "Plankton associations" (chap. 8), the zooplankton portion of "The life within and things outside" (chap. 9), and "Counting it up" (chap. 11), the author is on firm ground and gives a detailed and extensive discussion of the distributional studies that have been carried on for so many years. Even in these chapters, additional charts and figures would have been helpful.

To give a better idea of the flavor and usefulness of this book I will describe the introduction. In it we are given a description of the appearance of the plankton in the sea and after they have been collected, personal anecdotes, a short history of planktonology, instuctions on making a plankton net, the derivation of the name *"Calanus finmarchicus,"* some systematics, an excerpt from the log of the *Challenger*, a history of the major oceanographic expeditions, a history of shore stations, some geography, some descriptive physical oceanography, and a 3½-page annotated bibliography.

The glossary should have been omitted. The definitions are either ludicrous ("diameter" referring to the greatest width of a diatom) or so general as to be meaningless ("production and productivity"). The "Illustrations of species," a separate section, is a collection of figures from many sources. They could easily have been distributed throughout the text; they most certainly cannot be used for identification. Two pages of figures of the unidentified appendages of mysids leave me at a loss. Finally, the index is completely hopeless. It consists of one-line entries like the following: "Atmosphere, and effect on sea, 37, 38," "Communities, and relative productivity rates of, 159-62," and "Primary geological period, and origin of petroleum, 288."

Despite my reservations and doubts about the general usefulness of this volume, *The Plankton of the Sea* is welcome for at least two particular reasons. In it the author presents his own special viewpoint. It is a pleasant change to read a scientific book that reflects the author's interests and prejudices rather than the usual comprehensive, even-handed, and pedantic piling of fact upon fact. Second, Wimpenny is not embarrassed to quote from the older literature when it is still pertinent. We tend to forget the *Meteor* Expedition, and the other expeditions. As a matter of fact, there is an abundance of data, acquired over the years, that awaits critical examination and synthesis.

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New Books

Biological and Medical Sciences

About Plants: Topics in Plant Biology. F. C. Steward. Addison-Wesley, Reading, Mass., 1966. 184 pp. Illus. Paper, $2.95. Addison-Wesley Series in the Principles of Biology.

Actions Chimiques et Biologiques des Radiations. M. Haissinsky, Ed. Masson, Paris, 1966. 204 pp. Illus. F. 66. Four papers: "Flash photolytic studies: The method and its applications" by R. Livingston; "Vacuum-ultraviolet photolysis of paraffin hydrocarbons" by J. R. McNesby; "Transfert intermoléculaire d'énergie d'excitation électronique entre molécules complexes en solution fluide" by J. T. Dubois; "Fluorescence à longue durée de vie de composés organiques" by S. Leach and E. Migirdicyan.

Advances in Ecological Research. vol. 3. J. B. Cragg, Ed. Academic Press, New York, 1966. 336 pp. Illus. $12.50. Four papers: "The distribution and abundance of lake-dwelling triclads—towards a hypothesis" by T. B. Reynoldson; "Energetics, terrestrial field studies, and animal productivity" by Manfred D. Englemann; "The production of marine plankton" by J. E. G. Raymont; and "The dynamics of a field population of the pine looper, *Bupalus piniarius* L. (Lep., Geom.)" by H. Klomp.

Basic Human Embryology. P. L. Williams, C. P. Wendell-Smith, and Sylvia Treadgold. Lippincott, Philadelphia, 1966. 136 pp. Illus. $6.50.

Biological Control Systems Analysis. John H. Milsum. McGraw-Hill, New York, 1966. 480 pp. Illus. $17.50.

Biology of Suspension Feeding. C. Barker Jørgensen. Pergamon, New York, 1966. 373 pp. Illus. $12.50. International Series of Monographs in Pure and Applied Biology, vol. 27, edited by G. A. Kerkut.

Cytology. G. B. Wilson and John H. Morrison. Chapman and Hall, London; Reinhold, New York, ed. 2, 1966. 333 pp. Illus. $8.50.

Developmental Genetics. Frederick J. Gottlieb. Reinhold, New York, 1966. 128 pp. Illus. Paper, $1.95. Selected Topics in Modern Biology Series, edited by Peter Gray.

Diagnostic Microbiology. W. Robert Bailey and Elvyn G. Scott. Mosby, St. Louis, ed. 2, 1966. 354 pp. Illus. $7.25.

Fishes of the Western North Atlantic. pt. 5, Order Iniomi: Aulopidae, Synodontidae, Bathysauridae, Bathypteroidae, Ipnopidae, Chlorophthalmidae, Myctophidae and Neoscopelidae (Interim Accounts), Scopelosauridae, Paralepididae, Omosudidae, Alepisauridae, Anotopteridae, Evermannellidae, Scopelarchidae; Order Lyomeri: Eurypharyngidae, Saccopharyngidae. Y. H. Olsen, Ed. Sears Foundation for Marine Research, Yale Univ., New Haven, Conn., 1966. 663 pp. Illus. $27.50. Sears Foundation for Marine Research Memoir No. 1. Contributors are William W. Anderson, Frederick H. Berry, James E. Böhlke, Rolf L. Bolin, Jack W. Gehringer, Robert H. Gibbs, Jr., William A. Gosline, N. B. Marshall, Gills W. Mead, Robert R. Rofen, and Norman J. Wilimovsky.

International Review of Experimental Pathology. vol. 4. G. W. Richter and M. A. Epstein, Eds. Academic Press, New York, 1965. 352 pp. Illus. $14.50. Five papers: "Recent advances correlating structure and function in mitochondria" by D. F. Parsons; "Ultrastructural cytochemistry: Principles, limitations, and applications" by Dante G. Scarpelli and Norbert M. Kanczak; "Cellular necrosis in the liver induced and modified by drugs" by A. E. M. McLean, Elizabeth McLean, and J. D. Judah; "The constitution and genesis of amyloid" by Alan S. Cohen; and "Complement: Hemolytic function and chemical properties" by P. G. Klein and H. J. Wellensiek.

Meat Hygiene. Paul J. Brandly, George Migaki, and Kenneth E. Taylor. Lea and Febiger, Philadelphia, ed. 3, 1966. 789 pp. Illus. $15.

Principles of Development and Differentiation. C. H. Waddington. Macmillan, New York, 1966. 127 pp. Illus. Paper, $1.95. Current Concepts in Biology, edited by Norman H. Giles, Walter Kenworthy, and John G. Torrey.

Protozoology. Richard R. Kudo. Thomas, Springfield, Ill., ed. 5, 1966. 1188 pp. Illus. $15.75.