first edition were the air mass and frontal concepts of the Scandinavian school. Almost the only quantitative procedures were Petterssen's kinematic formulas, which were never very powerful tools.

The transformation of synoptic meteorology began (about the time the first edition was published) with Rossby's vigorous applications of dynamic meteorology to weather forecasting. The vorticity concept became a central idea of synoptic meteorology, culminating in Charney's development of numerical weather prediction, the computation of prognostic weather maps by means of high-speed computers. At the same time the expansion of networks of upper air observations during and after World War II eliminated the need for inference about the structure of weather systems, providing weather analysts with a tremendous body of new data which forced them to revise their ideas and techniques.

In addition to numerical weather prediction, the last 15 years have seen the development of other quantitative forecasting procedures of a statistical nature. Graphical and numerical techniques of forecasting have been developed. The latter have been facilitated by the use of electronic data-processing machines which make it possible to digest the mountain of meteorological data required to deduce statistically useful relationships.

The meteorological revolution has not yet reached weather forecasting at the "will it rain today?" level, and the public may question whether forecasts are better today than they were 15 years ago. But the impact of these technologic developments on the thinking of synoptic meteorologists is evident in Petterssen's new book. The distinction between dynamic (theoretical) and synoptic (applied) meteorology is being erased. Thus the author lays down a sufficient groundwork of dynamic meteorology in this book to justify its use as an introductory textbook in dynamic meteorology.

The book is published in two volumes. (I question the necessity for two volumes, which is both inconvenient and expensive.) The first volume is devoted to applied hydrodynamics and the prediction of pressure and wind systems. Applied thermodynamics and the prediction of weather is left to the second volume. In both volumes the treatment is thoroughly up to date, and the book abounds in examples and references from the last 5 years. The relatively small size of volume II and the brief portion of that volume devoted to *weather* forecasting (as opposed to pressure forecasting) is representative of the currently lopsided state of development of synoptic meteorology.

A few errors are found in the book. The European, rather than the American, definition of sleet has been retained in the new edition. The definition of balanced motion on page 57 is incomplete, no mention being made of a balance of forces at right angles to the motion. The definition of relative humidity adopted by the International Meteorological Organization in 1947 is omitted in favor of the older definition. An unfortunate omission is that of the integrated baroclinic (for example, thermotropic) models from the chapter on numerical prediction.

The author deserves high praise for accomplishing the formidable task of bringing synoptic meteorology up to date.

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Polysaccharides in Biology. Transactions of the first conference, 27–29 April 1955, Princeton, N.J. Georg F. Springer, Ed. Josiah Macy, Jr., Foundation, New York, 1956. 271 pp. Illus. $5.

This book seems to be a verbatim transcription of a very informal conference. The table of contents looks interesting: "Problems of communication: nomenclature," M. L. Wolfrom; "Problems of classification," K. Meyer; "Bacterial polysaccharides," M. Heidelberger; and "Blood group substances," W. T. J. Morgan. Unfortunately the formal presentations are so frequently interrupted by questions and comments from the participants that it is very difficult to extract any useful information from the text. The comments are often amusing, if one has a taste for the macabre in science, and the book will make an interesting souvenir for the participants in the conference. This hardly seems justification for publishing such a book, and there is no excuse for selling it at $5.

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Bibliography of Solid Adsorbents, 1943–1953. An annotative bibliographical survey. NBS Circular 566. Victor R. Deitz. National Bureau of Standards, Washington, D.C., 1956 (order from Superintendent of Documents, GPO, Washington 25). iv + 1528 pp. $8.75.

V. R. Deitz and his collaborators at the National Bureau of Standards are to be commended for continuing to assemble the material that is published in this second volume in the series. The first volume covered the period 1900–42, whereas this one includes only the decade 1943–53. In spite of this shorter time period, the present volume cites twice as many publications as were listed for the previous four decades. However, the coverage is still restricted to heterogeneous phenomena at solid-liquid and solid-gas interfaces. Each entry is followed by a good abstract that has been prepared from the various abstract journals published here and abroad.

The authors list the references under seven chapter headings. Each chapter has a number of subsections. The first two chapters cover adsorption of gases and vapors and adsorption from solution, both on solid adsorbents. This material is followed by chapters on thermal effects and theories of adsorption. Chapter V is devoted to the refining of sugars and other applications of adsorbents. The last two chapters concern themselves with general information on adsorbents and special methods of investigation, together with the preparation of adsorbents. These are followed by a complete index of authors and subjects.

This reference volume does not claim to be complete, but the authors have not missed many publications. Workers in the field will find this volume more than useful, and younger investigators will be not only helped but stimulated by the thorough coverage of the important areas of solid-adsorbent research.

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Creatures of the Deep Sea. Klaus Günther and Kurt Deckert. Translated by E. W. Dickes. Scribner, New York, 1956. 222 pp. Illus. $3.95.

In general coverage of its subject, this is a thoroughly satisfactory volume, presenting an accurate, semipopular, overall picture and digested account of the known inhabitants of the deep sea. The scope of treatment may be judged by some of the chapter headings: "The poverty, sameness, extent, and inhabited regions of the deep sea," "Food of its fauna," "Inorganic foodstuffs," "Animal world of the ocean floor," and "Pelagic fauna and migration." The two most significant chapters deal with the biological peculiarities, distribution, and origin of deep-sea creatures.

To show one point of view of the authors, I quote a paragraph from one of the latter chapters.

"More general, though less striking at first, are the physical adaptations and peculiarities imposed on deep-sea animals by the other special features of their gloomy environment, the increasing cold in the depths, the relative stillness of the water, and the lack of calcium, especially

in the great depths. In all cases of such special features acquired by animals to enable them to cope with the special circumstances of their environment, in this case the deep sea, we speak of adaptation of the animals to their environment. It is better, however, not to associate with this conception the ideas of necessity and of the appropriateness of such adaptations, as was done in the past, for, as we have said, many animals manage without such adaptations, and of two closely allied species of the same genus, both living in the same way, in one the adaptations may be well developed and in the other entirely absent. Thus these adaptations are often not necessary changes, but merely changes made possible by the ecological system of the species or family concerned, changes which at a more advanced stage of development of the species or family may become biologically important and have an influence on natural selection."

The style of writing is excellent in spite of the difficulties of translation from the German. The illustrations are numerous and adequate, including both borrowed, adapted, and original ones. There is, unfortunately, no list of illustrations, nor is there any mention of them in the brief index. Since the book was originally published in 1950, there is understandably no mention of recent notable dives such as those of Piccard, Cousteau, and others. These recent dives have been characterized, however, by depth records rather than by additions to the sum of scientific knowledge. Clarity and compactness are the major advantages of the present volume.

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Advances in Enzymology and Related Subjects of Biochemistry. vol. 17. F. F. Nord, Ed., Interscience, New York, 1956. 556 pp. Illus. $11.

This annual publication needs no introduction to biochemists, and laudatory comments are superfluous. For certain of the chapters a listing of the title and author is sufficient indication of subject matter and quality. Such chapters are "Enzyme kinetics" by R. A. Alberty; "The respiratory chain and oxidative phosphorylation" by Britton Chance and G. R. Williams; "Enzymatic phosphate transfer" by Bernard Axelrod; "Formation of oligosaccharides by enzymic transglycosylation" by Jeffrey Edelman; "Nature and function of metalloflavoproteins" by H. R. Mahler; and "Chemistry and biochemistry of xanthine oxidase" by E. C. De Renzo.

"Solubilization, migration and utilization of insoluble matter in nature" is the strange title of an even stranger article by I. Mandl and C. Neuberg. This chapter is a cursory survey of soluble metal complexes of such substances as nucleic acid, ATP, uronic acids, amino acids, and proteins. The significance of much of this to biology is not clear in spite of the authors' conclusion that "All solubilizing agents are of the utmost biochemical importance."

Wainio and Cooperstein in discussing "Some controversial aspects of the mammalian cytochromes" have uncovered plenty of controversy in 367 references and deliberately leave both the field and the reader in an unsettled condition. "Metabolic aspects of chemical genetics" by A. G. De Busk is a superficial summary of a much reviewed subject. This chapter might have been improved by restricting the field of coverage and by careful editing. The last chapter on "Ribonucleic acids and virus multiplication" by R. Jeener is a timely review of the significance of RNA in plant virus growth. The editor has made a worth-while selection in eight of ten chapters, far more than enough to justify publication of this volume.

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Anatomy of the Honey Bee. R. E. Snodgrass. Comstock (Cornell University Press), Ithaca, N.Y., 1956. xiv + 334 pp. $6.

This book gives a detailed analysis of the gross structure of the adult bee. Most of the topics have a brief comparative introduction, and there is adequate consideration of development, histology, and the functional aspects of anatomy. The writing is clear and well organized.

Although essentially a new book, this is well based on the author's earlier publications, which extend back to 1910. His *Anatomy and Physiology of the Honeybee* (1925) was about the same size as the present book, but Snodgrass now leaves most of the physiology to specialists and has omitted most of the biology and behavior, with bows to the recent books of von Frisch, Ribbands, and Butler. Since 1925 our knowledge of the anatomy of the honeybee has had major additions (many of them by Snodgrass himself) and some subtractions. The most obvious additions to this book are in musculature and endocrine organs. Two-thirds of the references given are to material published since 1925, and the early ones have been carefully winnowed.

Illustrations are the most significant feature of any treatise on anatomy, and here one must admire the precision and elegance of the pen work. Few of the many figures are completely new in this volume, but whether they are well redrawn from recent publications, diagrammatized, or borrowed from the author's early publications, they give constant evidence of Snodgrass' critical judgment. Even excellent drawings have been slightly reworked; figures have been regrouped; and the labels have been punctiliously revised to conform to changed concepts of homology. The ample letter labels are abbreviations probably recognizable to an entomologist. However, the key to these letters comes at the end of the chapter, and this makes it difficult for a beginner who may want to study a figure before the text.

The index is awkwardly analytic rather than primarily alphabetic; it does little more than the table of contents.

This will be a fundamental reference book, and an excellent textbook and manual for advanced students.

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New Books

Learning and Instinct in Animals. W. H. Thorpe. Harvard University Press, Cambridge, Mass., 1956. 493 pp. $10.

Aquatic Insects of California. With keys to North American genera and California species. Robert L. Usinger. University of California Press, Berkeley, 1956. 508 pp. $10.

Coal-Mining. I. C. F. Statham. Philosophical Library, New York, 1956. 564 pp. $15.

A Life of Sir William Ramsay. Morris W. Travers. Arnold, London, 1956. 308 pp. $12.50.

Modern Views on the Secretion of Urine. Cushny Memorial Lectures. F. R. Winton, Ed. Little, Brown, Boston, 1956. 292 pp. $8.50.

Mathematics for Electronics, with Applications. Henry M. Nodelman and Frederick W. Smith. McGraw-Hill, New York, 1956. 391 pp. $7.

Fine Structure of Cells. A symposium held at the 8th Congress of Cell Biology, Leiden, 1954. Union Internationale des Sciences Biologiques; Interscience, New York, 1956. 321 pp. $8.50.

Scientific Serials. Characteristics and lists of most cited publications in mathematics, physics, chemistry, geology, physiology, botany, zoology, and entomology. ACRL Monogr. No. 16. Charles Harvey Brown. Association of College and Reference Libraries, Chicago, 1956. 189 pp. $4.25.

Family Medical Costs and Voluntary Health Insurance: A Nationwide Survey. Odin W. Anderson with Jacob J. Feldman. Blakiston Div., McGraw-Hill, New York, 1956. 251 pp. $6.50.

Theory and Dynamics of Grassland Agriculture. Jack R. Harlan, Van Nostrand, Princeton, N.J., 1956. 281 pp. $6.75.