

value of the English language translation since their remains are significant in delineating stratal sequences in some geologic provinces.

Notwithstanding these deficiencies, as well as several glaring typographical errors, a few upside down photomicrographs, and an inferior binding, all of which make this weighty volume less attractive than the more compact German edition, a clear presentation of the principles of micropaleontology and microstratigraphy is provided in the introductory chapters on basic terminology and the historical development, collection, preparation, and examination of fossils and their intra- and interregional value in correlation.

It is hoped that volume 2, on the Ostracoda and other well-known microfossils, soon will be available in English, for the wealth of material in its 453 pages is indispensable to the academic and commercial microscopist.

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## Classic Papers on Genetics

**Papers on Human Genetics.** Samuel H. Boyer, IV, Ed. Prentice-Hall, Englewood Cliffs, N.J., 1963. x + 305 pp. Illus. \$9.

In line with the current fashion of collecting, for ready reference and study, classic papers in a discipline, Boyer, a member of the very active Johns Hopkins group, has put together his selection of the contributions to human genetics which have oriented and stimulated the science. Those of us who have had the privilege of reading most of these papers when they first appeared find it a real pleasure to have them available under one cover. For the relative newcomer in the field, the collection should be of great value in developing an understanding of the origins, intuitions, inferences, pitfalls, deductions, and rigid investigations which have combined to bring human genetics to the outstanding position that it holds today.

Part 1 contains Weinberg's demonstration of equilibrium and Lenz's exact treatment of the role of consanguinity, classic papers indeed.

Part 2 deals with human blood groups and presents Landsteiner's original contribution (1901) as well as the

Hirschfelds' historic paper on racial distribution. The Rh factors are represented by the works of Levine and Stetson and by that of Landsteiner and Wiener. A paper by Watkins and Morgan considers group-specific substances. I wish Bernstein's very basic and important contribution had been included.

Part 3 is concerned with studies of biochemical genetics: the original papers on alcaptonuria, phenylketonuria, and galactosemia; a series of papers on the hemoglobinopathies; and a selection of contributions on the serum proteins. Although population genetics is not given a specific part in the volume, some of the papers in part 3 deal with this phase of human genetics.

Part 4 is devoted to recent papers on human chromosomes and the anomalies that result from their aberrations. Mary Lyon's excellent contribution to the problem of sex chromatin and gene action is included here.

Part 5 deals with mutation and contains papers by Penrose and by Schull and Neel.

Part 6 is a reprint of Leslie Dunn's provocative presidential address made to the American Society of Human Genetics (1961).

An interesting vignette by the editor precedes each selection and adds immeasurably to the value of the collection.

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## Analytical Chemistry

**Ionic Equilibria in Analytical Chemistry.** Henry Freiser and Quintus Fernando. Wiley, New York, 1963. xiv + 334 pp. Illus. \$4.95.

Everyone who teaches analytical chemistry knows the feeling of resignation with which he approaches the topic of equilibrium calculations. He struggles with freshmen and sophomores, again with seniors, yet again with graduate students. The difficulty arises because ionic equilibria cannot be reduced to one simple all-purpose formula, nor are they amenable to rigid mathematical treatment. Even simple acid-base problems include hydrogen-ion concentrations to the third or fourth power, and to describe the titration of zinc ions with EDTA in an ammonia buffer, for example, requires 10 equilibrium constants. That most

practical situations can be described quite adequately by simple approximate equations saves a chemist from going crazy, but it is the art of making these approximations that baffles the student.

For a very long time there has been a need for a book devoted exclusively to the calculations of ionic equilibria, and now that this book has been written, the authors, Henry Freiser and Quintus Fernando, deserve the heartfelt thanks of all teachers of analytical chemistry. The book is written for students who know a little physical chemistry but who have no special knowledge of electrolytic solutions. Activity coefficients and the calculation of "concentration quotients" from thermodynamic equilibrium constants are considered in chapter 3, and the problem of approximations to solve high-order equations in chapter 4. Here an error of  $\pm 5$  percent is arbitrarily selected as that to be allowed in calculations in this book.

To judge the validity of approximations one must know the orders of magnitude of the various ionic and molecular concentrations. To show these concentrations the authors have made generous use of logarithmic graphs, including potential-pH diagrams. Acid-base, oxidation-reduction, and complexation equilibria, as well as separations by precipitation, solvent extraction, and ion exchange are discussed. Each chapter has a very fine set of problems, including some that are worked out in the text, and the tables of equilibrium constants and standard potentials at the end of the book are unusually extensive.

There is one strange omission from the literature citations: "Hydrogen Ion Concentration" by J. E. Ricci (1952), which is surely the definitive work on acid-base equilibria in aqueous solutions. The problems of liquid-junction potentials and activities in mixed electrolytes are not mentioned, and these will make the allowed error of 5 percent unduly optimistic for many practical cases. Hydrogen-ion concentrations, rather than activities, are calculated. Of course the calculation of single-ion activities requires extra-thermodynamic assumptions, but these are implicit in the whole concept of pH.

My main criticism is that the book might have been more clearly written. Complicated equations are used where simple ones would suffice; there seems

to be a little too much "substituting into formulas." I find it helpful to emphasize the "principal equilibrium" (to borrow a term from E. L. King), calculate an approximate answer first, then check the approximation to see if it is valid. But this is a subjective matter. There is no doubt that this book will help many thousands of students understand ionic equilibria.

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## Botany

**Botanique.** Anatomie, cycles évolutifs, systématique. Pierre-Paul Grassé, Ed. Masson, Paris, 1963. vi + 1040 pp. Illus. F. 98.

*Botanique*, one of a series of volumes that summarize the present state of knowledge in various fields of biology, deals with structure and life cycles throughout the vegetable kingdom, with emphasis on phylogenetic interpretation. It is designed as a textbook for French students who are working towards a first degree in biology, and it combines the knowledge of a number of specialists, each dealing with a particular group of plants. Essentially the volume falls into three parts: the first chapters are devoted to the bacteria (Prévot), Cyanophyceae (Grassé), algae (Feldmann), fungi (Chadefaud), and lichens (Abbayes); the second, which is preceded by a special chapter on the general principles of evolution (Gaussen), includes chapters on Bryophyta and Pteridophyta (Ferré), gymnosperms (Gaussen), and the morphology and reproduction of the angiosperms (Ozenda), a general chapter that precedes the systematic account of the angiosperms (Leredde) in which the families are arranged according to the system of Hutchinson. The third section, which includes an account of ecology and phytogeography (Gaussen), is of special interest.

There is no marked unevenness among the accounts; each chapter is preceded by a summary of its salient features and then enters into more detailed systematic treatment. The necessarily brief accounts are explained and illuminated by profuse and excellent illustrations, mostly black-and-white line drawings (many are originals). The excellent diagrams that illustrate growth

and the life cycle in the lower orders are noteworthy in that they are the kind students delight in reproducing in examinations and workbooks. The sections that deal with the lower orders are most successful because they do not wholly dissociate biochemistry and function from accounts of structure and life history. Function is largely ignored in the discussion of form in the higher groups and, although we are promised a separate volume on plant physiology, the unfortunate tendency to overcompartmentalize botany is not resisted.

There is probably no up-to-date survey of the structure, life history, and presumed phylogeny of the entire vegetable kingdom that can compare with this volume; in addition to its undoubted value to the student, the volume will serve as a valuable reference book for the nonspecialist. The simple, lucid French will not tax the resources of the amateur linguist, although the tendency to refer to plants solely by their common name may do so.

Unfortunately there is no information about sources and there are no guides to further reading. That the work is not intended to be a complete survey is indicated (on p. 725): "Il est certain que chacun de ces paragraphes peut à lui seul, pour les Angiospermes faire l'objet d'un volume." It would have been worthwhile to indicate to what extent these volumes are already available. Certainly there is ample space in the book for references to further reading.

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## Protozoology

**Essays on Protozoology.** H. Sandon. Hutchinson, London, 1963. 143 pp. Illus. Paper, 15s.

One can read this pleasant little book in an evening or two. In it Sandon attempts to do "what the guide-demonstrator does in a museum, namely to help the visitor to find his way by going around with him. . . ." He has brought together an interesting assortment of facts about the flagellates, amoebae, and ciliates, and he has collated the diverse topics very effectively. These three groups of protozoa are discussed with respect to their nutrition, locomotion, reproduction, osmoregula-

tion, and various other aspects of their biology. In the introductory section on protozoa in general, Sandon comments briefly on the ecology of a variety of types, including symbionts, and on the difficulties of dealing with the possible lines of evolution among protozoa.

The text should have been warmed up a bit with some good illustrations. The only figures introduced are coupled to an appendix in which the classification of flagellates, amoebae, and ciliates is sketchily outlined. Some of these illustrations fall short of showing the details that are essential to an understanding of the principal taxa. Protozoan classification (even if the so-called sporozoa are summarily omitted) is surely not simple, and it cannot be very well explained by brief comments on the orders and a few representative genera.

There is a lively enthusiasm running through this book, and I think it will make enjoyable reading for students as well as biologists who look to the protozoa for help in their own particular studies.

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## Maury's Biography

**Matthew Fontaine Maury, Scientist of the Sea.** Frances Leigh Williams. Rutgers University Press, New Brunswick, N.J., 1963. xxii + 720 pp. Illus. \$10.

This well-written and well-printed book is a very complete biography of an energetic and surprisingly studious naval officer. The author has done an immense amount of research, and the end result far surpasses the other attempts with which I am familiar.

Maury was a controversial character during all of his adult life. For a naval officer to be accepted as an equal by the scientific community is not easy even today, and in the days before the Civil War most officers had very limited educational opportunities and were therefore not considered able to take up science. Maury also had difficulties with the Navy Department, which did not quite know how to deal with an officer engaged in scholarly work.

Maury maintained an immense correspondence, especially with European scientists, for his work was well thought