simple drawings to the text. These supplement very nicely some 70 photographs, many of which are superb. One by Laurence Lowry, showing the eastern end of Martha's Vineyard, Chappaquiddick Island, Nantucket Sound, Cape Cod, and Massachusetts Bay, is on the cover of this issue of *Science*; another, showing the meanders of the White River near Edwardsport, Ind., is reproduced with this review.

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**Free Associations.** Memories of a psychoanalyst. Ernest Jones. Basic Books, New York, 1959. 264 pp. $5.

The author of this book, Ernest Jones, was one of the principal contributors to, and developers of, the psychoanalytic theory of personality organization and function. This small and somewhat fragmentary autobiography was interrupted by his death in 1958.

Whatever one's personal views of psychoanalysis as a discipline may be, and I am favorably inclined towards it, Jones' somewhat abbreviated autobiography has severe limitations. Perhaps some of this reaction has to do with the level of expectation with which I approached the book and my subsequent disappointment in it.

It is likely that Jones' reminiscences about his early years will be a matter of interest to his intimates and to those who attach a sentimental significance to him, but they have little to recommend them to the general reader. Because his self-revelations are so fragmentary they do not provide the broad view which one would need in order to obtain a better understanding of the man. While the book is titled *Free Associations*, unfortunately the content is neither free enough to give the reader a reasonable sense of the scope of the man, nor disciplined enough to give the associations an inner coherence. This stands in striking contrast to Jones' earlier contributions to the theory and practice of psychoanalysis, which are marked by his logically consistent and definitive style.

For those who have a particular interest in the development of psychoanalysis as a "movement" (although Jones deplored the widespread use of this term), the latter part of this book has many pertinent historical references. One is impressed by Jones' enthusiasm for the newly developed perspective of personality development, and by the intensity of his drive to communicate the findings to others. The violence of his response to views which deviated from the classically psychoanalytic ones is one of the more remarkable aspects to be observed. These responses are presented with a degree of candor which, while it is hardly one of the more flattering aspects of psychoanalysis, throws light on the impact of radically new ideas in any sphere of science. Such new ideas are significant, among other ways, both as things in themselves and as disrupters of the usually definitive social hierarchy within a given field of endeavor. Then, of course, as the new system of ideas becomes intrenched, it in turn establishes its own hierarchal structure.

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**Handbuch der Physik.** vol. 44, *Nuclear Instrumentation*, I. S. Flügge, Ed. Springer, Berlin, 1959. vii + 473 pp. Illus. DM. 125.

"Nuclear Instrumentation on a Grand Scale" would be an appropriate title for volume 44 of the *Handbuch der Physik*, which is titled simply *Nuclear Instrumentation*, I. The articles contained here describe the major pieces of nuclear physics instrumentation, the heavy machines most commonly associated with modern experimental physics.

One does not blindly set out to build devices such as are described in these eight articles, and as a consequence, the most interested reader will already be familiar with the general theoretical discussions presented here. It is the specific comments about specific machines that make these articles most lively; the lore of machine building is well represented in this volume of the *Handbuch*.

The first article, by E. Baldinger, presents a thorough treatment of rectification circuits and then discusses cascade generators. R. G. Herb's discussion of Van de Graaff accelerators contains some sage advice for the would-be builders of such machines who would also like to work in experimental physics: "A faithful copy of a generator that is operating can be safely predicted in regard to performance." And conversely!

The magnetic accelerators—cyclotrons and synchrocyclotrons, electron synchrotrons, and betatrons—are discussed by Bernard L. Cohen, Robert R. Wilson, and Donald W. Kerst. Cohen's article contains an interesting tabulation of the characteristics of a large number of cyclotrons and an excellent treatment of the theory and the headaches (the practice) of cyclotron construction and operation.

George K. Green and Ernest D. Courant (Brookhaven National Laboratory), have written a monumental article on proton synchrotrons; they draw heavily on the experience with the Brookhaven, University of California Radiation Laboratory, Birmingham, and Dubna machines. The design features of the alternating gradient synchrotrons at Brookhaven National Laboratory and at the laboratory of the European Organization for Nuclear Research (CERN) are outlined. The latter is now in operation.

Linear accelerators—electron, proton, and heavy ion—are discussed by Lloyd Smith. An article by D. J. Hughes contains selected topics on reactor techniques of particular interest to nuclear physicists.

Very little of the material in these articles will interest those experienced in the design and operation of "his machine," except for comparison purposes. These articles will be of great use to those who wish to be brought up to date on machines with which they are not well acquainted.

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**The Gentle Art of Mathematics.** Dan Pedoe. Macmillan, New York, 1959. 143 pp. Illus. $3.50.

This is a book for the intelligent layman who wants to know something about modern mathematics and is willing to work a little to attain this knowledge. It starts out entertainingly enough with a discussion of mathematical games. These are used to acquaint the reader with number systems other than the familiar decimal system, although their use in electronic computers is not even mentioned. The next chapter discusses the theory of probability and its many opportunities for paradox. More paradoxical ideas are introduced in the following chapter, which discusses infinity and introduces

transfinite numbers. At this point, a breathing spell is offered with a rather trivial chapter on logic. But the author returns shortly to serious mathematics with a discussion of various topics in topology. Abstract algebra is then introduced, with an aside on the esthetics of mathematical symmetry, and this is followed by a discussion of infinite series. The foundations and essentials of mathematics are examined in the concluding chapters.

Although there is some new material, presented rather pleasantly, one has the impression that he has seen most of this before in some other popular treatment of mathematics. In addition, there are other failings; these include a very detailed table of contents that promises more than it delivers and several errors, some rather serious. Thus, the explanation of when one class has a greater transfinite number than another class (page 58) omits a crucial clause, and the discussion of bracketing in infinite series (page 126) is slightly misleading. Finally, I wonder how insulted the people at the University of North Carolina will be by his statement that extrasensory perception is investigated there, instead of at neighboring, rival Duke.

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**Fresh-Water Biology.** Henry Baldwin Ward and George Chandler Whipple. W. T. Edmondson, Ed. Wiley, New York; Chapman and Hall, London, ed. 2, 1959. xx + 1248 pp. Illus. $34.50.

Perhaps no field and laboratory identification manual in the English language has been so widely used as the original edition (1918) of "Ward and Whipple." Our knowledge of fresh-water invertebrates has increased so markedly, however, especially during the past 25 years, that this complete revision is long overdue. The general organization of the first edition has been followed; that is, each chapter is written by a specialist and is devoted to a particular taxonomic group. The material consists mainly of illustrated keys to those fresh-water forms found north of the Rio Grande. Beyond introductory remarks, little space is usually devoted to a consideration of the *biology* of the groups discussed. Depending on the complexity of the group and the degree to which it is known in North America, each key is usually carried to either genus or species. The former situation, for example, applies to the Protozoa, Bacteria, Fungi, most of the Algae, Nemata, Rotifera, Insecta, Acari, and Bryophyta. The latter arrangement includes such groups as the Myxophyceae, Porifera, Gastrotricha, Bryozoa, Tardigrada, Oligochaeta, Hirudinea, Crustacea, and common vascular plants.

Most of the 46 chapters contain many fresh illustrations, but for the Rhizopoda, Actinopoda, Porifera, Nemata, Oligochaeta, Hirudinea, Cladocera, and Mollusca the majority of the illustrations are those of the first edition (reproduced, apparently, from the old, worn plates). There are no halftones.

Although the editor, W. T. Edmondson, has done a good job of reconciling the inequalities in style, emphasis, illustration, and conviction of the contributors, there are important differences in the level of usefulness of the various presentations.

Many readers will be disappointed to find that vertebrates and internal parasites are not included, but, on the other hand, new and excellent chapters on the Fungi, Tardigrada, Polychaeta, and Bryophyta have made their appearance. In addition, the chapters on aquatic insects have been greatly expanded, although they no longer include terrestrial adult forms having immature aquatic stages. Other taxonomic groups given greatly revised and expanded treatment are Bacteria, Algae, Protozoa, Gastrotricha, phyllopods, Ostracoda, Copepoda, Malacostraca, Acari, and rooted aquatics. The brevity of the final chapter, on "Methods and equipment," however, is regrettable. There appear to be very few typographical errors.

The editor has been intentionally conservative in making up the index, but many biologists will feel that this is a serious error. The following terms, for example, are used in the text and keys but are not to be found in the index: *birotulate, cingulum, crawling water beetles, microsclere, operculum, paralabial plate, theca, trichocyst, trochus, water tiger,* and *whirligig beetle.*

Although specialists will disagree on matters of emphasis and taxonomy, there will be no argument as to the care and labor involved in the preparation of this book. Edmondson has done aquatic biology a great service in providing direction and stimulus for 50 other specialists in the preparation of the compilation, and in editing their efforts.

The high price is most unfortunate. Undoubtedly much of the cost is a reflection of the complicated (sometimes wastefully complicated) format.

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## New Books

*Antibiotic Therapy for Staphylococcal Diseases.* Henry Welch and Maxwell Finland, Eds. Medical Encyclopedia, New York, 1959. 220 pp. $4.50.

*Arterial Embolism in the Limbs.* The clinical problem and its anatomical basis. A. L. Jacobs. Livingston, Edinburgh, Scotland, 1959. 212 pp.

*Automatic Titrators.* J. P. Phillips. Academic Press, New York, 1959. 233 pp. $6.

*Automating the Manufacturing Process.* George F. Hawley. Reinhold, New York; Chapman and Hall, London, 1959. 156 pp. $4.95.

*Calculus with Analytic Geometry.* Donald E. Richmond. Addison-Wesley, Reading, Mass, 1959. 473 pp. $8.75.

*The Cathode-Ray Tube.* And its applications. G. Parr and O. H. Davie. Reinhold, New York, ed. 3, 1959. 445 pp. $9.50.

*The Clonal Selection Theory of Acquired Immunity.* Sir MacFarlane Burnet. Vanderbilt Univ. Press, Nashville, Tenn.; Cambridge Univ. Press, London, 1959. 222 pp. $5.

*La Corrosion des Métaux.* André Hache. Presses Universitaires de France, Paris, 1959. 124 pp.

*Dictionary of Atomic Terminology.* Lore Lettenmeyer. Philosophical Library, New York, 1959. 298 pp. $6.

*Faune de France.* No. 63, *Coleopteres Scarabeides.* Renaud Paulian. Lechevalier, Paris, rev. ed., 1959. 298 pp. F. 5500.

*Flat Rolled Products: Rolling and Treatment.* Metallurgical Soc. Conferences, vol. 1. T. E. Dancy and E. L. Robinson, Eds. Interscience, New York, 1959. 147 pp. $3.75.

*General Crystallography.* A brief compendium. W. F. de Jong. Freeman, San Francisco, Calif., 1959. 290 pp. $6.

*A Guide to Antibiotic Therapy.* Henry Welch. Medical Encyclopedia, New York, 1959. 69 pp. $3.

*Husa's Pharmaceutical Dispensing.* A textbook. Eric W. Martin, Ed. Mack Publishing Co., Easton, Pa., ed. 5, 1959. 738 pp.

*The Ice Was All Between,* T. A. Irvine. Longmans, Green, New York, 1959. 240 pp. $4.50.

*An Introduction to the Organic Chemistry of High Polymers.* Carl S. Marvel. Wiley, New York; Chapman and Hall, London. 90 pp. $4.50.

*An Introduction to Public Health.* Henry S. Mustard and Ernest L. Stebbins. Macmillan, New York, ed. 4, 1959. 349 pp. $4.50.