

## BOOK NOTICES

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### Cells and Tissues

A clear, forceful style, terse, pithy sentences, and short, compact chapters characterize this excellent introduction to histology. While valuable to the medical student, the applications of the book do not end there. The author has kept in mind the interrelations of a knowledge of cells, tissues, endocrine glands and other organs with the broader aspects of genetics, evolution, physiology and the social sciences. Each tissue, organ and system is thoroughly though briefly discussed. Especially good are the chapters on blood, marrow, and the endocrine glands. As here presented, the subject matter of histology becomes an integral and essential part of biological knowledge and culture. Students of biology in any of its phases will enjoy and profit by this volume.—L. H. S.

**A Textbook of Histology**, by Joseph Krafska, Jr. vii+246 pp. Baltimore, The Williams and Wilkins Co., 1936. \$2.50.

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### The Great Naturalists

This is a series of historical essays, delightfully written and attractively printed and bound. From the classic scholars of Greece and Rome to the modern observers and students of nature, the great naturalists of history pass before us. We catch intimate glimpses of their work and their inspiration, their hopes and fears, their failures and successes, and above all, their love of nature and the living world. We find ourselves inexorably caught in the spirit of the book, and born buoyantly on the current of outdoor investigations. From Aristotle through Baubin, Gesner and Rondelet, Malpighi, Swammerdam and Leauwenhock, Buffon and Reaumur, Linnaeus and Ardeci, Cuvier and Lamark, Bartram and Michaux, Wilson and Audubon, Say and Rafinesque, Goethe and the Romanticists, Darwin and Wallace to Fabre, the spirit of research in natural history permeates and gives life to the book. For those who know the peace and the turbulence, the satisfaction and the despair of research in the field, the volume is highly recommended. For those who have not this knowledge, a reading of this book is not only recommended, but strongly urged.—L. H. S.

**Green Laurels**, by Donald Culross Peattie. xxiii+368 pp. New York, Simon and Schuster, 1936. \$3.75.

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### Biometry

"An Outline of Biometric Analysis," by Alan E. Treloar, in its 1936, second edition, covers the fundamentals of statistical procedure in a practical and progressive manner. Of special importance is the clarity of the text, where it lies its appeal to the non-mathematical research worker or student.

The outline is divided into three parts, each of which is designed to form the basis of a term of college work, or the whole when supplemented with practical or laboratory problems should form a sequence for progressive work for the school year. The first part introduces statistical measurements in univariate and bivariate frequencies, some uses of the chi square test, and the significance of differences in means. The second part deals with the correlation ratio, contingency, partial correlation and intra-class correlation. The third part elaborates the techniques of the "small sample" and the elements of "analysis of variance."

In this outline we have a sound contribution to a field that has too long remained obscure, not because of innate difficulty, but rather for lack of clear presentation of fundamentals. The research worker or student wishing to develop confidence in statistical usages will find this outline a valuable aid, for the algebraic derivations necessary for routine applications are carefully worked out, and interpretation of results in terms of probability is stressed in each section of the outline.—R. G. SCHOTT.

**An Outline of Biometric Analysis**, by Alan E. Treloar. 193 pp., mimeoprint. Minneapolis, Burgess Publishing Co., 1936. \$3.10.

### The Psychology of Education

Twenty-five psychologists and educators from twenty-two colleges and universities have collaborated to produce this volume. Although each chapter is by a different author, the continuity is excellent and the arrangement logical and functional. Among the topics treated are growth, acquisition of skills and knowledge, attitudes, problem solving, creative activity, motivation, character and personality, learning, individual differences, nature and measurement of intelligence, educational measurements, teacher evaluation and guidance. The genetic viewpoint is clearly kept in mind, and the co-operative role of genetic and environmental influences in the production of characteristics is recognized and stressed throughout the book. It is indeed a pleasure to find the biological basis of behavior so clearly perceived and used in the treatment of a subject which all too often lacks the biological approach.—L. H. S.

**Educational Psychology**, by twenty-five collaborators, edited by C. E. Skinner. xxvi+754 pp. New York, Prentice-Hall, Inc., 1936. \$3.20.

### Radiation

The development of the quantum mechanics which has made it possible to make quantitative theoretical predictions concerning atomic and molecular phenomena has had its most evident successes in the application to actual atomic and molecular mechanical problems rather than in theory of radiation. This field which deals not only with such items as, for example, the shapes and breadths of spectral lines, dispersion, etc., but also is fundamental in the study of cosmic rays and other nuclear phenomena, is one of ever increasing importance in modern physics. It is therefore with enthusiasm that we receive this book, *The Quantum Theory of Radiation*, the first of its kind to systematically present an account of this theory. Beginning with a discussion of the classical theory of radiation, such subjects as field theory, the interaction of radiation with matter, radiation processes connected with the positive electron and the penetrating power of high energy radiation is discussed in the quantum theory. This work can be heartily recommended as one which deserves a place among the other books on the physicist's shelf.—H. H. NIELSON.

**The Quantum Theory of Radiation**, by W. Heitler. xi+252 pp. Oxford, at the Clarendon Press, 1936. \$6.00.

### How to Know the Insects

This book was prepared by the author with special reference to the insects of Iowa, but should have a rather wide application because many of the species found in Iowa are also common throughout the Mid-west. The material presented by the author is as follows: the place of insects in the world; the development of insects; directions for collecting and mounting insects, including a list of 65 places to look for insects; how to use an identification key; an illustrated key for the identification of the more common families of insects; the Iowa insect survey; a list of the Orders and Families of insects with a common example for each family and a note on where they can be found; and a combined index and glossary of important terms.

Under the topic of collecting and mounting the author gives types of nets, ways of making nets, making killing bottles, use of baits, traps, and the making of light traps. Methods of pinning, spreading, various types of mounts, and the labelling of insects are discussed rather thoroughly. The illustrated key has one common representative of each family figured and briefly described. This should be valuable especially to a beginner in entomology.

The book is planographed by the John S. Swift Company and may be obtained with either side staple binding or spiral binding. The book should be useful to the high school biology teacher as well as to college students who are being exposed to their first taxonomic studies in entomology.—R. H. DAVIDSON.

**How to Know the Insects**, by H. E. Jaques. 140 pages, 251 figures. St. Louis, The John S. Swift Co., Inc., 1936. \$1.00. (Twenty-five per cent discount on orders of 10 copies or more. The book may also be obtained from the author at 709 N. Main Street, Mt. Pleasant, Iowa.)

### Biology

This book is a general introduction to biology. It should prove particularly useful to that group of students who do not continue in either botany or zoology. The major portion of the book consists of a study of the physiological processes of selected type forms, both plant and animal. No attempt is made at completeness from the standpoint either of systematic zoology and botany or of biological theories. There is very little said concerning ecology, parasitology or economic importance. Emphasis is placed upon unity of life processes. What is an animal, and how does it live? What is a plant, and how does it live? How do animals and plants differ? These three questions are discussed in this book. The section on heredity is clear and understandable, presenting the basic principles of this phase of biology. Dr. Rice's discussion of evolution is especially well organized and leads one gently but firmly to a rational conclusion. The book is well illustrated, the type large and clear, paper and binding are of good quality.—J. A. MILLER.

**An Introduction to Biology**, by Edward Loranus Rice. xii+602 pp. Boston, Ginn and Company, 1935.

### Biological Effects of Radiation

Biologists and physicists alike have prospected the ever-broadening field which links their sciences with results which have often been no contribution to either. This two volume work, sponsored by the National Research Council, should aid in bridging this gap, and help investigators to tread more securely as they approach many of the problems of biophysics. Forty-six authors have collaborated in the preparation of the forty-three papers which are included. Each of the authors is a well known investigator in the field concerning which he has written. The editor-in-chief has guided the compilation of this material with the assistance of six collaborating editors.

Papers I-V, inclusive, and VII deal with the fundamental aspects of radiant energy phenomena and should prove of interest to all biologists. They are readily comprehensible to any reader with an elementary knowledge of physics and admirably epitomize the present status of physical knowledge and theory in the field of radiations. The papers on "Photons and electrons" (Darrow) and "Measurement and application of visible and near-visible radiation" (Brackett) especially should attract widespread attention.

Each of the remaining thirty-six papers deals with a specialized phase of the effects of radiant energy upon living organisms. Few aspects of the subject have escaped consideration. Not all of these contributions will be of interest to any one biologist, but every biologist should find at least a few of them to more than repay him for the time required for their reading. Plant science is better represented than animal science, twenty of the papers dealing primarily with influences of radiation upon plants. This distribution of the topics discussed reflects primarily the greater attention which botanists have devoted to radiant energy effects than zoologists.

Without prejudice to the other contributions, all of which appear to be meritorious, the following may be mentioned as most likely to be of interest to biologists generally: "Radiation and the vitamins" (Bills), "Motor responses to light in the invertebrate animals" (Mast), "Action of radiations on living protoplasm" (Heilbrunn and Mazia), "Photoperiodism" (Garner), "Light Factor in photosynthesis" (Spoehr and Smith), "Effects of radiation on bacteria" (Duggar), and the series of five papers by Dobzhansky, Schultz, Stadler, Goodspeed, and Anderson upon chromosomal aberrations and mutations as induced by radiations. The dispassionate review by Hollaender of the status of the problem of mitogenetic rays is a welcome contribution to this highly controversial subject.

Most of the papers are copiously and excellently illustrated, many of the fundamental relations being graphically presented. Practically every paper includes a selected bibliography, many of which are extensive. The value of these is self-evident. It is a book to which any alert biologist will be able to turn again and again with profit.—B. S. MEYER.

**Biological Effects of Radiation**. Edited by B. M. Duggar. Two vol., 1,342 pp. New York, The McGraw-Hill Book Co., 1936.

### Mining

The subject of mine economics has been little touched upon by the mine engineer and geologist and hence it is with pleasure that this book comes to hand. It is divided into three parts: Mine Valuation, Mine Organization, and Mine Management. Under Mine Valuation, Prof. Hoover goes into great detail as to how to correctly evaluate a mine from the sampling to the final report. All persons having to make either engineering or geologic reports should read this chapter on "reporting." In the section on mine organization are considered the set-up of mining companies, promotion, the stock exchange and a series of interesting descriptions of things to beware of under the heading "Fakes and Fallacies." Many good warnings often unheeded by the investing public are included here. An all-too-brief but with-all very good chapter on the Mining Engineer and the Law finishes Part II. In Part III (Mine Management) we are concerned with the organization and duties of the mine staff from the manager down. This section also considers the training and discipline of mine personnel, and their safety, health, and welfare. The last chapter discusses the young engineer and his career. Here is much good advice for the young graduate.

This is a most valuable book and although directed primarily at mine engineering, it would also apply to petroleum engineering and other phases of economic geology. It can be recommended for all students of geology even though they do not expect to be engineers. Most if not all geologists at one time or another are connected with economic problems and would find this volume very valuable. Investors in the mining industry would also find it of value as would some boards of directors and others having to do with the employing of geologists. Much misunderstanding might be avoided if the facts included in this volume were more commonly known. The book is well organized and well written. Rather complete bibliographies with each chapter are very useful as is the carefully worked out and complete index.—WILLARD BERRY.

**The Economics of Mining (Non-ferrous Metals)**, by T. J. Hoover. viii+547 pages. Stanford University Press, 1933. \$6.00.

### Elementary Geology

There is now available a book of some 500 pages divided into fifty-one chapters which covers in an interesting and non-technical manner the field of general geology. The first thirty chapters cover what is usually termed physical geology and the last twenty cover historical geology. Numerous figures, some more or less humerous but in general to the point, are scattered through the text. Some of them we fear are somewhat too jocular and are likely to instill the wrong impression in the student's mind. We refer to the cephalopoda with arms and legs, using dumbbells and other such pictures. There are in addition to text figures 64 pages of rotogravure pictures in four groups. These illustrations are excellent and as far as we know a new step in geologic texts. It is to be regretted that the titles of the pictures do not clearly indicate the scenes to which they refer. Another criticism is that pictures on widely different scales are shown on the same page with no reference to the exact size. For example, on Plate 61 a picture entitled "Large fishtail drills" shows in part several fish tail drills and just below is a "Gusher in a Crane Field." The largest "fishtail" is three inches high and the "gusher" only about two inches. Some scale should have been introduced. This is one of the University of Chicago "New Plan" texts and as such is to be used in the geological program for the physical science general course. As part of a general course in physical science it may serve satisfactorily. For a full term college course it would appear to be entirely too elementary and rather difficult to teach. The arrangement seems awkward and although we do not ask for any set order the one followed here does not seem to intergrate with any laboratory set-up. After all, geology is a laboratory science. Although we would not care to use it as a text we have had students who would have benefited by reading it.

The make-up is excellent. It is printed in clear type on non-calendared paper, making for easy reading. The use of rotogravure pictures gives excellent reproduction.—WILLARD BERRY.

**Down to Earth**, by Croneis and Krumbein. xviii+501 pages. Chicago, University of Chicago Press, 1936.

### Structural Geology

During the past five years there has been quite an advance in structural geology. Nevin in the second edition of his text on structural geology follows the same method of treatment as in the former edition. The text is divided into twelve chapters; it begins with the physical properties of rocks and ends with mountain systems. A chapter on "Structures associated with Igneous Intrusions" is by E. B. Mayo and is an addition to this edition. Various phases of structural geology are taken up from several different viewpoints. This is especially true of the more disputed parts of the field. The chapter on "Some Facts, Inferences and Hypotheses Regarding the Earth-- gives an excellent picture of what we know and what we infer. The discussion of isostasy and continental drift is well handled. It is presented so as to present the several sides of the arguments, allowing the student to realize that all is not finished. The references, although primarily from American sources, are such that the more advanced students will find leads into the detailed literature. The discussions are in general simple and clear. Some of the terms used such as high-angle and low-angle faults, seem to us to be poor usage. The use of foot-notes and of numbered references as well is confusing.

This text should prove even more popular than the first edition. It is well written and quite readable. The illustrations are good. It is a beginning text and makes no pretense to be otherwise. Needless to say the make-up and typography are in the usual style of the publishers.—WILLARD BERRY.

**Principles of Structural Geology**, by C. M. Nevin. xii+348 pp. New York, John Wiley and Sons, 1936.

### Mineralogy

For those familiar with the second edition of this work we need only quote from the Preface of the third edition: "Changes have been made in the chapters of Physical Properties, the Polarizing Microscope, Crystal Structure and X-ray Analysis, and the Formation and Occurrence of Minerals. . . . Sixty-six illustrations have been added, and the number of pages has been increased by thirty-four." For those not familiar with this text we find it divided into 18 chapters: crystallography, the six crystal systems, compound crystals, physical properties, the polarizing microscope, crystal structure and X-ray, chemical properties, formation and occurrence of minerals, qualitative blow-pipe methods, descriptive mineralogy, gems and precious stones, and classification of minerals according to elements. This takes up 438 pages. A glossary of 222 terms comprises 6 pages. A tabular classification showing elements of symmetry and the simple forms of the 32 classes of crystals takes 7 pages. The rest of the text is devoted to tables for the determination of the 150 minerals described. These tables are based first upon the color and luster of the mineral, then upon the streak, finally upon increasing hardness. When these are run down the other physical properties are used to completely identify the mineral. Brief descriptions of the minerals are given in the tables. A rather full index completes the book.

This is definitely a text for introductory mineralogy of college level, and as such it is excellent. We question the advisability of including so much on X-ray analysis in a text of this rank. The illustrations of the minerals and crystals are excellent and clear. The inclusion of pictures of important mineralogists has our hearty approval. Such pictures add much to the interest of the beginner and help all of us to remember how some of our friends looked. A few of the rock-type figures do not give clear ideas of the rock texture. We refer especially to figures 4 and 5; either figure might be titled the opposite of what it is. However, we will admit that it is nearly impossible to take pictures of marble and sandstone of about the same grain size and reduce the picture and still show any great difference. This text is very well suited for general introductory mineralogy where the number of minerals to be studied is within the 150 described. The make-up and handling are in the usual excellent style of the publishers.—WILLARD BERRY.

**Mineralogy, An Introduction to the Study of Minerals and Crystals**, by E. H. Kraus, W. F. Hunt, and L. S. Ramsdell. Third edition, x+638 pp. New York, The McGraw-Hill Book Co., 1936.

### One Man's Idea of Physical Science

Sir Arthur Eddington believes that the world of physical science with all its apparent complexity is not so strange as the human mind which has assigned to it this complexity. The world picture is, in short, the result of the reaction of man's consciousness with it, rather than a picture having an inherent truth apart from that consciousness. Eddington has already had a good deal to say concerning this viewpoint in "The Nature of the Physical World" and "The Expanding Universe." In the present book, "New Pathways in Science," he adequately discusses contemporary developments in physical science again from the same point of view. Many who are convinced that real electrons swoop dizzily around real nuclei in real orbits will probably not agree with Sir Arthur, but in the opinion of the reviewer his is much the soundest way of looking at the problems of physical science.

"New Pathways in Science" integrates current ideas in physics, astronomy and philosophy. There are chapters on the Decline of Determinism, Indeterminacy (one of the very few adequate treatments that has yet been written on this subject), Probability, Constitution of the Stars, Subatomic Energy, Expanding Universe, and the Theory of Groups. All these are written in Eddington's engaging but minutely penetrating style.

The book is one that should be read by everyone having a mature interest in physical science whether they agree with this one man's idea of the universe or not.—C. HESTHAL.

**New Pathways in Science**, by Sir Arthur Eddington. x+333 pp. New York, The Macmillan Co., 1936.

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### Statistical Methods

In this revised edition we have almost a new book. Symbols and formulae are brought into standard form, and new and specialized techniques are given a place. Perhaps most important is the assemblage of tables useful in statistical calculations and determination of significance. Among the tables, besides those given as computation aids, squares, cubes, etc., are values of the probability integral, a table of odds, ordinates of the normal curve, Chi square, tables of  $F$  for ratio of variances,  $t$  for significance of mean differences, and significance and values for  $r$  in several combinations and functions. Tables for use in the study of human inheritance give values of  $Q$  for various sized families and various cross-over values, and the standard error of  $Q$  (Wiener). Tabulated proportions of expected recessives in random matings of dominants,  $R$  and  $S$  classes, (Snyder), are also included. The book fulfills its conception as a manual for the worker confronted with the need for reference forms, however it is by no means exhaustive in the applications of any particular technique. The exposition is crisp and concise and each method of procedure is illustrated with problem material so that a novice in statistics should be able to follow the technique. The student of statistics will notice the lack of algebraic derivation that give formulae relationships. But as a manual for definition of working forms one is gratified to find so much practical and fundamental material assembled in a small convenient volume.

—R. G. SCHOTT.

**Statistical Methods in Biology, Medicine and Psychology (4th Edition)**, by C. B. Davenport and Merile P. Ekas. xii+216 pp. New York, John Wiley and Sons, Inc., 1936.

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### How Animals Develop

To understand how animals develop is to know what they are. Our present knowledge, however, is a polychrome mosaic, black in many places, but being filled in with blocks from many sources. The beginning student of embryology finds himself hopelessly confused in the task of tracing both the pathway of development, from ovum to adult, and the interplay of forces which determine it. Numerous descriptive studies trace in detail development as observed from sections and reconstructions. But what of the rapidly growing literature dealing with micromanipulations and analyses, with artificial parthenogenesis, the role of vitamins and hormones, the function of the newly-discovered organizers, and the interaction of genes and cytoplasm? What is the significance of mutilation experi-

ments, of transplantations, of vital staining and tissue culture? Where do axial gradients come in, and do we still retain Haeckel's law of Recapitulation?

A simple, clear statement is indeed needed and welcome. Professor Waddington has attempted to give just such an exposition. He has brought these questions together and shown their interrelationships in a way not otherwise understood by the student without a very wide range of reading and thought. Writing in relatively simple but precise language, the author, I think, will make himself clearly understandable to the beginning student in embryology, and stimulate him to read further. Many questions are raised; a few are answered.

This volume does not constitute a source book in any sense. Its main usefulness is probably in orienting and stimulating the student. The author's hope of writing intelligibly for the interested layman is doubtfully realized. However, the difficulty lies more in the inherent complexity of the subject and the prerequisite of a broad reading knowledge in Biology.—JOHN W. PRICE.

**How Animals Develop**, by C. H. Waddington. 128 pp. New York, W. W. Norton & Co., 1936.

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#### Physical Chemistry

This new work departs rather widely from the traditional formula for a physical chemistry textbook. The author places great emphasis upon the state of equilibrium in a chemical reaction and the rate at which the equilibrium is attained. The book is written around these two fundamental chemical problems. Consequently the arrangement of material differs from that of most other works in the field. There are no single chapters on the liquid state or the solid state, material on these states being distributed through the book under the various general headings. Certain fundamental propositions are discussed at length, such as the laws of thermodynamics and the theory of Debye and Huckel. Some subjects usually included in elementary texts are omitted; there is no discussion of the colloidal state.

The treatment is unusually mathematical for a beginners' textbook, and is designed for students with a knowledge of calculus. Detailed explanations usually accompany and clarify the calculations. The excellent chapter on the quantum theory is for the mathematically inclined reader only.—HERMAN VON DACH.

**Elementary Principles in Physical Chemistry**, with special reference to the state of equilibrium in a chemical reaction and to the rate of attainment of the state of equilibrium; by T. J. Webb. x+344 pp. New York, D. Appleton-Century Company, 1936.

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#### Earthquakes

Earthquakes—such a title brings to mind the scare heads of the newspapers telling of the damage, the loss of life, and so on accompanying the scattered major earthquakes, but usually does not bring to mind the detailed and careful studies carried on by students of earthquakes and of the earth's interior. Dr. Heck has put into some 218 pages a rather exact account of the what and the way, as far as known, of earthquakes. In a relatively non-technical manner he has given us a general review of some of the progress of seismology. The first nine chapters deal with the effects, causes and studies of earthquakes coupled with their recording and interpretation. The seismic belts of the earth are discussed in chapter ten, while the next chapter discusses some seventeen of the world's great earthquakes. The earthquake regions of the United States are handled in chapter eleven and the next two chapters consider regional investigations. The human side with safe construction is not forgotten. An answered questionnaire of some 23 factorial questions makes up chapter sixteen. A brief history of Seismology closes this very useful book.

The book is written in a non-technical style, and although somewhat meaty is nevertheless good reading. The numerous pictures, diagrams, and charts are well selected and add much to the text. We feel that Dr. Heck has given us a book which should fill an important place as a general reference for students in geology and related fields. It is not a text, but a general book.—WILLARD BERRY.

**Earthquakes**, by Nicholas Hunter Heck. xi+222 pp., Princeton University Press, 1936. \$3.50.