SCIENTIFIC BOOKS

DYNAMICAL ANALOGIES

Dynamical Analogies. By HARRY F. OLSON. New York: D. Van Nostrand Co., Inc. pp. xi + 196. 1943.

THERE was a time when the student of physics sought to understand electrical problems by seeking their dynamical analogies. To-day, the correct utilization of electrical methods, the wide potentialities of those methods and the enormous amount of energy which has been expended upon them, has resulted in a reversal of the process of thinking, so that the custom is now to transform dynamical problems to electrical problems as soon as possible, in order that the thinking and ingenuity of the investigator may be more readily exerted in that realm.

Dr. Harry F. Olson has done a distinct service to physicists and engineers in putting the story of this matter into a consistent and connected whole, and he performs no small service in collecting together in eight pages a list of that galaxy of new terms which the engineer has invented to the confusion of the physicist who, in contrast to the chemist and biologist, used to live in a heaven of simplicity as regards nomenclature. He can once more live in comfort in full knowledge of the fact that he knows where to find the meaning of "inertance," "rotational compliance" and a hundred other similar queer expressions.

Most of the discussions in the book are made in terms of comparisons of electrical, acoustical, rectilinear mechanical and rotational mechanical systems, and the foundation of the whole subject, as based upon the dynamical equations of Lagrange in the form contemplated in Maxwell's theories, is exhibited. It may be remarked that while the equations of Lagrange contain the conservation of energy, the converse is not true except in systems of one degree of freedom, and it is perhaps well that the student should clearly realize that conservation of energy is not in itself a sufficient criterion for the solution of problems, except in this case.

Matters are developed in as concise and simple a manner as is consistent with the range of problems studied. There is also a set of useful tables stating conventional symbols for and dimensions of important electrical, mechanical rectilinear, mechanical rotational and acoustical quantities.

Chapters I and II deal with definitions and an explanation of the meaning of the fundamental elements of electrical and mechanical discussions. The third chapter concerns electrical, mechanical rectilinear, mechanical rotational and acoustical systems of one degree of freedom. The fourth chapter extends the discussion to two and three degrees of freedom. Chapter V is devoted to corrective networks, Chapter VI to wave filters, Chapter VII to transients, Chapter VIII to driving systems, Chapter IX to generating systems, and there is a valuable chapter, No. X, dealing with such miscellaneous important theorems as Thevenin's theorems, superposition theorems, reciprocity theorems, etc. The last chapter is concerned with applications.

W. F. G. SWANN

BARTOL RESEARCH FOUNDATION OF THE FRANKLIN INSTITUTE, SWARTHMORE, PA.

PROBLEMS IN CHEMISTRY

General Chemistry Problems. By W. M. SPICER, W. S. TAYLOR and J. D. CLARY. 120 pp. New York: John Wiley and Sons. 1943. $1.25.

IN this book the authors show in detail, with full explanations and many illustrative examples, how to solve most types of numerical problems encountered in the study of elementary chemistry. About 245 unsolved problems are included in the fourteen chapters, some with answers given, most without; and 118 "review problems" without answers are added, in groups with topic headings, at the end of the book.

The language used throughout is simple and understandable, the explanations logical and clear. The authors make an especial effort to induce the student to follow each thought-process involved in working a problem through to the end. They do not use nor advocate short-cuts even to the extent of setting up simple proportions. This full step-wise method, if followed patiently, leads to clear understanding of the principles involved; but at times becomes quite awkward and may distract attention from the central core of information used in solving the problem—as the balanced equation. One doesn't actually decide how many apples he can buy as described on page 32; nor does he, after the beginning phases, calculate the amount of zinc required to displace a given amount of hydrogen as described on the same page. However, this book is intended for use in the elementary stage where it is well to be meticulous.

Very useful features, to the average student, should be the chapter—six pages—devoted to an interesting discussion of "significant numbers"; a chapter on the use of exponential numbers, logarithms and the slide rule; and a chapter on using moles, gram-equivalents —chemical units in general—in solving problems where it is advantageous to do so. There are also frequent illustrations of rapid approximations as a check against gross errors.

On page 49 an error appears: "log of a quotient = log of the denominator—log of the numerator."

Such errors are few and otherwise negligible. On pages 81, 84 and 112 the student is asked to deal with physically impossible concentrations of calcium hydroxide and calcium sulfate; the problems are, however, workable on paper if not in the laboratory. The authors apparently prefer the pre-Debye-Hückel ideas of ionization, devoting three pages to the relation of freezing points to the extent of ionization of salts. Problems are given involving the solubility products of compounds of three and four ions without explanation in the text.

Such criticisms are, for the most part, of secondary importance, since the authors have clearly fulfilled their aims as set forth in an excellent introduction. This book should prove very satisfactory to the student who must learn to work problems alone, as well as for class or "quiz section" use.

CECIL V. KING

WASHINGTON SQUARE COLLEGE,
NEW YORK UNIVERSITY

TEXT-BOOKS OF BOTANY

Textbook of Botany. By E. N. TRANSEAU, H. C. SAMPSON and L. H. TIFFANY. xi + 812 pp. 424 figs. New York: Harper & Brothers. 1940. $4.00.

WITH increasing emphasis, in both secondary schools and colleges, on survey courses in general science, frequently just skimming the crests of the waves—with the ever-present danger of merely lifting off the foam—it is consoling to come upon a volume that rides on a deep keel; and certainly this book does.

More than any other recent text, it surveys the whole field of botany; more than any other recent text, it stresses physiology and ecology. There are separate chapters, among the total of fifty-three, on "The Synthesis of Sugar," "Factors Influencing the Rate of Photosynthesis," "Synthesis of Starches," "Synthesis of Fats and Proteins," "Respiration," "Respiration and Plant Development," "Physical Processes Involved in the Movement of Materials in Plants," "Plant Behavior Related to Osmosis," "Transpiration," "Growth, Dormancy, and Germination of Seeds," etc. Similarly, from the ecological standpoint, individual chapters are devoted to "Seasonal Aspects of Plants," "Environment and Leaf Development," "Non-Green Plants," "Under-water Environments" and "The Vegetation of North America." The authors take ample cognizance of recent research in these fields. The illustrations are abundant, clear-cut, effectively reproduced, and many are original.

The evolutionary development of plants does not form the central theme of the second half of the volume, as in most of our texts. This makes it possible for the authors to draw on a wider range of material, and detracts somewhat from the unity of the book. However, it is in keeping with the pedagogical philosophy set forth in the preface. "We have tried to interfere as little as possible with the teacher who prefers to have students observe and discuss phenomena before books are consulted. Nearly every chapter has been written with the assumption that it will not be read by the student until the instructor thinks that the student's own observations should be supplemented by what is written." With more traditional methods of instruction, an eight hundred page volume to be mastered by beginning students would not be conducive to the preservation of undergraduate tranquility. In accordance with the philosophy that these authors have developed, however, a large treatise is a necessity. Those who disagree with this philosophy will prefer to use a shorter book; those who are converted will find this one well written, very inclusive, beautifully illustrated, modern and scientifically accurate.

Fundamentals of Plant Science. By M. ELLEN O'HANLON. xii + 488 pp. 268 figs. New York: F. S. Crofts & Co. 1941. $4.25.

INTENDED as a text-book for a full year's work in general college botany, "Fundamentals of Plant Science" amply does justice to its title. As in most of the standard texts, the first part is devoted to the cell and to the organs of the higher plants; part two, which comprises considerably more than half the volume, deals with the groups in the plant kingdom and with genetics, evolution and botanical history. There is a twenty-five page glossary at the end. The serious student will find much food for thought and very appreciable mental stimulation between these covers.

Any new text-book of general botany must win its spurs, and this one does have its distinctive features. The author is well known for her work on liverworts, and they are accorded effective if necessarily brief treatment. The Bryophyta are subdivided into the Hepaticae, the Musci and the Anthocerotales, thus raising this last group in rank, as suggested by Howe at the turn of the century. Similarly in the Pteridophyta, the lycopods are discussed first, where they really belong, and not last, as in most text-books. Fossil Pteridophyta, as well as fossil gymnosperms, are also given consideration. In view of the importance of the Psilophytales in phylogenetic interpretations, every adequate modern text-book must afford them consideration, and this one does. Similarly, the enterprising student may read and learn here of apogamy and apospory, the embryo sac of the lily and other atypical angiosperms, soilless growth of plants, tree rings, artificial parthenocarpy, hormones, xenia, the Gnetales and numerous topics which many other books fail to mention. The illustrations are largely original.

At the close of each chapter there are "Suggestions for Investigation and Discussion" and "References."