*Biology and Human Affairs.* By JOHN W. RITCHIE. 1026 pp. Yonkers, N. Y.: World Book Company. 1941. $2.32.

*This Living World.* By C. C. CLARK and R. H. HALL. 519 pp. New York: McGraw-Hill Book Company. 1940. $3.25.

BECAUSE of the fundamental importance of the elementary course in every biological department, the available text-books are of moment to all teachers. An inspection of a series of American texts, recently issued, should therefore be comforting, for their quality is generally evident partly from the fact that many of them have reappeared in repeated editions. Such books have become well known and have been previously reviewed. It will be necessary to note therefore only recent changes that have appeared in them.

In Shull greater emphasis is given to function, and development has been reconsidered in the light of more recent knowledge. Animal relationships have been given more attention.

Guyer presents a new chapter on ecology and increases the consideration given to the experimental aspects of biological study. Much general revision of the text is found.

Mavor shows many alterations, some extending to quite extensive changes in methods of treatment. Increased emphasis is shown to physiology, neurology and ecology, and less attention is paid to distribution and to the historical aspects of the subject. Many rearrangements of material, especially that relating to plants, are evident. There have been added at the ends of chapters lists of readings and an appendix outlining the classification of plants and animals.

Considerable revision, change and rearrangement of material characterize the sixth edition of Woodruff. There are new chapters on endocrinology and on human descent, and there are many new illustrations.

It is interesting to note the degree to which these texts approximate a common method of treatment. There are variations in emphasis and in the subdivisions of topics, and Woodruff and Mavor give consideration to plant material separately, but the general topics treated do not vary greatly. The aims and methods of these authors are not significantly different. Each is obviously fully aware of the fact that something is not to be gained for nothing—that not mere information, but a way of thinking and doing is the important outcome of a course in elementary biology. Consequently, any one of these texts will serve a worthy end in a college curriculum, although local conditions or needs may, for the moment, make one preferable to the others.

Baitsell's book is not quite what the title indicates—a study of the biology of a single type, but rather, in the words of the author, "a humanizing of general biology." The basic principles of the subject are presented in the conventional manner, but illustrations are drawn from human anatomy and physiology, and emphasis is placed on the human significance of facts and principles. Aside from the pedagogic value which attaches to the use of personally relevant material, there is an advantage, the author believes, in providing a new type of treatment for students who have already had biology presented in the usual manner. This text will have a particular appeal to those interested in biology in relation to medicine and to those whose contact with the subject is restricted to a single course. To assist in extending the interest of students there is an appendix of 92 pages wherein is found a glossary, historical notes and more extended treatments of subjects than space permits in the main text. There is, for example, a thirteen-page consideration of the subject of enzymes. Often direct quotations from important papers are given.

The book by Ritchie is definitely designed for use in high schools, although it seems somewhat mature for the purpose. It is intended to develop in the minds of students a conception of the significance of biology in human life. The method is developmental rather than informative and it does not confine itself to the use of any one of the usual procedures of types, principles or systematics. It is moreover a source book and not a fixed outline to be followed. There are "comprehension tests" at the end of each "unit" and questions for class discussion; also practical exercises, a glossary and numerous appropriate quotations from general literature. The illustrations are many and good and the typography satisfactory. Naturally in a book covering so much ground there are errors, sometimes of fact, sometimes of philosophy. On the whole, however, it should serve an excellent purpose in the hands of good teachers, but one wonders how well it will aid the teacher lacking comprehensive understanding and background.

The text by Clark and Hall is of a distinctly different type from the others in the list. Its purpose is set forth by the authors in the Preface in the following words: "The aim of this book is to present, in a form which combines accuracy with pleasant reading, the gist of modern knowledge about the living world." If one thinks comprehension and understanding or any real mental development can result from pleasantly skimming over the surface of a subject, without hard individual effort, this book would be a good one to employ.

C. E. MCCLUNG

## ACOUSTICS

*Acoustics.* By ALEXANDER WOOD, M.A., D.Sc. (Glas.) xvi + 588 pp. New York: Interscience Publishers, Inc. Glasgow: Blackie and Son, Ltd. 1941. $6.00.

THIS book is characterized by a very happy mixture of experimental methods, particularly those pertaining to recent advances in acoustics, with the mathematical theory of the subject developed to the stage of use in advanced problems, but without such dilution by generalities which often, in more advanced treatises, prevents one from getting rapidly to the point which he wishes to reach.

The mathematics is presented in attractive and comparatively easily understandable form, and in the classical realm the book should form a good intermediary between an elementary book and such profound treatises as Rayleigh's "Theory of Sound."

As an illustration of the respects in which the book brings the science of acoustics up to date, we may cite from the subjects treated such topics as "Applications of Supersonic Waves," "Echo-Sounding," "Sound-ranging in Air," "Submarine Detection by Binaural Listening," "Supersonic Waves in Liquids and Solids," "Measurements of Intensity by Various Modern Methods," "Quartz Oscillators," "Magnetostriction Oscillators," a chapter containing about 40 pages on the ear and hearing, a chapter of about 30 pages on the recording and reproduction of sound and a chapter of about 30 pages on the acoustics of buildings.

The author is to be congratulated upon producing a work which should be of considerable use not only to the mathematical physicist but also to the experimental physicist who wishes to enrich the possibilities of his experiments by sound theoretical analysis.

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## THE GLASS ELECTRODE

*The Glass Electrode, Methods, Application and Theory.* By MALCOLM DOLE. xv + 332 pp. Illustrated. New York: John Wiley and Sons, Inc. 1941. $4.50.

IN 1906 Haber and Klemsiewicz first showed that the potentials on glass surfaces in aqueous solutions functioned with respect to hydrogen ion concentrations as did hydrogen electrodes. Twenty years elapsed before practical use was made of this discovery to measure pH, and it was natural that the earlier applications were made by physiologists who had long realized the importance of hydrogen ion concentration in vital processes. This delayed development was in major measure due to lack of convenient electrometers for use in the high resistance glass electrode circuits. The rapid development of thermionic tubes, which were early applied to glass electrode circuits, coincided with the rapid spread in the use of the glass electrode. To-day commercial instruments are made in large quantities by methods of mass production, and the formerly laborious pH determination with the hydrogen electrode is, with the glass electrode, now about as simple as a temperature measurement.

Now Professor Dole has fittingly capped this period of development and application by a treatise on the glass electrode which should be authoritative for many years to come. His knowledge, gained by much experience in the theory and practice of the glass electrode, has been combined with an unusual skill in scientific writing and the result is an authoritative book of unusual clarity and completeness.

Professor Dole devotes several chapters to theory which though brief are complete and furnish just the right amount of background for the understanding of practice. These include considerations of the theory of solutions pertinent to hydrogen ion measurements, theory of vacuum tube circuits and their application to glass electrode circuits, theory of cell assemblies and liquid junctions. In particular the chapter on the "Theory of the Glass Electrode" is noteworthy. Here the author has compiled all the literature and discussed in detail the theory and experiment which is concerned with the mechanisms by which the glass electrode functions as a hydrogen electrode.

The book devotes several chapters to the history of the development of pH methods and to special applications of the glass electrode in biological chemistry. This latter shows how varied has become the use of this new tool including as it does not only the measurement of pH of blood *in vitro* but also continuous recording of pH in circulating blood. Even instantaneous measurements of the pH changes in contracting muscle have been measured and important interpretations concerning muscle physiology drawn therefrom.

In the discussion of the application of the glass electrode in industrial research and control laboratories are included references to the important uses in food, leather, rubber and many varied industries. Special chapters are devoted to micro methods, continuous recording of pH and automatic pH control, potentiometric titrations, and many other special applications of the glass electrode. Technical details of standardization and management of glass electrode circuits are fully given in special chapters. The use and limitations of the glass electrode in non-aqueous solutions is authoritatively discussed. The extensive bibliography alone is a valuable compilation.

Research chemists, physiologists, physicists, pathologists, industrial chemists and many others will feel indebted to Professor Dole who has so ably given them this aid in their technical application of the glass electrode and a stimulus to the development of new uses for this invaluable tool.

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