RECENT ZOOLOGICAL TEXT-BOOKS

DURING the latter part of 1933 and the whole of the year 1934 six new works have come to the reviewer's desk. Brief summaries of these follow.

The zoological text-books which have come from the presses of various publishers in the United States during the past few years are of three types, with various degrees of intergradation: (1) There are original works which have been carefully prepared by thoughtful, competent and alert professional men of high standing (Curtis and Guthrie; Shull, Larue and Ruthven; Guyer; Woodruff; etc.). These to some degree represent the labors of those who love science and students, and who have ideas and ideals about how things should be done. They often present new points of view and contain original illustrations. The statements which students are to read are carefully considered, critical and "scientific." One may not approve of an author's plan of treatment or of some of the opinions expressed, but such works must be treated with respect. Some of these books raise standards of teaching and thinking, as well as give information. (2) There is another class of works which are opportunistic compilations by those who write books to sell. They seldom contain original figures or ideas. They are usually encyclopedic rehashes which will be useful to a great body of not-too-well-trained, time-serving teachers. They sell because they are mediocre, conservative or perhaps even a little backward in their outlook. They perpetuate old dogmas and poor figures, which every zoologist knows only too well. Students get no ideas from such books. (3) There is unfortunately another group of books which perhaps never should have been written or published. They are the works of poor writers and perhaps even ignorant, incompetent, narrow-minded or bigoted zoologists. Students who try to use these books are often confused and worried. The writers of such books continually attempt to intrigue their readers to agree with them by the frequent use of "we" and "our." They often refer loosely and uncritically to the body, the animal, forms, higher, lower, etc. They are unprogressive because they get their own information from other text-books, and not from new, inspiring, original sources.

A glossary seems to be a rock on which many authors founder. Many attempts to define terms appear, in the hands of zoological text-book writers, to result in statements which give students a very limited or distorted view. Perhaps it may be better for writers to omit glossaries and depend instead on a good dictionary which is made readily accessible to students in a laboratory or library.

The appearance of a text-book of general science for college students raises the old question of the content of beginning courses. Shall such courses be broadly informative or give technical training in methods of scientific thought and procedure? Shall students be taught the interesting and inspiring generalizations which have resulted from zoological or botanical study without knowing about animals or plants as such? Shall the backbone of a course be general principles, types, natural history, systematics or what? Shall teachers give students what they would most like to know and what may be most useful as equipmnet for an educated man in modern society, or shall teachers train students to be real scientists in a small way? The University of Chicago now requires all students to take four broad informational courses during the first two years. This is avowedly an attempt to give students a broad point of view rather than a technical limited one. Schiller[1] says:

> The interest of the professor is to become unassailable, and so more authoritative. He achieves this by becoming more technical. For the more technical he gets, the fewer can comprehend him; the fewer are competent to criticize him, the more of an oracle he becomes. If therefore he wishes for an easy life of undisturbed academic leisure, the more he will indulge his natural tendency to become more technical as his knowledge grows, the more he will turn away from those aspects of his subject which have any practical or human interest. He will wrap himself in technical jargon and become as nearly as possible unintelligible.

The teacher is always in a dilemma. Shall he try to give students a real view of the inwardness of the subject he has spent his life in mastering or shall he artfully and tactfully select the essential things from his field of learning which will enable his students to live better lives? There is only one Huxley in each generation. A small man who attempts to write a popular text-book which is not technical and critical may do nothing but present superficial, sentimental slush. It is better to be technical than silly. The writing of a well-balanced, thoroughly scientific and interesting book which is suited to the needs of students requires a rare degree of knowledge and judgment.

Probably the scientific text-books of the future will be less technical. The increasing costs of laboratory instruction on a large scale and the continual failure of technically informed college graduates to take up the ordinary duties of life without retraining themselves make educational administrators strong advocates of general informational courses. The professional scientist hates superficiality and loose thinking, but loves accuracy and truth. He therefore fears "general" courses. Yet common sense indicates

[1] F. C. S. Schiller, "Tantalus." N. Y. vi + 66. 1924.

that he must be less technical. If scientist-teachers will seriously consider this problem they can probably show a little more human interest without sacrificing scientific spirit.

An Introductory Course in Science for Colleges. By FRANK COVERT JEAN, EZRA CLARENCE HARRAH, FRED LOUIS HERRMAN and SAMUEL RALPH POWERS. *I. Man and the Nature of his Physical Universe.* x + 524 pp. *II. Man and the Nature of his Biological World.* Ginn and Company, New York. 1934. $2.20, $2.40. This two-volume work is intended for a broad, cultural course in science. The first volume deals with astronomy; matter and energy; mechanics, electricity, aeronautics and inventions; meteorology and geology. The second begins with a discussion of protoplasm and then considers the adaptations of plants and animals for life, metabolism, evolution, ecology, heredity, man's place in nature, nutrition, hormones, public health, archeology, anthropology and sociology. Each volume has a rather limited glossary at the end. In general the work is well written, interesting and at times inspiring. Good taste is used in the selection of material which students will understand. Though the treatment is often more or less popular, as it must be because such a wide range is covered, it is thoroughly scientific.

Laboratory Outlines for Animal Biology. By MICHAEL F. GUYER and HALCYON W. HELLBAUM. xiv + 240 pp. Harper and Brothers, New York. 1933. $1.50. The first part of this manual deals with frogs in detail and the second with other representative types of animals. The work is presented as 72 exercises for two-hour laboratory periods. Though the treatment is largely descriptive, suggestive questions are often asked, and a list of topics for discussion is found at the end of each exercise. There are also some comparative tables to be filled in and drawings to be labeled. Blank pages for drawings and notes are interpolated.

General Zoology. By FREDERICK H. KRECKER. xi + 634 pp. Henry Holt and Company, New York. 1934. $3.50. This book attempts to present zoology for those who desire a liberal education, rather than training for specialization. It begins with a section called "A Typical Animal," which "deals with physiological and morphological principles applicable to animals in general" and introduces "the cell and the ascending order of units into which it is organized." This is followed by a systematic survey of the chief phyla of animals. In each chapter a group is first described in a semi-popular manner; then follows a somewhat more technical discussion of morphological features; and finally there is a systematic summary in which classes and orders are briefly characterized. A third section considers animals in relation to environment. A final section, entitled "The Origin of Animals," deals largely with evolution and heredity. The book has been written by an experienced teacher who has used good judgment in presenting what students may read with interest and assimilate. It is unfortunate that there are at times careless errors and uncritical or misleading statements. For example, probably most zoologists do not believe that "since a specialized animal is thought of as being higher in the scale than a generalized form the terms higher or advanced and lower or primitive are used as synonyms for specialized and generalized respectively" (p. 159). In 1688 Francesco Redi said, "Besides, 'low' and 'high' are unknown terms to Nature, invented to suit the beliefs of this or that sect, according to the needs of the case." Such illustrations as Figures 333 and 334 appear to be poorly conceived and executed. In the first a katydid is properly designated; in the second another katydid is called a grasshopper.

Elements of Modern Biology. By CHARLES ROBERT PLUNKETT. Henry Holt and Company, New York. viii + 540 pp. $3.00. This is a book by a teacher for teachers. It is an abridgment and modification of "Outlines of Modern Biology" by the same author. The work is divided into five parts: (1) Protoplasm, seven chapters; (2) Nutrition, five chapters; (3) Response, five chapters; (4) Reproduction, four chapters; and (5) Evolution, three chapters. The treatment is from the point of view of general biology. Plants and animals are often considered together as illustrative material, but they are usually more or less ignored as such in order to present the physical and chemical basis for the phenomena of life. There is much of chemistry and physics and little or no natural history. Some of the statements are misleading, peculiarly limited or uncritical: *e.g.*, the discussion of parasitism (p. 110) and tropisms (p. 267); and in the glossary the definitions of such words as aberration, absorption, activation, adhesion, alternation of generations, analogous organs, etc. (p. 513). The work is perhaps a little heavy for students who are beginning the study of biology, but gives a thorough and thoughtful survey of the principles of biology.

Principles of Animal Biology. By A. FRANKLIN SHULL, GEORGE R. LARUE and ALEXANDER G. RUTHVEN. xiv + 400 pp. 4th edition. McGraw-Hill Book Company, New York. 1934. $3.50. This is a revision of a well-known and successful text-book. It considers the principles of zoology rather than types

or taxonomy. Though it is perhaps somewhat difficult for college freshmen at times, it impresses one as a well-written work by thoughtful, careful and competent zoologists. A new feature of this edition is a chapter on elementary chemistry and its biological applications. In twenty-one chapters the following topics are considered: biology, cells, protoplasm, chemistry, metazoans, mechanical support and movement, materials and energy, internal transport, disposal of wastes, unity and control, reproduction, breeding habits, development, genetics, classification, ecology, geographic distribution, fossils and evolution.

Animal Biology. By ROBERT H. WOLCOTT. xvii + 615 pp. McGraw-Hill Book Company, New York. 1933. $3.50. This book advocates the following principles: "(1) Life has a chemicophysical basis; (2) life phenomena are the outgrowth of organization; (3) the central fact in life is metabolism; (4) animals may be arranged in a progressive series with reference to organization; (5) the most complex animals are most effective and also the most efficient from a metabolic standpoint; (6) man, as the highest of animals, can learn by the study of animal life the principles of the most effective living; (7) he can also understand more fully his place in nature and more justly judge the actions of his fellows; this in turn may contribute to his intellectual and spiritual development; (8) every problem concerned with living is essentially a biological problem and capable of analysis and solution by the application of biological principles." The text is intended for the use of college students. Its writer was a teacher of long experience who has thoughtfully presented the general facts and principles of biology. The book contains fifty-five chapters grouped into five parts: (1) Fundamental Principles, (2) Protozoa, (3) Metazoa in General, (4) Metazoan Phyla and (5) General Considerations. It is well illustrated, a few of the figures being original. At the end is an excellent glossary, which not only defines scientific terms but also gives brief statements concerning authors mentioned in the text.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A TIMING DEVICE FOR TAKING MOTION PICTURES[1]

THE study of any morphological state attains its full value only when a record is taken of the stages which precede and which follow it. An apparatus was built to operate a motion picture camera automatically so that single exposures are taken in adjustable intervals from one second to ten minutes. When a film so exposed is projected with the normal speed of 16 frames per second the recorded process will be accelerated in a corresponding ratio.

In the recent literature several automatic devices were described, most of which are too elaborate, filling the space of a laboratory room, and being correspondingly expensive, while others show in their construction signs of amateurish work. Therefore, it became necessary to design a simple apparatus which is within the financial scope of any laboratory and yet is constructed precisely and sturdily to withstand long wear. This apparatus was built to operate the camera in exactly equal intervals, adjustable to any interval required, over long periods of time, and synchronously to put into action a source of light for each individual exposure; for it is obvious that the living object would suffer unnecessarily from the powerful light if it were not excluded during the long intervals between two exposures.

[1] The construction of this apparatus was made possible by a grant from the Committee on Scientific Research, American Medical Association, to whom the senior author expresses his obligations.

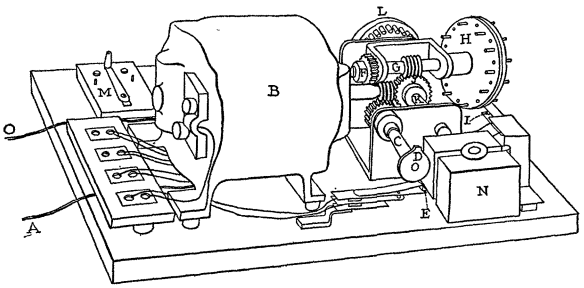

FIG. 1. The timing apparatus; *A*, power line; *B*, synchronous motor; *C*, first shaft; *D*, cam, operating *E*, the contact for the tripping magnet; *F*, worm and gear, connecting first shaft with second shaft (worm mounted on first shaft not represented in drawing); *G*, second shaft with peg disc *H*, (for intervals 1–20 seconds), operating contact *I*; *J*, worm and gear connecting second shaft with third shaft *K*; *L*, peg disk for intervals from 20–600 seconds; *M*, switch, short circuiting preparatory contact when operating in intervals below 20 seconds; *N*, condensors; *O*, three wire cable to plug board.

The equipment consists of a motor-driven impulse transmitter (timing apparatus), shown in Fig. 1, and B, B[1], in Fig. 2, and a tripping magnet (G, in Fig. 2) which by means of an adaptor ring is mounted on the motion picture camera. The timing apparatus transmits in regular intervals two current impulses. One operates the tripping magnet which—if energized—presses the release button of the camera for *one* picture. The other impulse lights the lamp (Fig. 2, K) for illuminating the object during the exposure.