Book Reviews

The Biology of the Amphibia. Unabridged republication of ed. 1. G. Kingsley Noble. Dover Publ., New York, 1955. 577 pp. Illus. $4.95.

Through the interest of and training with that patron of science, Thomas Barbour, the thorough doctoral training of the master scientist, W. K. Gregory, and the sympathetic opportunity given by Mary C. Dickerson, Gladwyn Kingsley Noble began an illustrious career of research, giving his chief attention to amphibians. Being essentially a laboratory scientist in a museum environment, the museum yielded him rich materials and a wonderful library of exceptional bibliographic value, whose staff and his own youthful assistants rendered much help.

By 1906 when Samuel J. Holmes brought out his *Biology of the Frog* the literature had become considerable but in 1931 (the first edition of this work) it was immense. In my opinion the references at the end of each chapter are one of its greatest merits. So much ink has not been expended on any vertebrate form outside man or has been used so extensively in biological classes as on the frog or amphibians. From 1906 to 1931 the work by Holmes in several editions served this purpose either as a textbook or as collateral reading. The coming of Noble's wider text, including salamanders, largely displaced this splendid work of Holmes.

I am glad to see a reissue of Noble's very useful work. In the immediate past several people have asked where they could secure a copy of the original text. I shall not review the various chapter topics, which are much the same as those of Holmes but far more extended. We have no comparable text for turtles, snakes, or lizards.

Fifty years ago I used Ecker and Wiedersheim, G. A. Boulenger's *Tailless Batrachia of Europe,* Gadow's *Cambridge Natural History* volume, and several more, but few emphasized the salamanders as Noble does. By 1931 a simply written, comprehensive volume was much needed, and this work supplied the need. Few could have done this review of the literature without the peculiar American Museum setup of efficient help. No work has appeared to replace it, and a reprint is in order. If after a quarter of a century it is to be reissued it must be a useful book of exceptional merit.

ALBERT H. WRIGHT
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Actions of Radiations on Living Cells. D. E. Lea. Cambridge Univ. Press, New York, ed. 2, 1955. 430 pp. Illus. + plates. $5.50.

This book, a classic in its field, has been out of print for some time, and those who must refer to it will be glad to know that it is once again available. The revisions consist of some minor textual changes, together with 11 pages of notes and 32 additional references, that the author, before his untimely death, had made as annotations in his personal copy. The work has therefore in no real sense been brought up to date, and workers who want a more recent and extensive treatment of the subject should refer instead to the two parts of *Radiation Biology,* volume I, edited by A. Hollaender (McGraw-Hill, 1954).—B.G.

Catalogue of the Type Specimens of Microlepidoptera in the British Museum (Natural History) Described by Edward Meyrick. vols. I and II. J. F. Gates Clarke. British Museum of Natural History, London, 1955. Illus. vii + 332 pp. and 531 pp. £3 and £6.

Most of us dream at times of bringing order into whole vast fields of human knowledge, but few of us have the energy, persistence, or even the proper circumstances actually to do any such thing. We can only admire, envy, or marvel at those who do. Gates Clarke, in the projected six volumes of Meyrick's type specimens, comes close to reorganizing the entire field of the taxonomy of the microlepidoptera. Of this work two volumes are at hand, the third is partially in press, and the remaining three are expected to appear during the next 5 years.

Edward Meyrick (1854–1938), in a publishing lifetime of 64 years, described the incredible total of well over 14,200 species of moths. One wonders if he ever slept! As might be expected with such an output, the work was not always as careful as might have been desired. The basic scheme of classification adopted by him was inadequate and artificial, and many of the characters of great taxonomic value to modern students of these moths were not even described by Meyrick. Consequently, microlepidopterists have been faced for years with the enormous task of combing through this immense mass of literature and these innumerable specimens to bring them into accord with present-day ideas and to organize them so that a modern worker would at least know which of Meyrick's species belonged to a group that he might have under consideration. Even to bring together the bibliographic citations for upward of 14,000 names would be a many-years' task for most ordinary people. Clarke has done this as a mere introductory list in the present work. It occupies the greater part of volume 1 of the series, along with discussions of Meyrick's specimens, labeling, and classification. These latter discussions might well be made required reading for students of taxonomy, both plant and animal.

Volume 2, treating the families Stenomidae, Xyloryctidae, and Copromorphidae, may be taken as an example of the five main volumes of the *Catalogue.* This volume consists of 531 large octavo pages of which 263 are fine halftone plates illustrating the wings and genitalia of generally four species each. The remaining pages are text for each species, giving Clarke's disposition of them, sometimes with brief excerpts from the original publication, synonymy, designation of the type, and explanation of the figures in the accompanying plates. Glancing over plate after plate of these moths, one is at the same time impressed by both the monotonous similarity and the infinite variability of these delicate creatures. After seeing the variation that occurs in the pattern of even a single genus, one ceases to be surprised that the Lepidoptera are the second largest group of living organisms in number of species. These illustrations are made from enlarged photographs of expanded wings and microphotographs of genitalia, usually in two views. Each of these represents a careful dissection done by Clarke himself.

In the text are many hundreds of new combinations, needed to bring the greater number of the insects treated into line with modern taxonomic arrangements. An interesting difference between zoological and botanical practice in nomencla-

ture is brought out strikingly in this connection. In many cases new combinations are made for specific names originally proposed in wrong genera, which are then, even on the same page, reduced to synonymy under other species. This seems to be perfectly correct zoological practice, but most botanists scrupulously avoid making unnecessary new combinations. Perhaps the bogey of adding to synonymy has been grossly overemphasized by botanists, since this wholesale creation of new binomials does not seem to inconvenience the zoologists in the least.

In sizing up the character and importance of this series, one may say that it seems to set the pattern for much of the most needed taxonomic work in both zoology and botany during the next century.

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Classical Electricity and Magnetism. Wolfgang K. Panofsky and Melba Phillips. Addison-Wesley, Cambridge, Mass., 1955. xi + 400 pp. Illus. $8.50.

After teaching for a long time from notes and by a multitude of references, it is good to find in a single book material of which one can say, "This is written just about the way I would like to have it done." No two teachers would agree in detail on what should be included in any textbook, but most will feel that this one contains a well-balanced assembly of topics for a graduate course. There is material on wave guides and cavities and material on scattering. Relativistic electrodynamics and the fields from a moving charge are discussed at some length.

The use of meter-kilogram-second units in a book having the stature of this one will speed their acceptance among physicists. Conformal mapping and the Schwarz transformation are treated too lightly to enable the student to work the assigned problems. A scaler magnetic potential that arises from conduction currents is defined, but another that arises from magnetization is also defined. The same symbol is used for both. A little maneuvering could show that the two are identical, but the student may well think that they are distinct. It has always been hard to find problems for an advanced electromagnetics course that are of just the right degree of difficulty; the present book does much to relieve that situation.

The adverse criticisms are trifling ones. This is an excellent book that gives in one volume material that has been scattered throughout many books.

ROBERT H. WHITMER
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Experimental Design and Its Statistical Basis. D. J. Finney. Univ. of Chicago Press, Chicago, Ill., 1955. xi + 169 pp. $4.50.

This book is in the series entitled "The Scientist's Library: Biology and Medicine," for which the editor's specifications included emphasis on introductory concepts and problems, assumption of a "common level of scientific competence" among readers, and avoidance of popularization—not easy specifications to meet in the subject of this volume. The author had to write principally for those biologists and medical research workers, still numerous, who are unfamiliar with the past 30 years' developments in the logic, and consequent practice, of experimentation; therefore he had to risk revealing that much of his potential readers' experimentation involves biased or inefficient designs and hazy inferences.

Even if a reader starts with a conception of statistics as some arithmetic for use after an experiment, he can hardly retain that notion after seeing this comprehensive up-to-date presentation of principles with illustrations from a wide variety of experiments on animals and plants, in field and laboratory, and from human therapeutic trials.

The author writes "in the hope of arousing interest," and makes "no claim that the subject is easy, but only that those who will rid themselves of the fear of mathematics can understand much without using advanced mathematical techniques." His advice with reference to some sections—to pass over difficulties without struggling with them greatly—could well apply to any passages that are difficult on the first reading.

One of the book's virtues is that probably no one will learn from it enough arithmetic to swell the multitude of misleading t's and χ^2's in current medical and biological literature—products of an unfortunate sequence in the development of modern statistics; namely, the dissemination of arithmetical techniques before the emergence of experimental methods (such as strict randomization) that are essential to justify the arithmetic after an experiment.

A good book stimulates one to suggest possible improvements, and here are three suggestions.

1) Does not even a brief display of the arithmetic of χ^2 and of t, early in an exposition of experimental design, tend to orient the reader in an undesired direction?

2) Is not the justification of normal (Gaussian) curve methods—an admittedly uncomfortable but fundamental question—too brief? It is to be hoped that, as experimenters become more at home with statistical thinking, they will raise this question insistently. An introductory book could, perhaps, best anticipate such inquiry by pointing out the distinction between techniques of design (such as the Latin square and randomization), which can be justified by well-known properties of our universe, and normal-curve techniques of analysis, which are justified for some phenomena by extensive experimentation and for others by little more than the statistician's analog of "clinical instinct."

3) The last sentence of the text rightly says that any biologist who has read the book will realize the need for a statistical specialist's advice—a very desirable outcome; but one could wish for a few remarks on problems met by a statistical consultant who continues to conduct his own experimental research. Such a person knows how constant must be the vigilance if bias is to be avoided that will render any statistical tests or estimates highly questionable. He knows how scarce statisticians are compared with the myriads of researches that need statistical aid throughout. He is faced with colleagues' demands for statistical analysis of their data, often prompted by journal editors or arithmetically minded referees who are willing to *assume* that an experiment was suitable for such treatment.

On the other hand, he knows that many experiments, not suitable for statistical arithmetic, have led toward the truth because the data have been produced and assessed by a skilled and self-critical experimenter who has arrived at a cautious conclusion—statistical, it is true, but without the spurious definiteness of a P value or a confidence limit.

When a book tends to increase the demand for a scarce commodity, it would not be unfitting for it to give advice to those who wish to obtain the commodity but can obtain little or none of it.

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The World We Live In. Lincoln Barnett and editorial staff of *Life*. Time, Inc., New York, 1955. 304 pp. Illus. $13.50, regular ed.; $15.50 deluxe boxed ed.

When the judges met in 1953 to select the winners of that year's AAAS–George Westinghouse Science Writing awards, they unanimously voted a special citation to *Life's* science department and Lincoln Barnett for the series of articles then appearing in *Life, The World We Live In.*

The series has since been completed and is now available in book form. In 1953 the judges considered the magazine