

## Book Reviews

**Handbook of Physiology.** A critical, comprehensive presentation of physiological knowledge and concepts. vol. 1, section 1, *Neurophysiology*. John Field, editor-in-chief. H. W. Magoun, section editor. American Physiological Society, Washington, D.C., 1959. xiii + 779 pp. Illus. \$22.

During the past two decades physiological knowledge, with the support of government and private agencies, has expanded at a progressively accelerating rate. The vast bulk of the current literature and the complexities of modern concepts make it increasingly difficult for the teacher, graduate student, and beginning investigator either to keep abreast of major advances or to begin a penetration in depth of a single field. If this new knowledge is to be useful to those who are not specialists, it must be collected, selected, and systematized. It must be fitted into the context of accepted fact and placed in proper perspective.

The handbooks of normal and pathological physiology, edited by Bethe and Roger in the 1930's, admirably fulfilled this need in the era just preceding the last war. Recognizing the need for an up-to-date compendium of physiological fact and theory, the board of publication trustees of the American Physiological Society has initiated the *Handbook of Physiology*, with John Field as editor-in-chief and Victor Hall as managing editor. *Handbooks* covering all phases of physiology are to be published during the next 5 to 10 years. Each will be planned and edited by a section editor, recognized as an authority in his specific field. It is anticipated that each *Handbook* will be revised about once every 10 years.

In no phase of physiology has the postwar development of fact and concept been greater than in neurophysiology. It is, therefore, appropriate that the first section of the *Handbook of Physiology* should be devoted to this subject. Volume 1 is the first of a three-volume series to be edited by Horace Magoun; the other volumes are sched-

uled for publication toward the close of 1959 and early in 1960. Comparable volumes on circulation are in preparation under the section editorship of William Hamilton, and still others are in the initial stages of planning.

*Neurophysiology*, volume 1, consists of 31 chapters by some 35 contributors, each of whom is a recognized authority in his field. Fifteen of the chapters were written by scientists from abroad, 16 by North Americans.

The book is divided into five sections: a historical review, neuron physiology, brain potentials and rhythms, sensory mechanisms, and vision. With the exception of Mary Brazier's historical review, each section has an introductory chapter by an outstanding senior authority. Thus neuron physiology is introduced by J. C. Eccles, brain potentials by A. Fessard, sensory mechanisms by E. D. Adrian, and vision by H. K. Hartline. Both the character and the scope of these introductory chapters differ. That of Eccles is supplementary to the content of its section, and it expands on certain concepts given relatively brief treatment or omitted from consideration. Others serve more as prefaces that place the content of succeeding chapters in perspective.

The historical chapter by Mary Brazier begins with the concepts of Aristotle and Galen and continues through those of Sherrington, Horsley, Berger, Sechenov, and Pavlov. As she points out, scientific neurophysiology has, in large measure, developed since 1600. Her review is, therefore, devoted mainly to the contributions of scientists of the last three centuries. The chapter is illustrated nicely, although the off-center placement of figures and legends, too large for single-column reproduction, does not appeal to my esthetic sense. This brief and general treatment of the historical development of neurophysiology is supplemented in succeeding chapters by a more detailed consideration of past investigators' contributions to the present body of knowledge in each field.

The chapter titles of each section of

volume 1 have been chosen to provide broad coverage. The authors of these chapters are eminent scientists recognized for their investigative contributions and fitted to write authoritative summaries. The section on neuron physiology includes chapters on conduction of the nerve impulse (I. Tasaki), initiation of impulses at receptors (J. A. B. Gray), synaptic and ephaptic transmission (H. Grundfest), neuromuscular transmission (P. Fatt), autonomic transmission (U. S. von Euler), and neuromuscular transmission in invertebrates (E. J. Furshpan). The section on brain potentials and rhythms includes chapters on single unit activity (K. Frank), intrinsic rhythms (W. G. Walter), evoked potentials (H. T. Chang), d-c potentials of the cortex (J. L. O'Leary and S. Goldring), and the pathophysiology of epileptic seizures (H. Gastaut and M. Fisher-Williams). The section on sensory mechanisms includes chapters on receptors in lower forms (H. Autrum), touch and kinesthesia (J. E. Rose and V. B. Mountcastle), thermal sensation (Y. Zotterman), pain (W. H. Sweet), taste (C. Pfaffman), smell (W. R. Adey), vestibular mechanisms (B. E. Gernandt), auditory receptors (H. Davis), and central auditory mechanisms (H. W. Ades). The final section on visual mechanisms includes chapters on photosensitivity in invertebrates (L. J. and M. Milne), the image-forming mechanisms of the eye (G. A. Frey), photoreceptor processes (G. Wald), neural activity in the retina (R. Granit), central mechanisms of vision (S. H. Bartley), and a final general chapter on central control of sensory receptors and transmission systems (R. B. Livingston).

Multiple authorship, although essential if accounts are to be authoritative, introduces difficulties in the compilation of any volume such as this. Scientific eminence is not invariably associated with lucidity of exposition; and not all the chapters are equally informative reading for the unsophisticated student of neurophysiology such as I. Each reader will no doubt seek to satisfy his own particular needs and will be variably pleased with the result. As a teacher, I found most complete satisfaction in chapters written, for the most part, by those who are teachers. Investigators in neurophysiology will no doubt bestow their accolades on others. However, the volume as a whole is readable, and differences in style and clarity of expression do not seriously compromise its usefulness.

A second difficulty of multiple authorship is inadvertent omission of topics or cursory treatment with the expectation that others will provide adequate coverage. I shall mention but two examples. In the chapter on transmission of the nerve impulse, the treatment of the Hodgkin-Huxley thesis is compressed into a little more than 1 page out of a total of 45. In the chapter on synaptic transmission, major emphasis is placed on postsynaptic events; little attention is devoted to presynaptic ones. Problems of this nature may be solved by having an introductory or concluding chapter that summarizes, gives perspective to, and supplements the materials presented in the chapters of any one section. Indeed these may have been the instructions given to those chosen to write introductory chapters. In any event, Eccles performed this task in exemplary fashion for the section on neuron physiology.

Each chapter follows a basic plan, yet individuality of expression does not seem to have been stifled by too rigid formalization. A summary of chapter contents is presented first, and this is followed by a brief historical résumé. Because this résumé emphasizes major contributions of the past, only a person thoroughly conversant with both the old and new literature could present it succinctly and in proper perspective. Each author then continues with the development of the present status of his subject, presenting a background of classical concepts, a description of modern investigative methods, quantitative data, and new ideas that have emerged from recent work. Each chapter ends with an extensive bibliography; unfortunately, the titles of original journal articles are not given.

The book is profusely illustrated and the quality of illustrations is good. However, many of the illustrations, because they do not fit into either a single or a double column, are placed off-center and to one side, and the legends are placed off-center and to the opposite side. Space is wasted, and the page imbalance is compounded: page 285 is a horrible example of the way not to arrange illustrations. Just why figures, slightly too wide to fit into a single column, were not further reduced, and why those a bit less than double-column width were not reduced less are mysteries to me. While such liberties with symmetry do not impair my comprehension, they do hurt my esthetic sensibility.

The *Handbook of Neurophysiology*

is not a textbook in the usual sense; it is far too detailed for either the casual reader or the beginning student. Furthermore, it presupposes a reasonable background of information and some knowledge of current literature. It will no doubt be of greatest interest and use to teachers of physiology and to beginning investigators. However, in volume 1 the ophthalmologist and otologist will find a wealth of fundamental information on visual, vestibular, and auditory processes. The neurologist and neurosurgeon will find much of interest and value, not only in volume 1, but no doubt in the next two volumes as well. These clinical specialists will profit from a study of volume 1 in direct proportion to their interest in the fundamental aspects of their respective disciplines. Little applied pathophysiology is included in any chapter except that which deals with epileptic seizures. Volume 1 will serve as a reference and bibliography source for many in all fields of biological science. The index prepared by W. Himwich will be particularly helpful to those who use the book in this fashion.

The organization of volume 1 is logical, with one exception. The section on brain potentials and rhythms seems out of natural order; just why it was placed between the sections on neuron physiology and sensory mechanisms is not immediately apparent.

Reviewing the first volume of a three-volume series is somewhat akin to reviewing a three-act play after seeing only the first act. Both are hazardous undertakings, for what may seem an inconsistency or an omission in the first volume or act may be clarified, justified, or included later. The publication of volume 1 of the *Handbook of Neurophysiology* is a significant accomplishment. Coupled with volumes 2 and 3, it will constitute a monumental treatise on the subject.

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**Science and Public Policy.** Dael Wolfle.  
University of Nebraska Press, Lincoln, 1959. 81 pp. \$1.50.

From the vantage point of his position as executive officer of the American Association for the Advancement of Science, Dael Wolfle is well qualified to speak authoritatively and informatively on the intricate interrelations of

science and public affairs. In these three pithy and well organized Montgomery Lectures delivered last spring at the University of Nebraska, he sets forth with commendable clarity and incisiveness the nature of the basic administrative, organizational, and policy problems which confront government, industry, education, and the individual citizen as a consequence of the development of science and technology as dominant factors in contemporary society.

Wolfle's statements of basic principles are sound and sensible and rooted in practical experience. Intelligent formulations and observations abound. This brief volume will undoubtedly be frequently quoted in discussions of the interconnections of science and society. Its succinct review of the scientific revolution and of its impact upon industry, the federal government, and educational institutions provides an excellent summary of recent developments.

Wolfle pleads for an increase in the level of support for basic scientific research by industry and private philanthropy, as well as by government; for recognition of the question of over-all top-level guidance for scientific activities as the number one problem facing science in the federal government; and for deliberately planned innovations in our educational system which will permit significant improvements while retaining the principle of freedom of action by states and local communities. His definitions of fundamental problems and issues are precise and valuable.

He is less persuasive, however, in his proposed solutions. Wolfle presents his own positions logically and eloquently, but one is not always certain that he has included all the relevant considerations in his analyses. It is questionable, for example, whether the "ultimate solution" of the difficulties inherent in the relations between scientific research and the military lies in the re-establishment of an Office of Scientific Research and Development along the lines of the justly praised World War II agency. Wolfle also supports the Berkner proposal for a limited type of Department of Science and Technology and the Klopsteg plan for financing higher education. Whatever the final fate of these suggestions, we can be grateful to Wolfle for his forthright and thoughtful presentation of the issues involved. Participants in future debates of these proposals will have to respect his considered judgments.

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