Book Reviews

Theories of Learning. Ernest R. Hilgard. Appleton-Century-Crofts, New York, ed. 2, 1956. 563 pp. Illus. $5.50.

Hilgard's revision merits more than the casual notice usually accorded a second edition of a standard textbook, for Hilgard's book stands almost alone as a guide to students of what has become in America the most actively explored field of experimental psychology. As it happens, the revision, while retaining its old form, represents a thorough reworking of the field, a complete rewriting of many chapters, the addition of much new material, and a bringing of the bibliography up to date. The first edition is still a valuable book, but the new one is indispensable.

"Learning theory" may be considered the typically American contribution to experimental psychology. Following Darwin and Pavlov, and guided by Dewey and Thorndike, psychologists in this country have been fascinated by the problem of explaining how man becomes molded by his environment into the person that he is. Broadly stated, this is the problem of "learning." American psychologists, in keeping with the Jeffersonian tradition, tend to seek a basis for the understanding of man in the laws that govern individual development. If all men are born equal, the explanation of their diversity must be referred to the influences of varying environments. In other words, men are what they are because of what they have learned. Can the natural laws of learning be formulated on the basis of observation and tested by logic and experiment? This has been the major preoccupation of American experimental psychology for more than half a century.

The literature on the theory of learning is enormous, and it bulges each year with hundreds of new titles, many of which represent utterly inconsequential contributions. Few psychologists have the time and patience to read it all, and fewer still have the scholarly perspective that will enable them to follow the trails of theory through the jungle of words. Hilgard gives us a steer. He identifies theories, presents the evidence for each with impeccable fairness, and leaves us (almost) free to draw our own conclusions.

For the readers of *Science*, most of whom are not psychologists, Hilgard's book can be recommended as a good introduction to experimental psychology, far better than any of the introductory textbooks that we impose on our students. Hilgard does not pretend to present all of psychology, but he gives us a wise and scholarly appraisal of one of psychology's most important fields. He knows his subject, knows how to communicate his enthusiasm, and—unusual among psychologists—knows how to use the English language.

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Précis de gérontologie. Léon Binet and François Bourlière. Masson, Paris, 1955. vii + 554 pp. Illus. Paper, F. 3800; cloth, 4500.

It is virtually impossible to squeeze a review of even so young a discipline as gerontology into 554 pages. The authors have not attempted this feat but have placed upon a clearly presented background of gerontology (the science of aging) an up-to-date compendium of modern medical thinking and practice dealing with older people (geriatrics).

The first impression of an awe-inspiring reference work is replaced on closer acquaintance with the attractiveness of a readable and stimulating review. The interesting and varied presentation can be attributed, in part, to a long list of competent collaborators.

The first five chapters constitute the gerontological background for the volume. In Chapter 1, Binet and Bourlière give a good summary of the status of the general biological problems of aging. In Chapter 2, Pacaud presents the psychological aspects of gerontology, and in Chapter 5, Daric gives a demographic summary of aging in France and discusses its socio-economic consequences. Chapter 3 on "Age and infection" and Chapter 4 on "Cancer and Gerontology" complete this part of the book, which covers just 105 pages.

The authors indicate that the next 12 chapters "study successively the physiology and pathology of each of the organs and functions of the human body." The chapters on the blood, arteriosclerosis, the respiratory apparatus, the digestive system, the kidney, and the endocrine glands fulfill this intent by achieving a good balance between the biological and clinical aspects of the discussions. The chapters on the heart, the prostate gland, the musculoskeletal system, the skin, the sense organs, and the nervous system are, however, more clinical in presentation and do not provide much physiological background. The book is concluded by Chapter 18 on "Gerontologic surgery" and Chapter 19 on "Therapeutic aspects of the aging problem."

This handsomely bound volume is printed on good paper with large readable type. The photographs, among 184 figures, are especially well reproduced. The bibliographies, which appear at the end of each chapter, range from a complete list of references following Chapter 1 to no references following Chapter 18. The authors recognize the limitation of their bibliography and refer the reader to N. W. Shock's *A Classified Bibliography of Gerontology and Geriatrics*. The somewhat topical subject index is strongly supplemented by a table of contents that includes the page numbers of the chapter subheads.

The title and the authors' statements indicate that the book is designed to aid the student and the physician who is interested in gerontology. It should be especially helpful to the physician to have, in one volume, some background of gerontology and a complete geriatric review. The authors have succeeded in filling the literary space between the more definitive works on gerontology and the more specifically geriatric works. They have provided an international type of summary by drawing heavily on the American and English literature. This book should be helpful to anyone who is interested in the problems of aging.

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Einführung in die Geometrie der Waben. vol. IV, *Elemente der Mathematik vom Höheren Standpunkt aus.* Wilhelm Blaschke. Birkhäuser, Basel-Stuttgart, 1955. 108 pp. Illus. DM. 15.25.

An encyclopedic book on the same subject by Blaschke, one of the principal workers in the field, and G. Bol appeared in 1938 under the title *Geometrie der Gewebe*. According to the preface, *Gewebe* (web or textile fabric) was changed to *Wabe* (honeycomb) because the author prefers being associated with apiarists rather than weavers.

Either term has little connection with

the strictly mathematical concept of web. For the benefit of the noninitiated: The simplest type consists of three one-parameter families of curves in the plane (or a part of it) such that through every point there is exactly one curve of each family. If each of the families consists of parallel lines, hexagons may be constructed as follows: consider a triangle ca_1a_2 whose sides belong to the three families, construct a_3 as the intersection of the parallels to a_1a_2 through c and to ca_1 through a_2. Proceed in the same way with the triangle ca_2a_3 obtaining a_4, and so forth. Then $a_7 = a_1$. This construction is possible in other webs, but in general $a_7 \neq a_1$. If always $a_7 = a_1$ the web is called hexagonal. A typical problem is the characterization of the hexagonal webs and the definition of a measure (called curvature) for the local deviation of an arbitrary web from a hexagonal one.

This book is no mere excerpt from the older work; the methods are thoroughly different, based on Pfaffian forms and exterior differentiation. This permits the author to cover a large territory in few pages. The four chapters deal with webs in the plane, webs of surfaces in space (consisting of four one-parameter families of surfaces), plane webs consisting of four one-parameter families of curves, and webs of curves in space. The connections with algebraic geometry are particularly intriguing—for instance, rectilinear hexagonal webs consist of the tangents of a curve of class three.

Calculations, as opposed to synthetic reasonings, play a greater part in this book than in its predecessor; at times the author himself seems to regret this tendency, for instance (p. 64) where he speaks of creating a little geometric light in a wild forest of formulas. Nevertheless, the book is very readable and transparent and can be recommended as an excellent introduction to the subject. Because in his other works the author often disturbs the reader by extraneous—that is, nonmathematical—prejudices, I emphasize that this little book is not open to such objections.

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Physiology of Digestion. I. P. Pavlov. Academy of Medical Sciences of the U.S.S.R., Moscow, 1952. 508 pp. (In Russian).

This is an elegant and complete collection of all of Pavlov's publications in the field of the physiology of digestion. It includes the famous lecture series, all of Pavlov's papers on his ingenious surgical and experimental techniques, as well as a great number of articles previously scattered in various journals. The surgical papers contain numerous neat and clear-cut drawings, which every physiologist and surgeon would greatly appreciate. This volume also includes six of Pavlov's erudite essays on the broad general principles of the physiology of digestion, with particular reference to clinical problems and applications. One of these papers represents the presentation made by Pavlov at Stockholm in 1904 on the occasion of his acceptance of the Nobel prize.

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Lectures on Theoretical Physics. vol. V, *Thermodynamics and Statistical Mechanics.* Arnold Sommerfeld. F. Bopp and J. Meixner, Eds. Translated by J. Kestin, Academic Press, New York, 1956. 401 pp. $7.

Sommerfeld has compiled the lectures that he gave to his students into six volumes. The present volume completes the series on theoretical physics and deals with thermodynamics, kinetic theory, and statistical mechanics. Unfortunately Sommerfeld died before he had finished the manuscript of this volume, and it has been completed and edited by J. Bopp and J. Meixner.

The first three chapters and part of the fourth had been virtually completed by the author. The subject matter of the latter part of Chapter IV had been discussed with the editors, but the presentation and method are theirs. Sommerfeld had not decided on the contents of Chapter V, which is entirely the work of the editors, although the sections on the electron theory of metals are based on the well-known article by Sommerfeld and Bethe in the *Handbuch der Physik.*

Chapter I develops the general considerations of thermodynamics. Thermodynamics had a very practical origin, and the author stresses the technical aspect of the subject. Sommerfeld avoids any notation, such as dx, for nonperfect differentials, preferring to think in terms of *properties* of systems and their associated perfect differentials. In this light, the main importance of the second law of thermodynamics (which is discussed here by the methods of both Clausius and Caratheodory) is that it shows the existence of a property (the entropy) of a system and shows that under certain well-defined conditions the entropy never decreases. The chapter concludes with a section on the origin and consequences of the Nernst heat theorem.

Chapter II applies the results of Chapter I to special systems, such as dilute solutions and galvanic cells. The section on black-body radiation follows the original train of thought by which Planck arrived at his radiation law. It is a feature of this book that, without ever disturbing the logical development of the subject, the historical approach is discussed whenever possible and the presentation is extremely clear and readable.

Chapter III, on elementary kinetic theory, gives an introduction to statistical mechanics. The statistical significance of the van der Waals constants and the classical derivation of the Langevin function amplify the earlier sections on these subjects. Statistical fluctuations are exemplified in the very elegant section on Brownian motion.

In Chapter IV classical statistical mechanics is developed by Boltzmann's enumeration method, and the ensemble theory of Gibbs is only mentioned. Quantum statistics are introduced by the Darwin-Fowler method, whereas the combinatorial method would have been more in keeping with the general tone of the book as an undergraduate textbook.

Chapter V, which deals with the Maxwell-Boltzmann transport equation and its solution by the method of moments, is at a much higher level of difficulty, and the editors are forced to refer the reader more often to specialized papers.

At the end of the book there is an excellent collection of questions appropriate to the subject matter of the various chapters and some 40 pages of comment and hints for solution.

The translator has succeeded in preserving the clarity and elegance of presentation of the original, and this volume is to be highly recommended to teachers and students of classical thermodynamics and statistical mechanics.

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Protoplasmatologia. Handbuch der Protoplasmaforschung. vol. XI. *Protoplasmatische Pflanzenanatomie.* Lotte Reuter. Springer, Vienna, 1955. 131 pp. Illus. $8.10.

Workers in the fields of experimental plant anatomy and developmental physiology will appreciate Lotte Reuter's monograph, which correlates the extensive studies in "protoplasmic anatomy" by Friedl Weber and his school with parallel or related trends in dynamic anatomy elsewhere. Although not all the aspects and reports dealing with structure, development, physiological state and function, and differentiation are covered completely, a satisfactory synthesis of main results in the chosen fields has been obtained.

The first part of the book deals with