book is to supply the chemist with information that he can use directly in his laboratory. As a result, the treatment is mainly from a practical viewpoint, with little emphasis on theory or basic principles.

Approximately one-half of the section on materials of construction is devoted to the corrosion of metals, while the remaining part gives a brief treatment of physical properties for metals and nonmetals. A number of different methods for measuring pressures and gas flow rates are discussed in the section on operations with gases. This section also presents an excellent, although brief, treatment of valves for use on gas lines.

Although the sections on heating and cooling, mixing, and grinding, screening, and classifying do include a small amount of elementary theory, they are devoted primarily to a discussion of equipment for carrying out these operations. The chemist who has no engineering background will find that these sections clearly explain the use of the various types of laboratory engineering equipment.

The book is well written, and, in general, the material requires little technical background for a complete understanding. The approach is almost completely qualitative, and most of the book is devoted to description of equipment. The engineer will find that very little information is presented that is not already well covered in the various textbooks and handbooks on chemical engineering. However, the chemist, and in particular the organic chemist, will find that the book fulfills its purpose of supplying a useful, concise, and fairly complete coverage of engineering methods and equipment for laboratory applications.

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The Leibniz-Clarke Correspondence. Together with extracts from Newton's *Principia* and *Opticks,* edited with introduction and notes by H. G. Alexander. Philosophical Library, New York, 1956. 200 pp. $4.75.

In the years 1715–16 Leibniz, the greatest philosopher on the Continent, engaged in a critical correspondence with Samuel Clarke, a scientific-minded theologian, a friend and disciple of Isaac Newton. It was through the efforts of Caroline, Princess of Wales, to whom Leibniz had first written a criticism of the theological implications of Newtonian philosophy, that this exchange of letters took place. Clarke had Newton's help in composing his replies and attacks. Thus, in effect, these letters reveal the coming to grips of the thought of the two greatest philosophic and scientific minds of that great age.

Behind this correspondence lay the long-standing controversy between Leibniz and Newton concerning the invention of the calculus. Fundamental differences in outlook, both scientific and philosophic, were factors in this quarrel. But these were obscured as the course of the debate took an increasingly bitter and shameful turn. The Leibniz-Clarke exchange is a far more temperate and significant reexamination of these differences.

Although the correspondence begins with certain theological considerations, the argument soon goes on to cover the range of basic philosophic-scientific ideas —the central topics of that branch of learning then known as "natural philosophy." So we find Leibniz criticizing the Newtonian account of gravity and the existence of a vacuum. He advances his own theory of space and time, in which these are taken to be relational and mathematically "ideal" orders, as against Newton's treatment of them as absolute and, in some sense, independently existing "substances." It remained for later readers to point out the critical difficulties to be found in both positions. But the letters draw the differences sharply and clarify the problems. Hence, they were to serve as valuable guides to all subsequent understanding of the thought of Leibniz and Newton and to provide a fertile source for future work on the problems they raise.

It is surprising, in view of the interest and historical significance of the correspondence, that the present book is the first complete English edition to be published since 1738. The original text is here, in modernized spelling and type. In appendixes the editor has wisely included pertinent selections from Newton's *Principia* and *Opticks* and from letters by Leibniz (and one by Newton) all bearing on issues that relate to the correspondence. These valuable additions to the original work are supplemented by H. G. Alexander's informative footnotes in the text. Furthermore, he has written a clear and thoughtful 50-page introduction, which surveys and discusses the problems raised in the letters and briefly traces some of the major phases of the subsequent history of the space-time controversy, from Berkeley and Euler, through Kant, to Mach and Einstein.

A few of the things Alexander has to say in this generally able discussion will cause some disagreement. The critical comments on Leibniz, for example, are not altogether clear. This may be partly due to the fact that not only is Leibniz difficult but we do not as yet have full access to his thought and to those of his writings that are still preserved for us. [There exists no complete edition of Leibniz. The first ample edition of his papers to appear in English has just been published by the University of Chicago Press (1957)]. It is not an easy matter to disengage "metaphysical" from "scientific" ideas and interests in Leibniz. It is very easy to be misled by his language into viewing the controversy as theology-metaphysics (Leibniz) versus mathematical science (Newton). Actually, all of these interests are shared by both sides to the controversy.

These are, however, relatively minor considerations and Alexander is to be congratulated for making this classic available and presenting it to us in a competent and attractive form. No secondary account can reproduce the vitality and contagious interest with which the Leibniz-Clarke debate was conducted. This book will prove valuable reading for all those with an interest in the background of modern science and philosophy.

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Hormones, Brain Function, and Behavior. Proceedings of a conference on neuroendocrinology held at Arden House, Harriman, N.Y., 1956. Hudson Hoagland, Ed. Academic Press, New York, 1957. 257 pp. Illus. $7.

Neuroendocrinologists have provided us with numerous clues to endocrine physiology since the studies and treatise of William Buchan of Edinburgh, who in 1779 stated that "the passions have great influence both in cause and cure of diseases. How mind acts upon matter will, in all probability, ever remain a secret. It is sufficient for us to know that there is established a reciprocal influence betwixt the mental and corporeal parts, and that whatever disorders the one, likewise affects the other." In this regard, Buchan's treatise remained as a challenge to future investigators, and the progress made in neuroendocrinology gives witness to the wide acceptance of the carefully documented challenge.

Hormones, Brain Function, and Behavior highlights the thinking of certain investigators concerned with (i) steroids in neuropsychiatry (R. A. Cleghorn); (ii) effects of adrenocortical steroids on the brain (D. M. Woodbury, P. S. Timiras, and A. Vernadakis); (iii) steroid anesthetic and brain metabolism (H. W. Elliott, B. F. Krueckel, and V. C. Sutherland); (iv) determinants of sexual behavior patterns (W. C. Young); (v) control of sex behavior in animals (Allan C. Goldstein); (vi) serotonin in mental disorders (D. W. Woolley); (vii) biochemical studies on, and physiological

implications of, serotonin (S. Udenfriend, H. Weissbach, and D. F. Bogdanski); (viii) central neurohumoral agents (B. B. Brodie and P. A. Shore); (ix) adrenolutin as a psychotomimetric agent (A. Hoffer); (x) metabolism of thyroid hormones by brain tissue (J. R. Tata); (xi) thyroid treatment and appetite for alcohol (C. P. Richter); and (xii) thyroid hormones and mental health (R. W. Rawson, H. Koch, and F. F. Flach).

The section on serotonin is especially good. Woolley concludes: ". . . sufficient evidence has been found to suggest that serotonin plays a role in the brain, and that the pharmacological interference with this function there may influence mental and neurological processes. There is no proof that these relatives (analogs) of serotonin do not affect other processes aside from those concerned with serotonin, and these other processes may be of great importance. However, the use of analogs of serotonin has brought to light so many phenomena related to mental function as to suggest a participation of this hormone in normal mental process." Furthermore, the biochemical studies on serotonin by Udenfriend, Weissbach, and Bogdanski provide additional evidence indicating that serotonin has a role in the function of the brain: (i) serotonin is found in the brain, (ii) enzymes which both make and destroy serotonin are found there, and (iii) increasing amounts of serotonin in the brain, as with 5-hydroxytryptophan, or decreasing it by pyridoxine deficiency produce marked central difficulties. Finally, the pharmacological effects produced by indole drugs give added proof of an important central function for serotonin.

Allan C. Goldstein's chapter, which includes a large amount of work accomplished in association with Frank A. Beach, is a rather thorough account of numerous observations on the experimental control of sex behavior in animals. From these observations it is rather evident that the lower spinal cord, the hypothalamus, the amygdaloid complex, and the cerebral cortex are important structures for the sexual act. As for the status of our knowledge pertaining to a relationship between hormone action and neural functioning, Goldstein admits that little is known beyond what was said by Beach and Philip Bard in 1940. The development of newer techniques, however, provides promise of obtaining pertinent information in this area.

The title of this book is somewhat out of proportion to the subject matter it contains. Notably absent are the groundbreaking contributions of G. W. Harris, J. D. Green, C. H. Sayer, A. Rathballer, Jacob de Groot, G. Sayers, David Hume, and Monte Greer. These names are synonymous with neuroendocrinology. The value of this little book could have been greatly enhanced by the incorporation of the newer observations from Harris and his school and from the Los Angeles group.

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Models of Man. Social and rational. Mathematical essays on rational human behavior in a social setting. Herbert A. Simon. Wiley, New York; Chapman & Hall, London, 1957. 287 pp. $5.

Herbert Simon's 16 "mathematical essays on rational human behavior in a social setting," gathered together under the title *Models of Man,* have appeared in recent years as separate technical articles. He has organized them into four groups and prefaced each section by a short introduction that establishes the common theme. Although the mathematical demands are not unduly severe or the mathematics unconventional, the book will be accessible mainly to those who have some knowledge of the general problem area and some technical facility with classical mathematics. Social scientists who possess the requisite skills should find much of the volume congenial. It is not polemic. ("In the long run, mathematics will be used in the social sciences to the extent that it provides a sufficiently powerful language of analysis and exposition to justify the time and effort required to use it.") And, in several of the papers, Simon has taken a well-known social theory as his starting point (see, for example, his formalizations of Festinger's and Homans' theories of group interaction).

There are three central, but independent, themes in the book: causation, social adaptation, and limited rationality. In the first series of essays, causation is treated essentially as unilateral interaction within a dynamic system, which is what Simon feels that practicing scientists—in contrast to philosophers—mean by the concept. The analysis is limited to those dynamic systems that can be described by certain fairly narrow classes of equations. These ideas for handling asymmetric relations are then applied to two substantive problems: political power and the influence of a social prediction (for example, prediction of the outcome of an election) on the actual outcome.

The first three papers on social adaptation, which formalize three current theories of group process, use familiar differential equation techniques to study social equilibriums and stability in human groups that are characterized in terms of certain aggregated group variables. As in the theories, no real analysis of the nature of the basic variables is presented, and, although this question is discussed in the introduction to the section, it is not disposed of to my satisfaction. "Friendliness," "activity," and "pressure to communicate" are extremely subtle, complex notions that are not clearly numerical in nature, and any model that assumes that they are may well have a fragile foundation. The final essay in this section—the best of the 16, to my mind—offers a general statistical mechanism to account for the diverse social distributions that exhibit the relationship known as Zipf's "law" or the rank-size rule.

Simon's final thesis is that "it is time to take account—and not merely as a residual category—of the empirical limits on human rationality, of its finiteness in comparison with the complexities of the world with which it must cope." He advocates a principle of bounded rationality under which, among other things, the goal of maximizing is to be replaced by what he calls "satisficing"—that is, achieving a criterion. What he means is amply illustrated in a variety of special cases, but nowhere is it formulated in sufficient generality to be really competitive with the traditional optimizing ideas.

The book suffers from what I am afraid must be the fate of any collection of journal articles. They have been written for experts and, hence, take for granted a familiarity with the literature, on the part of the reader, that cannot be supplied by the short connective sections. At the same time, in articles that were originally directed to different audiences, there is bound to be some redundancy and unevenness of level. Since Simon has a flair for exposition, we can only regret that he did not elect to rework this material into a fully integrated book.

R. DUNCAN LUCE
New York, New York

New Books

General and Applied Entomology. V. A. Little. Harper, New York, 1957. 551 pp. $7.

The Terpenes, vol. IV, *The Triterpenes and Their Derivatives: Hydrocarbons, Alcohols, Hydroxy-aldehydes, Ketones and Hydroxy-ketones.* The late Sir John Simonsen and W. C. J. Ross. Cambridge University Press, New York, 1957. 533 pp. $13.50.

Psychology, Evolution and Sex. Cecil P. Martin. Thomas, Springfield, Ill., 1957. 179 pp.

The Journal of a Scientician. Piero Modigliani. Philosophical Library, New York, 1957. 136 pp. $3.75.

Radioactivity and Nuclear Physics. James M. Cork. Van Nostrand, Princeton, N.J., ed. 3, 1957. 427 pp. $7.75.