ments has been made even more comprehensive.

The editor has wisely chosen to accept a certain amount of repetition to make possible a more rounded presentation of relevant material in the subdivisions of the text so that each tends to stand alone, adding to reference value. At the same time, other than the chapter by Wyss concerned with natural and acquired resistance to antimicrobial substances, there is no general theoretical discussion of microbial growth inhibition and death, or consideration of the implications of the dynamics of the processes of disinfection. Possibly the authors assume an adequate background on the part of the reader, and this assumption is doubtless justified, but in my opinion the book would gain in stature by presentation of the subject material against an authoritative theoretical discussion.

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Handbook of Chemical Data. F. W. Atack, Ed. Reinhold, New York, 1957. 629 pp. $6.75.

This is a handy little pocket-size volume of essential chemical information in tabular form. Although by no means as complete as the familiar *Lange* and *Chemical Rubber* Handbooks, it lists the properties of 2100 inorganic and 5500 organic compounds and contains useful tables of specific gravities of solutions, logarithms, formulas, gravimetric factors, and so on. The book is small enough to fit a pocket or a brief case, the typeface is easy to read, and the arrangement of headings makes it possible to find information quickly without using the index.

Psychology, Evolution and Sex. Cecil P. Martin. Thomas, Springfield, Illinois, 1957. x + 166 pp.

Evidence for any biological theory is never complete. Destructive criticism points out the gaps in the evidence without offering a better explanation of the demonstrated order of facts. Constructive criticism offers an alternative theory that is more in accord with the evidence, or provides new facts that logically force modification or overthrow of inadequate theories.

Martin's book attempts to refute the "mutation-selection theory" of evolution, and, in its place, he offers the alternative theory which is little more than a modern restatement of Lamarckian inheritance of acquired somatic characters—psychological, physiological, and structural. He does not claim proof for Lamarckism, but he is strong in his opinion that the "mutation-selection" theory is less well established. He does not incorporate adequately the advancing information on the roles of recombination, inbreeding, and population genetics. He thus fails to understand how complex functions or regressions can evolve in conformity with modern genetic and ecologic principles. Many sweeping statements are made in contradiction to available evidence not mentioned in his limited bibliography. For example, he says (page 23): "That the modificatory preferences become, in time, hereditary seems fairly certain. That they do so through mutation and natural selection has not been proved and appears to be virtually impossible." He seems sincere in his viewpoint and convictions but, in my opinion, too often substitutes biased generalizations for a careful analysis of the facts, pro and con. When he does gather facts together, he often leaves out evidence opposed to his conclusions. It would take far too much time and space to supply the data that would tend to refute his major conclusions, but I suggest that the interested reader examine the following books and papers: (i) W. C. Allee, A. E. Emerson, O. Park, T. Park, and K. P. Schmidt, *Principles of Animal Ecology* (Saunders, 1949); (ii) G. L. Stebbins, Jr., *Variation and Evolution in Plants* (Columbia University Press, 1950); (iii) T. Dobzhansky, *Genetics and the Origin of Species* (Columbia University Press, ed. 3, 1951); (iv) J. Huxley, A. C. Hardy, and E. B. Ford, *Evolution as a Process* (Allen and Unwin, 1954); (v) H. J. Muller, "Life," *Science* **121**, 1 (1955).

These publications give both discussions of concepts and many pertinent bibliographical references that will supply much of the critical data lacking in Martin's book. Of course, these references do not solve completely all of the problems raised, and there are some differences of opinion and interpretation among the active investigators of evolutionary dynamics, but I think the major questions raised by Martin are largely answered. Old-fashioned Lamarckism is now rather thoroughly discredited. I would also suggest that "The evolution of adaptations" by C. H. Waddington [Endeavour **12**, 134 (1953)] be read. This essay shows how examples once used by Lamarckians may be harmonized with modern genetic and ecologic theory. Instead of a cause always preceding an effect, genetic substitution indicates that the effect, in a sense, causes the selection of genetic triggers setting off processes once physiologically acquired. In time there may be an evolutionary feed-back from effect to cause, provided only that the cause is continuous or repeated.

It is well to have a healthy skepticism concerning any theory, major or minor. Science grows by the accumulation of new evidence and the refutation or verification of theories explaining the order of facts. Relationships are observable facts as much as are the facts that are related. However, in the book under review, I am not convinced that the alternative of Lamarckism is justified by the evidence, nor am I convinced that Martin has penetrated thoroughly enough into the evidence that supports the theory he attempts to refute. He accuses others of approaching the problem with fixed preconceptions and dogmatic attitudes, but it seems to me that Martin may have erred by proceeding from a somewhat subjective bias himself. Unfortunately none of us can be thoroughly objective and remain human.

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Introduction to the Mechanics of Stellar Systems. Rudolf Kurth. Pergamon Press, New York and London, 1957. ix + 174 pp. $9.

A stellar system may be characterized as an assemblage of mass points, each moving under the combined gravitational influence of all the others, with no spatial bound on the motion of any individual particle. No straightforward theory has ever been developed for the mechanics of such a system; instead, techniques have been drawn in catch-as-catch-can fashion from theories of the *n*-body problem, the motion of continuous media, statistical mechanics, and kinetic theory. Rudolf Kurth says he has attempted to bring out the essential parts of this subject, but the scope of his book is not as broad as the title would indicate. He concerns himself chiefly with the abstract mechanical principles that may be applied to stellar systems. He cannot claim to give a systematic presentation of current theories of stellar dynamics and their application to actual stellar systems.

The book begins with a short summary of observed characteristics of existing stellar systems, followed by a consideration of the basic assumptions and methods on which a theory of their mechanics may be based. Next comes a discussion of the dynamics of many-particle systems. The two central chapters deal successively with stellar systems as assemblies of gravitating mass points and as gravitating continua. The book closes with a brief discussion of the relation of statistical mechanics to the mechanics of stellar systems.

The author's point of view is abstract and general. Such an approach can be very powerful, but in this book it is not.

Many discussions end with vague generalities, solutions-in-principle, or doubts as to whether the mathematical model really applies. Moreover, one may question the choice of material and the emphasis. Kurth spends 12 pages on a proof of Poincaré's recurrence theorem, in spite of the fact that the escape of stars is known to make the evolution of stellar systems irreversible. On the other hand, the theory of stellar encounters is completely omitted, along with its evolutionary consequences and its significance for the basic approach to stellar dynamics. The occasional illustrative use of observational data shows no appreciation of their significance—and especially their uncertainties and discrepancies. Indeed, the author confesses that most of his data are taken not from the original sources but from a general text published in 1950.

The foregoing evaluation reflects in part my own prejudice. A general theory need not set forth its own applications, but it should go so far as to ease any doubts as to whether the applications can be made in practice.

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Instinctive Behavior. The development of a modern concept. Translated and edited by Claire H. Schiller. International Universities Press, New York, 1957. xix + 328 pp. Illus. $7.50.

Claire Schiller has translated from the German eight papers illustrative of European studies of animal behavior during the 1930's. Originally published in scattered sources, these have not been readily available to American readers. An introduction by K. S. Lashley and a preface by N. Tinbergen help to orient the reader who is not already acquainted with the ethological movement.

The introductory paper by J. von Uexküll, "A stroll through the worlds of animals and men," stands apart from the remainder of the book. It is pleasant reading; however, the perceptual worlds described are not accessible to scientific investigation. Six papers are concerned with the observational and theoretical foundations of ethology, largely in the words of Tinbergen and Konrad Lorenz. The bringing together of papers originally presented separately has resulted in undue repetition of such theoretical points as the distinction between "instinct" and "taxis" and the definition of "innate releasing mechanisms." Judicious editing might have provided more space for observational and experimental material. However, by the time the reader has encountered Lorenz's description of an instinct for the third time, he has learned that ethologists, too, reject the concept of an instinct as a goal-directed chain of activities. So wide is the gap in meaning between Lorenz's "instincts" and McDougall's "instincts" that a better word should be found. P. H. Schiller is represented by a hitherto unpublished study of manipulative play in young chimpanzees. He throws doubt on the importance of "insight" as a factor in tool-using by these primates.

Ethologists are concerned with precise descriptions of responses, with their adaptive value, and with their phyletic evolution—problems which receive little consideration in contemporary comparative psychology in America. Fundamentally trivial responses such as bar-pressing or running down an alley serve well enough to establish quantitative relationships between antecedent events and behavior. The law, not the response, is important. Nevertheless, I was struck by a resemblance between the ideas of Lorenz and Schiller on the interrelationship of instincts and learning and B. F. Skinner's concept of the conditioning of operant behavior. Then, on page 286, I found that the comparison had already occurred to Schiller. Perhaps the entire range of ethological theory could be reviewed from this point of view.

The usefulness of the volume is enhanced by a bibliography of ethological studies, including some as late as 1955. Some of the newer research is more quantitative, techniques having been borrowed from other experimental sciences. These early papers are, however, important reading for the animal behaviorist interested in the history of ideas.

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New Books

Methyl Glucoside. Preparation, physical constants, derivatives. G. N. Bollenback. Academic Press, New York, 1958. 188 pp. $5.50.

The Alimentary Tract of the Ruminant. David Benzie and A. T. Phillipson. Thomas, Springfield, Ill., 1957. 24 pp. and 54 plates. $5.50.

Application of Tensor Analysis. A. J. McConnell. Dover, New York, 1957 (originally published as *Applications of the Absolute Differential Calculus*). 330 pp. Paper, $1.85.

Block Diagrams. And other graphic methods used in geology and geography. Armin Kohl Lobeck. Emerson-Trussel, Amherst, Mass., ed. 2, 1958. 221 pp. $6.

Biochemical Investigations. In diagnosis and treatment. John D. N. Nabarro. Little, Brown, Boston, ed. 2, 1958. 310 pp. $6.

The Medical World of the Eighteenth Century. Lester S. King. University of Chicago Press, Chicago, 1958. 366 pp. $5.75.

The Guide to Garden Flowers. Their identity and culture. Norman Taylor. Houghton Mifflin, Boston, 1958. 332 pp. $4.95.

Antony van Leeuwenhoek and His "Little Animals": Being Some Account of the Father of Protozoology & Bacteriology and His Multifarious Discoveries in These Disciplines. Collected, translated and edited, from his printed works, unpublished manuscripts, and contemporary records by Clifford Dobell. Russell and Russell, New York, 1958. 442 pp. $10.

Bibliography and Index of Geology Exclusive of North America. vol. 21. Marie Siegrist, Mary C. Grier *et al.* Geological Society of America, New York, 1958, 845 pp.

Principles of Biology. W. Gordon Whaley, Osmond P. Breland, Charles Heimsch, Austin Phelps, A. R. Schrank *et al.* Harper, New York, ed. 2, 1958. 887 pp. $6.75.

Oral Communication of Technical Information. Robert S. Casey. Reinhold, New York; Chapman & Hall, London, 1958. 199 pp. $4.50.

The Story Behind the Word. Some interesting origins of medical terms. Harry Wain. Thomas, Springfield, Ill., 1958. 350 pp. $8.50.

Social Class and Mental Illness. A community study. August B. Hollingshead and Frederick C. Redlich. Wiley, New York; Chapman & Hall, London, 1958. 454 pp. $7.50.

The Future Supply of Oil and Gas. A study of the availability of crude oil, natural gas, and natural gas liquids in the United States in the period through 1975. Bruce C. Netschert. Johns Hopkins Press, Baltimore, 1958. 145 pp. $3.

The Measurement of Color. W. D. Wright. Macmillan, New York, 1958. 272 pp. $10.75.

Vibration and Impact. Ralph Burton. Addison-Wesley, Reading, Mass., 1958. 320 pp. $8.50.

Your Speech Reveals Your Personality. Dominick A. Barbara. Thomas, Springfield, Ill., 1958. 189 pp. $5.50.

Ion Exchange Resins. Robert Kunin. Wiley, New York; Chapman & Hall, London, ed. 2, 1958. 479 pp. $11.

Theoretical Physics. Thermodynamics, electromagnetism, waves, and particles. F. Woodbridge Constant. Addison-Wesley, Reading, Mass., 1958. 377 pp. $7.50.

Chromatographic Techniques. Clinical and biochemical applications. Ivor Smith. Heinemann, London; Interscience, New York, 1958. 322 pp. $6.75.

Pears Cyclopaedia. An everyday work of reference for the home, office, and school. L. Mary Barker, Ed. Pears, Isleworth, England, ed. 66, 1957 and 1958. 975 pp. 15s.

Biological Ultrastructure. Arne Engstrom and J. B. Finean. Academic Press, New York, 1958. 335 pp. $8.

5-Hydroxytryptamine. Proceedings of a symposium held in London on 1–2 April 1957. G. P. Lewis, Ed. Pergamon Press, New York and London, 1958. 270 pp. $9.50.

Fundamental Concepts of Inorganic Chemistry. Esmarch S. Gilreath. McGraw-Hill, New York, 1958. 428 pp. $7.50.