

Books

Problems of Life. An Evaluation of Modern Biological Thought. By Ludwig von Bertalanffy. 216 pp. John Wiley and Sons, Inc., New York; Watts and Company, London, 1952. \$4.00.

The author's translation of his *Das Biologische Weltbild, Die Stellung des Lebens in Natur und Wissenschaft* makes available a summary of the development of his organismic conception. The task of biology is stated to be the establishment of laws governing order and organization within the living. Hitherto biological research and thought were determined by ideas which Bertalanffy classifies as analytical and summative, machine-theoretical, and reaction-theoretical conceptions. A brief review from the iotrophysical and chemical days through the development of vitalistic doctrines to mechanical concepts is presented and these concepts rejected as inadequate. The leading principles of his organismic conception are summarized as: "*The conception of a system as a whole* as opposed to the *analytical* and *summative* points of view; the *dynamic conception* as opposed to the *static* and *machine-theoretical* conceptions; the consideration of the organism as a *primary activity* as opposed to the conception of its *primary reactivity*." This concept is examined as a method of research and theory in biology, and also as to its epistemological significance.

Several chapters (dealing with levels of organization, unitary conception of the processes of life, laws of life, life and knowledge, and the unity of science) develop his concept and discuss it with respect to biological information and the development of theories in other branches of science. The book is documented with references to critical papers, mostly German, and particularly to his own work. Knowledge from developmental mechanics, growth, and genetics are cited in evidence that laws are being formulated in biology in terms of statistics, as they have been in physics. Much of this material is to be covered in the second volume, which postpones criticism until the evidence is made available for review. For the physicist and chemist, these references and discussions may be too meager to be satisfying, unless firsthand knowledge of the results of the biological research is known by them.

Living systems, unlike the closed systems of thermodynamics, are open systems in dynamic equilibrium. They must be more than machines since they maintain and reproduce themselves. This uniqueness is the result of organization and may be investigated, within the limits set by the indeterminacy principle, although the

results will probably be statistical in form and application. Biological organization requires investigation and analysis at its own level of organization rather than a synthesis of the laws of physics and chemistry. The geneticist has not yet been forced to postulate more and more elementary particles.

Finally, Bertalanffy believes that science can be unified by a "general systems theory". The principles which hold for systems in general can be defined in mathematical language, perhaps as a theory of probability. He notes the differences of the least action principle, as an example, in different branches of science. For details we must await the next volume. Bertalanffy closes by quoting Goethe, "... Consider and 'tis easy understanding, Life is not light, but the refracted colour."

The importance of organization and the differences between organized and unorganized systems are well recognized. The development of his organismic system, or concept, has a history that merits consideration. Experimentation is necessary for obtaining information and it need not be limited by mechanistic or vitalistic postulations. Biological science does not yet have enough quantitative information to round out a general theory and it will be interesting to learn how well the author can work out this theoretical architecture in the next volume.

This is a thought-provoking volume that should interest scientists concerned with the broader aspects of science. Nonbiological readers might be reminded that this is one man's labor of many years, rather than the all and credo of biologists.

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Flying Saucers. By Donald H. Menzel. 313 pp. Harvard University Press, Cambridge, Massachusetts, 1953. \$4.75.

"They sought it with thimbles, they sought it with care;
They pursued it with forks and hope;
They threatened its life with a railway share;
They charmed it with smiles and soap."

Lewis Carroll
—*The Hunting of the Snark*

But nobody quite found it. Or, more accurately, them. And now Dr. Menzel has provided the reasons for their elusive behavior in a very convincing book entitled, succinctly enough, *Flying Saucers*.

While the "saucer" designation is only six years old, saucer-like apparitions have been reported at many times in history as far back as Ezekiel's wheels. No part of the world has escaped them, although China does not seem to have had its full share. Dr. Menzel discusses at length several of the more widely known and believed saucer stories of the past and present, which, on the basis of the reports of competent observers, cannot be dismissed as hoaxes or as nonsense. Their explanation in terms of perfectly normal, although infrequent, optical manifestations in the atmos-

phere is clearly presented, to the probable discomfiture of the sixteen-little-men-from-Venus adherents. If Dr. Menzel is to be believed, confidence in the tangible physical existence of interplanetary flying saucers is on the same level of credulity as confidence in the tangible physical existence of Donald Duck.

Both pure speculation and circular reasoning are absent in the careful and detailed section of the book in which the actual causes of the phenomena which have been called flying saucers are explained. Such natural events as mirages, mock suns, the aurora, comets, and meteors come in for analysis, with an abundance of photographs and drawings adding to the clarity of the material. Simple experimental demonstrations of atmospheric refraction and the effects it produces are illustrated, with Dr. Menzel himself acting as the sorcerer in several pictures. The discussion of radar ghost images is especially pertinent in view of the totally unwarranted faith most laymen seem to have in the infallibility of radar.

After more than two hundred pages devoted essentially to debunking wild speculations, Dr. Menzel could not resist a few speculations of his own (of a more conservative nature to be sure). Hence chapters on space travel and visits to Mars and Venus which, partly because of the authority with which the author speaks, are quite interesting despite their nonsensational character.

Flying Saucers, according to the publisher, is written for "anyone with a spark of intellectual curiosity." Perhaps a bit of openmindedness is also needed, since it is probable that to many people Dr. Menzel is, as he likes to say, the man who shot Santa Claus. However that might be, the book is both fascinating and enlightening, a welcome addition to the unhappily small shelf of nontechnical but intelligent expositions of scientific ideas.

Arthur Beiser

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Uranium Oxides

An Annotated Bibliography of Selected References on the Solid-State Reactions of the Uranium Oxides, by S. M. Lang, has recently been prepared by the National Bureau of Standards at the request of the Atomic Energy Commission. The 95-page bibliography contains 257 abstracted and about 60 nonabstracted references on the solid-state reactions of the uranium oxides with 36 other oxides as reported in the literature. The bibliography (NBS Circular 535) is available from the Government Printing Office, Washington 25, D. C., for 30 cents.

X-Ray Spectroscopy

An 82-page report has been issued on the Conference on the Application of X-Ray Spectroscopy to Solid State Problems, held at the University of Wisconsin in October 1950 under the joint sponsorship of the Wisconsin Alumni Research Foundation and the Office of Naval Research. The report (No. PB 111027) includes

sixteen papers presented by scientists from the United States, England, France, and Germany, and is available from the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., for \$2.25. Checks should be made out to the Treasurer of the United States.

Books Received

INTERNATIONAL TABLES FOR X-RAY CRYSTALLOGRAPHY. Vol. I. Symmetry Groups. Edited by Norman F. M. Henry and Kathleen Lonsdale. 558 pp. Kynoch Press, Birmingham, England, 1952.

STATISTICAL METHODS FOR CHEMICAL EXPERIMENTATION. By W. L. Gore. 210 pp. Interscience Publishers, Inc., New York, 1952. \$3.50.

INTRODUCTION TO THE FOUNDATIONS OF MATHEMATICS. By Raymond L. Wilder. 305 pp. John Wiley and Sons, Inc., New York, 1952. \$5.75.

VISION THROUGH THE ATMOSPHERE. By W. E. Knowles Middleton. 250 pp. University of Toronto Press, Toronto, Canada, 1952. \$8.50.

STATISTICAL THERMODYNAMICS (Second Edition). By Erwin Schrödinger. 95 pp. Cambridge University Press, New York, 1952. \$1.75.

THE MOLECULAR THEORY OF FLUIDS. By Herbert S. Green. 264 pp. North-Holland Publishing Company, Amsterdam; Interscience Publishers, Inc., New York, 1952. \$5.75.

PHOTOCONDUCTIVITY IN THE ELEMENTS. By Trevor Simpson Moss. 263 pp. Academic Press Inc., New York; Butterworths Scientific Publications, London, 1952. \$7.00.

HIGH FIDELITY SIMPLIFIED. By Harold D. Weiler. 208 pp. John F. Rider Publishers, Inc., New York, 1952. Paperbound, \$2.50.

CONTROL OF ELECTRIC MOTORS (Third Edition). By Paisley B. Harwood. 538 pp. John Wiley and Sons, Inc., New York, 1952. \$7.50.

ELECTRICAL MEASURING INSTRUMENTS. Part I: General Principles and Electrical Indication Instruments (Second Edition). By C. V. Drysdale and A. C. Jolley, revised by G. F. Tagg. 598 pp. John Wiley and Sons, Inc., New York, 1952. \$12.00.

FILTER DESIGN DATA FOR COMMUNICATION ENGINEERS. By J. H. Mole. 252 pp. John Wiley and Sons, Inc., New York, 1952. \$7.50.

NUCLEAR STABILITY RULES. By N. Feather. 162 pp. Cambridge University Press, New York, 1952. \$4.00.

AN INTERNATIONAL BIBLIOGRAPHY ON ATOMIC ENERGY. Vol. II. Scientific Aspects. Supplement No. 1. Atomic Energy Section, Department of Security Council Affairs, United Nations, New York, 1952; distributor, Columbia University Press, New York. \$3.50.

ESSENTIALS OF FLUID DYNAMICS. By Ludwig Prandtl. 452 pp. Hafner Publishing Company, New York, 1952. \$6.00.

DIE IONOSPHERE, IHRE BEDEUTUNG FÜR GEOPHYSIK UND RADIOVERKEHR. By Karl Rawer. 189 pp. P. Noordhoff N. V., Groningen, Holland, 1953.

REMOTE CONTROL BY RADIO. By A. H. Bruinsma. 96 pp. Philips Technical Library, Eindhoven, Netherlands; Elsevier Press, Inc., Houston, Texas, 1952. Paperbound, \$1.50.

ADVANCES IN GEOPHYSICS. Vol. I. Edited by H. E. Landsberg. 362 pp. Academic Press Inc., New York, 1952. \$7.80.