

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.

Oscar W. Richards
American Optical Company
Research Laboratory

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-