

Die philosophischen Grundlagen der Naturwissenschaften. Max Hartmann. Fischer, Stuttgart, 1959. 183 pp. DM. 19.

When Max Hartmann published the first edition of his *Allgemeine Biologie* (1927), he provided this penetrating introduction into the general problems and results of biology with a philosophical framework. *Allgemeine Biologie* begins with remarks on the position of biology in the system of the natural sciences, the methodology of the biological sciences, and the concept and range of general biology; it ends with sections on the body-mind problem, the epistemological foundations of biology, purposefulness, and the mechanism-vitalism issues. These pages were not those of a philosophizing specialist in science but of a philosophically trained thinker. Nor was this the first and only time that Hartmann had dealt with the relations between biology and philosophy. From 1924 to 1954 lectures and articles appeared in which this master of protozoology and cytology, and of the experimental and theoretical analysis of the general phenomena of sexuality and reproduction, bore witness to the philosophical foundations of biology.

Hartmann's *Die philosophischen Grundlagen der Naturwissenschaften*, a separate volume, appeared in 1948, and this second edition was published in 1959 when its author had reached his 82nd year of life. In its present form the book consists of two main parts, one dealing with the theory of the knowledge of nature, the other with the methodology of the natural sciences. A third section in the original edition dealt with epistemological and methodological and with controversial specialized problems of modern science, particularly physics and biology. It has been deleted in the new edition.

The first part of the book, nearly two-thirds of the volume, is a greatly abbreviated condensation of the *Grundzüge der Metaphysik der Erkenntnis* by Nicolai Hartmann, the late, contemporary namesake of Max Hartmann. It consists mainly of quotations from the former's work joined together by introductory and connecting passages. A complete unity is achieved in which Nicolai Hartmann's sharp formulations and Max Hartmann's explanatory or complementary phrases are fused together into a terse wholeness. The second part, that concerned with methodology, is, in a full sense, Max Hart-

mann's own. Here he discusses such topics as the elements of the so-called inductive method of science—namely analysis, synthesis, induction, and deduction—which together form a four-fold methodologic system of induction; distinguishes between generalizing and exact induction which correspond closely, but not completely, with the comparative and experimental methods; and illustrates these concepts with a number of examples taken from the history of the sciences. This part of the book is less demanding of the reader's concentration and philosophical training than the first, so that the author urgently recommends to his scientific audience that the second part be read before the first.

Hartmann rejects the positivistic point of view and at the same time goes beyond the limitations of the Kantian and Neo-Kantian systems. His own philosophical position is based on the phenomenological acceptance of the existence of an objectively real external world. Recognition of this external world is a relation between a personal subject and an object, a relation in which the transcendent object is the determining factor. The concept of the object thus gained by the subject does not correspond to the object itself but is a representation of it as seen or grasped by the subject. This interpretation of recognition is compatible with such ideas as truth—that is, the conformity of the representation with the object—and the progression of recognition—that is, the tendency of approximation of the representation to the object. Indeed, one of the strongest impressions one gains from the book is that of the infinite, inexhaustible character of the ontologic reality and, at the same time, of the infinite, limitless possible extension of our representation of it.

As evidence for the recognition, by prevalently a posteriori elements, of true aspects of nature, Max Hartmann has added a new chapter to the present edition, a chapter devoted to the "principle of convergence." This principle is illustrated by a diagram in which the recognizing subject is represented by a large circle and the transcendent object by a smaller circle, the two circles being connected by two or more lines which converge on the object circle. Each line signifies an independent relation of recognition of the object, and their convergence is seen as proof of the relative truth of recognition. The most convincing demonstration of the principle of convergence is seen in the independent

determination of Loschmidt's number by more than nine different methods dealing with different phenomena. No attempt, however, is made to demonstrate that the convergence of these determinations is not based on common elements in the methodology rather than on the transcendent unity of reality.

This is a difficult book, concerned with a difficult area of thought. Its depth cannot be explored in a single reading. It will reward the student with new insights and stimulate him to further contemplation of the problems in the philosophy of science.

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Space Research. Hilde Kallmann Bijl, Ed. North-Holland, Amsterdam; Interscience, New York, 1960. xvi + 1195 pp. Illus. \$24.

Space Research contains the approximately 100 papers presented at the symposium sponsored by COSPAR and held at Nice, France, during January 1960. The topics covered by the papers include the earth's atmosphere, the ionosphere, tracking and telemetering, solar radiation, cosmic radiation, interplanetary dust, and the moon and planets. It is impossible in a short review to discuss the content of these papers individually, but I should like to point out that almost all of the papers report on original research conducted by the authors and that the authors utilized satellites and space probes launched by the U.S. and by the U.S.S.R. For this reason the collection will, no doubt, form a nucleus of source material for a considerable time to come.

It is unquestionably a unique occurrence in the history of science when a new field can have most, if not all, of the pertinent observations collected in one volume at so early a stage in its development. The program committee responsible for the choice of papers given at the meeting is to be congratulated on its able decisions in selecting the contributors and in the complete and thorough coverage of the observational material made available. Last but not least, the editor of this volume, Hilde Kallmann Bijl, deserves unreserved praise for making this outstanding volume available in so short a time.

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