Book Reviews

Philosophy of mathematics and natural sciences. Hermann Weyl. Princeton, N. J.: Princeton Univ. Press, 1949. Pp. x + 311. $5.00.

Philosophers of science have long admired Weyl's "Philosophie der Mathematik und Naturwissenschaft," which appeared in Oldenbourg's *Handbuch der Philosophie* in 1927; they have also regretted its unavailability. The present volume is in part a translation of that classic work with its penetrating analysis of the philosophic foundations of arithmetic and geometry, and its clear formulation of the concepts of space, time, and relativity. The translation is ably done by Olaf Helmer and Joachim Weyl, the author's son. In addition, the book contains 80 pages of new material in the form of six appendices, the quality of which elevates this work to a unique rank in its field today.

With respect to subject matter, the appendices cover the most important topics of scientific methodology (the effects of Gödel's theorems on the structure of mathematics, quantum physics and causality, physics and biology). Their attractiveness is greatly increased, however, by the author's philosophic frankness, by his clear statements of the motives for his selection. Up to 1926, the continuous, extensive medium of space and time stood in the center of philosophic thought. Meanwhile, the discontinuous combinatorial structures of quantum theory, its concern for symmetries, have become increasingly significant. In view of this change, the new portions of the book attack "ars combinatoria" on a very basic plane and show its relation to several of the theories of modern physics. A new point of view is brought to bear upon the problem of chemical valence, and the only regret one might feel in reading Appendix D, which deals with it, is that the elegant treatment is so condensed as to leave it beyond the grasp of many workers in the field.

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History of the primates: An introduction to the study of fossil man. W. E. Le Gros Clark. London: British Museum (Natural History), 1949. Pp. 117. (Illustrated.) 2s 6d.

That well-served character, the intelligent layman, will find here an answer to almost any reasonable question on present knowledge of the ancestry of man. The discussion is scientific in the best sense but is thoroughly readable and nontechnical. From the general principles of evolution and of classification through the fossil and recent lower primates to fossil man and the rise of *Homo sapiens,* the treatment is amazingly complete for so short a book, phrased in such easily comprehensible terms. Its excellent balance, its cautious and fair presentation of controversial points, and its inclusion of the most recent discoveries and studies make this surely among the best and perhaps quite the best available work on the subject for the layman.

The more professionally interested reader will be specially concerned with Professor Le Gros Clark's comments on the crucial and disputed episodes in human phylogeny. Although no one has better right to opinions on this subject, he presents the issues fairly and without ex-cathedra edicts, but he does quite properly weigh the probabilities.

The higher primates are suggested to have arisen from some of the more advanced Eocene tarsioids, rather than from lemuroids or less clearly differentiated prosimians. The hominoid group (including both apes and men) is believed to have had an independent origin among the tarsioids and not to have passed through a cercopithecoid stage. All the hominoids are indicated as having a common, ultimately monophyletic origin among unspecialized, mid-Tertiary apes from which arose the specialized recent apes, on one hand, and the hominids, on the other. Evidence for this degree of affinity of apes and men is seen among the generally primitive Miocene apes, still typified by *Dryopithecus,* although the group is now known to have been rather highly diverse and to have included, for instance, such forms as the somewhat chimpanzee-like *Proconsul.*

The South African Australopithecinae are stressed. The vexatious question of their generic and specific classification is evaded, and their essential common characters are described and illustrated without specification as to the several supposedly distinct types. The australopithecines as a group are regarded as closely related to man, either as direct ancestors or as little-modified survivors of an ancestral stock.

Pithecanthropus (including *Sinanthropus* as a synonym) is also considered directly ancestral to later hominids. It is suggested that descent from *Pithecanthropus* occurred in two different lines, one leading to the neandertaloids as a distinct, specialized offshoot that became totally extinct, and the other leading through such forms as the Swanscombe, Steinheim, and Ehringsdorf men to modern man, *Homo sapiens* strictly speaking.

Each of these phylogenetic decisions invites discussion and all will be disputed by one student or another. This is not the place to argue them, and the author continually emphasizes that they are matters of opinion in a field where too many of the facts still elude us.

The book contains no restorations of prehistoric men or other fossil primates and is not provided with a graphic phylogenetic tree. Most of the illustrations are factual drawings of living animals or of known fossil remains. The farthest departure from this objectivity is a diagram of the questionable Milankovitch-Zeuner chronology of the Pleistocene, and the provisional nature of this is duly noted.

This is a well-written, sound, modest book for which