Taylor suggest short of compulsion? After all, the two phrases differ essentially only by the word "enlightened." Discussion such as Dr. Taylor's may further enlightenment, but what has it to do with the virtues or faults of the specific provisions of the Kilgore bill?

L. A. HAWKINS

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SCIENTIFIC BOOKS

MAN

Man Real and Ideal: Observations and Reflections on Man's Nature, Development, and Destiny. By EDWIN GRANT CONKLIN. xvii + 247 pp. New York: Charles Scribner's Sons, 1943. $2.50.

IN 1921 Charles Scribner's Sons published Professor Conklin's "The Direction of Human Evolution." An important philosophical discussion, this volume was scarcely appreciated because the publishers failed to do anything much in calling it to the attention of scholars. It is sincerely to be hoped that the same fate will not follow the present book. It richly deserves the widest possible distribution and consideration.

As president of the American Philosophical Society, Dr. Conklin is most appropriately filling his position by significant philosophical leadership, at a time when the whole world needs a clear exposition of the philosophical implications of science. Our current philosophers are not very helpful. Few of them understand science. Most of them seem to fear it.

Last year *Fortune* published a series of philosophical articles by such leading American philosophers as Hocking, Sperry, Montague and Maritain, most of whom clung tenaciously to scientifically outmoded positions of intuitionism, mysticism and philosophical idealism. The net impression was that the best to be offered by American philosophy for the future of the world is reliance on wishful thinking and the support of supernatural agencies. It seems to have taken an Englishman to suggest something more worthy of intelligent consideration. *Fortune* was kind in accepting an article from Julian Huxley giving a brief but clear statement of the philosophical implications of modern science. This appeared in December, 1942. It is remarkable that current philosophical problems should after all be important enough for the attention of business men and executives for whom *Fortune* is designed. It is regrettable that the editors of *Fortune* failed to include Conklin in the symposium.

Dr. Conklin agrees with Huxley that the state of our present knowledge of ourselves and our environment leaves little room for hoping that supernatural powers exist to bring us the salvation we crave. Science seems to indicate that responsibility for the future of mankind is on the shoulders of men.

That the implications of our developing verifiable knowledge of ourselves and our environment, as revealed by scientific inquiry, have significant moral consequences is a conclusion reached by many competent biologists. The statements made by C. Judson Herrick (*Sci. Monthly,* 49: 99, 1939) and S. J. Holmes (SCIENCE, 90: 117, 1939) agree with those expressed by Conklin. In a remarkable discussion aroused by C. H. Waddington ("Science and Ethics," London, 1942) there is further agreement with the conclusion that our morals are phases of our adaptation to our environment, and thus enable us to develop control of some of our evolutionary progress. It remains to be determined whether or not there is a naturally operative principle regarding human relationships which may have ethical significance. A tentative formulation of such a principle has already been attempted (*Nature,* 141: 783, Dec. 27, 1941).

Dr. Conklin appreciates very clearly what he is doing: "The results of the scientific study of man and philosophical conclusions that are derived from such a study run counter to the inherited traditions and cherished beliefs of multitudes of persons." He is convinced that all phases of human nature are amenable to scientific treatment and must be studied, if studied at all effectively, by scientific methods. These methods consist of careful, systematic, verifiable observations of phenomena, and logical deductions as to their causes, which deductions are then tested by further observations, and, whenever possible, by experiments aimed at isolating various factors or causes. As a biologist, Professor Conklin emphasizes the importance of biological methods in dealing with men. These methods are comparison, analysis, and experiment.

The volume offers a well-organized, comprehensive and brief survey of our present knowledge regarding the human species, tracing the past evolution of man, and discussing paths of progress, natural selection and organic selection as factors in progress, the role of eugenics, and future factors in the evolution of man.

Conklin clearly indicates the conclusions which the biologist must reach on the time-honored mind-body problem—that no distinction is valid. An assumed distinction is as semantically invalid as that between what is considered to be living from that which is thought to be dead.

Dr. Conklin then considers the development of the individual, with discussions of asexual and sexual reproduction, and factors in development, with a careful treatment of mechanisms of differentiation involving cells, chromosomes and genes. In discussing rela-

tions between structure and function Dr. Conklin reveals increasing complexity of organization as more efficient adaptation. Carefully he considers factors in psychic and social development.

The philosophical portion of Dr. Conklin's book deals with the antagonism of science and tradition in which scientific evidence is contrasted with emotional belief. One may infer that Conklin would hold that science sets the limits to belief and faith. He insists on the unity of nature and emphasizes the importance of biological satisfaction in living things. This adaptation for satisfaction becomes the basis for a biological appreciation of value, and for a biological basis for ethics. Ideals are emphasized by Professor Conklin as highly significant if appreciated as goals toward which it may be possible to develop. This offers a basis for a sort of scientific religion.

Of course, the volume must be carefully read in order to appreciate the skill with which Professor Conklin develops his thesis. His achievement is highly artistic and his work is earnestly commended to the sincere study of philosophers, scientists and scholars.

First delivered at Rice Institute, Houston, Texas, in 1941, the lectures comprising this book have already been published in part in the *Rice Institute Pamphlet* (28: 153–281, 1941). It is sincerely to be hoped that Professor Conklin's effort, in relation to many similar attempts by his scientific and philosophical colleagues, may result in a United Nations symposium on science and ethics. Such a symposium might lead to international agreements on articles of a scientific faith that might be very instrumental in helping us to obtain the sort of a peaceful and satisfying world which we all want.

CHAUNCEY D. LEAKE
MEDICAL BRANCH, GALVESTON,
THE UNIVERSITY OF TEXAS

OPTICAL CRYSTALLOGRAPHY

Optical Crystallography. By ERNEST E. WAHLSTROM, professor of mineralogy, University of Colorado. $5\frac{1}{2} \times 8\frac{1}{2}$ inches. v + 206 pp. 209 figs. New York: John Wiley and Sons, Inc. London: Chapman and Hall, Ltd. 1943. $3.00.

THIS well-designed new text-book is a welcome boon to the students of optical crystallography. The author covers the essential phases of his subject in seventeen short but pithy chapters under the following headings: 1. Crystallography; 2. Physical properties; 3. Elementary optics; 4. The polarizing microscope; 5. Optics of isotropic substances; 6. Measurement of index of refraction; 7. The Uniaxial Indicatrix; 8. Polarization of light; 9. Uniaxial crystals in plane-polarized light; 10. Uniaxial crystals in convergent polarized light; 11. Optical accessories; 12. Sign determination in uniaxial crystals; 13. Biaxial crystals —the triaxial ellipsoid; 14. Biaxial crystals in convergent polarized light; 15. Determination of optical sign in biaxial crystals; 16. Dispersion in biaxial crystals; 17. Microscopic examination of nonopaque substances.

The text contains numerous (209) selected illustrations, including line drawings, half-tone reproductions and stipple-shaded diagrams. Approximately 80 pages of the 206-page book are occupied by illustrations. Diagrams designed to illustrate the three-dimensional visualization of the relationships between crystallographic directions and optical directions are well constructed and will give valuable aid to students who find difficulty in visualizing three-dimensional relationships.

In addition to the author's original material, he has brought together items and illustrations from other good sources and arranged them in a unified order so as to make it easy for the user to get the information he seeks.

His definitions have been carefully written in clear simple language to keep within the understanding of the user. This feature along with others shows the author's recognition of the fact that it is the function of a text-book to inform those who do not know.

In the first half of the book the author reviews briefly the principles of optical crystallographic theories, emphasizing only fundamental ideas; in a few pages discusses the physical properties of crystalline substances, and devotes a short chapter (6 pp., 9 figs.) to elementary optics dealing principally with the nature of light, followed by a well-illustrated chapter on the construction of the polarizing microscope. In the opinion of the reviewer, the chapter describing optical accessories—quartz wedge, gypsum plate, mica plate, etc., recognized as standard equipment—might well follow the chapter on the polarizing microscope.

In the author's discussion of refraction, reflection and the measurement of the indices of refraction (24 pp., 22 figs.), he describes several variations of the immersion method and other methods, using numerous and effective diagrams.

Since immersion media are an invaluable part of the equipment when working with crystal fragments, it will interest the reader to know that a more satisfactory, very inexpensive series of low-index liquids[1] has replaced the alcohols, butyrates and volatile distillates given on page 45. Isopropyl acetate (1.385, very slowly volatile), and diethyl oxalate (1.408) and dibutyl phthalate (1.490), both non-volatile, are miscible in all proportions and are colorless, viscous, odorless, and do not react with mineral grains within that range. The author did not have this information.

[1] These liquids may be purchased from U. S. Industrial Chemicals, Inc., 3200 N. 17th Street, Philadelphia, Pa., for $1.00 per pound.