BOOK REVIEWS

The Mechanization of the World Picture. By E. J. Dijksterhuis. Transl. of 1950 Dutch ed. by C. Dikshoorn. 539 pp. Oxford U. Press, New York, 1961. $16.80. *Reviewed by Gerald Holton, Harvard University.*

BOOKS in the history of science which are apt to come to the notice of a working scientist present a curious paradox. They are usually accounts of the the rise of science, stretching over a century or more, written at the level where the largest part of the intended audience is primarily the *non*professional reader. On the other hand, these general review books are seriously meant to be genuine contributions to the professional literature in the history of science, and often are responsible for the author's general reputation. *The Mechanization of the World Picture*, by E. J. Dijksterhuis, falls in this class, and it goes largely over the same ground that is covered in one or another of the several good existing general histories of science (e.g., those by Singer, Koyré, Crombie, Hall, Kuhn, and Gillespie). Most of these books study such major topics as the rise of science in the 17th century; they refer to the same facts and have similar didactic purposes; and they largely share the same faults—for example, stopping short of what will interest present-day scientists most, namely, the history of the recent period.

To resolve the paradox and to understand the importance of these books, one must remember that every field of scholarship has two mechanisms for making major transformations. One is the cumulative impact of specific contributions in small, special areas. This is a characteristic mode of growth in science, but it happens to some extent in the history of science, too; for example, the new book by A. R. Hall and Marie Boas Hall on *The Unpublished Papers of Sir Isaac Newton* may in the long run correspond somewhat to the discovery of artificial radioactivity in physics.

The other mechanism for transformation is the introduction of a new point of view that synthesizes well-known data in a new manner. Fermi's theory of beta decay and the Bohr-Wheeler model of the nucleus fall in this category. And at their best, these general volumes in the history of science aim to fulfill an analogous function for their own field.

The book under review has this intention, and will find an honored place among volumes of this kind. The author has been professor of the history of science at the University of Utrecht, and over the last 40 years has written a number of books on the work of Euclid, Descartes, Archimedes, and Stevin—but unhappily they are not available in English translation. The present volume itself was issued first in Dutch in 1950, then in a German translation in 1955. The English text has not been revised from its Dutch version some 12 years ago, although additions to the bibliography are carried up to 1959. The translation reads well.

It is a large, imposing volume, characterized by a measured thoroughness in grappling with difficulties that are often slighted (for example, a step-by-step account of Kepler's work on establishing the shape of planetary orbits). It carefully summarizes the content and proofs in major scientific documents in physical science over almost 2000 years, and gives full citations of sources.

I can here only list some of the parts which struck me as particularly enlightening: A lucid and brief discussion of Aristotelianism and Neoplatonism in Greek philosophy of nature; the consideration of 14th century physics; a perhaps rather brief account of technology as a source of medieval natural science; a detailed probing of the main works of Kepler and of Huygens; and a fine summary of the aims and deficiencies of Newton's scientific work.

The avowed philosophical aim of the book is to deal with the great change of mind on what constitutes the proper explanation of observable phenomena, from "substantial" thinking to "functional" thinking, or from Aristotle's conception of motion as "the actuality of that which *is* potentially, viewed from the standpoint of potential beings", to the rigorous mechanism of Huygens, to whom even Newton's conception of gravitational attraction seemed "absurd" because it was "not explicable by any principle of mechanics".

As a structural device, the author sets at the beginning the question of what may be meant by the phrase "mechanical" or "mechanistic" conceptions of the world. On the way to his final answer, he provides the encyclopedic summary of main trends and works in the history of physical science which, I believe, is his real interest and purpose. For the final answer by itself—"the mechanization of the world picture during the transition from ancient to classical science meant the introduction of a description of nature with the aid of the mathematical concepts of classical mechanics"—would not require all the magnificent care and documentation which is here presented.

This is not the place to quarrel with the author about specific points of interpretation. But I must confess my disappointment with the publisher that a book of this importance as a Handbuch (and, one might add, with such a price tag) should not have a subject index.