History of Science

Robert Boyle on Natural Philosophy: An Essay with Selections from His Writings. Marie Boas Hall. Indiana University Press, Bloomington, 1965. x + 406 pp. Illus. $6.75.

"Boyle died just as Newtonian physics was beginning its ascendancy, and the success of the Newtonian synthesis somewhat obscured Boyle's influence upon science and thought. How many readers of Locke's *Essay on Human Understanding*, published 3 years after Newton's *Principia* and directly associated with Newtonian philosophy, have realized that the 'Newtonian' echoes were, in fact, derived from Boyle?" (p. 110).

Thus, in the conclusion of part 1 of this book, Marie Boas Hall states her case for a continued interest in the work of Robert Boyle. Her justification is valid, and in this book she has excellently summarized Boyle's achievements (in part 1) and illustrated them (in part 2) with extensive and appropriate excerpts from Boyle's writings. This book is thus both a summary and a source.

Although, as Hall freely acknowledges, Newton was the better scientist of the two, his work did not supersede or displace Boyle's, and the latter's scientific work continued to be read and admired by scientists throughout the 18th century. Boyle was more of an experimentalist and less of a synthesizer than Newton, and it was to his detailed accounts of experimental investigations that later scientists turned for information and example. Boyle's standards of investigatory procedure had not become habitual even by the end of the 18th century.

The book is divided into two parts. Part 1 includes a 30-page "Life," a "Conclusion," and four chapters efficiently describing Boyle's contributions to "The New Learning" (the experimental investigation of nature), "The Mechanical Philosophy," "Chemistry," and that field uniquely Boyle's, "Pneumatics." For those already familiar with recent writings on this period, these 110 pages constitute an excellent summary. At the same time, part 1 is sufficiently extensive to be useful to any one making his first attempt to study Boyle's life and science.

In part 2, which constitutes about two-thirds of the book, the four interpretive chapters of part 1 are paralleled by four identically titled sections devoted to illustrative quotations from Boyle's writings. The order is significant, for Boyle was first of all an experimentalist, and what he saw was a mechanical world. Hall's inclusion of Boyle's familiar definition of the chemical element in the section devoted to mechanical philosophy illustrates this interpretation. Hall has done us all a great service in making these selections topically available, for as she knows, probably better than any one else, Boyle's writing style is terribly prolix and for the modern reader a major work appears almost impenetrable.

The quotations are drawn largely from Thomas Birch's *The Works of the Honourable Robert Boyle*, although it is not clear whether from the edition of 1744 as stated on page 118, or from the edition of 1772 as stated in the prefatory note on page vi. In either case, references to place and date of original publication are given only in the introductory note to each group of selections, and page references are given only to the *Works*. This may constitute a minor frustration to readers who wish to pursue more of Boyle's thought in the original context.

In summary, the book is a valuable source for those who require a brief but reliable interpretative account of Robert Boyle, and a correlated supply of supporting quotations.

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Koshtoyants Commemorative Volume

Essays on Physiological Evolution. J. W. S. Pringle, Ed. Pergamon, London; Macmillan, New York, 1965. xxii + 364 pp. Illus. $12.

This is a collection of papers published in Moscow in 1961 in memory of Professor Kh. S. Koshtoyants, the leading comparative physiologist of Russia. A biographical sketch shows how Russian scientists are active in public affairs; Koshtoyants was elected from Armenia to be a Deputy of the Supreme Soviet of the U.S.S.R. His bibliography contains some 120 papers written between 1928 and 1961 and covering a variety of topics but emphasizing comparative physiology of nervous systems and muscle.

The essays are a miscellaneous lot, very few of them related to the title of the volume, *Physiological Evolution*. Some are in the style of reviews, a few resemble after-dinner talks, and others present original research. Some of the Russian papers use vague concepts that have little meaning to Western physiologists—for example, "anelectrotonic and catelectrotonic syndrome" (Arshavskii), "cathodal parabiosis" (Zhukov), "pessimum" (used on p. 1 and defined on p. 341), and the use of mineral water to block acetylcholine receptors (Mirzoyan). It is also difficult to accept without more critical proof that the fact that the temperature of fish is below water temperature on warming and above it on cooling is not more than a lag due to thermal conductance (Pegel' and Remorov). It is also difficult to understand the reported significance of increased production of ammonia by brain *and* muscle in epileptic seizures (Budanova), the release of acetylcholine and changes in Ach metabolism not only in acute radiation sickness but several years after severe irradiation (Demin), and the recommended use of honeybee venom for treatment of hypertensive diseases (Artemov).

Many of the Russian papers present aspects of physiological evolution in clear and original ways. A paper on the phylogeny of chemo- and baroreceptors in vascular reflexes includes much new information (Chernigovskii). Interesting changes in succinic dehydrogenase, also in transport properties of the gills and kidneys of fish according to whether they are in fresh water or seawater, are presented (Ginetsinski, Vasil'yeva, and Natochin). Karamyan traces the evolution of central responses to visual stimulation from midbrain to specific regions of the forebrain. Evidence that the acetylcholine receptor of frog ventricle is a sulfhydryl-protein is given by Turpayev. Zhukov reports on the tonic (slow fiber) muscle in reptiles and suggests that such fibers (also found in cyclostomes but not fishes) were used in amphibians and reptiles in static antigravity responses whereas in mam-