Book Reviews

History of Science

A History of Chemistry. vol. 3. J. R. Partington. Macmillan, London; St. Martin's Press, New York, 1962. xxiv + 864 pp. Illus. $25.

In this third of his projected four-volume history of chemistry, Partington deals with men and events of fundamental importance to the development of modern chemistry. In some 850 pages he ranges, in time, from 1600 (for French chemistry only—volume 2 dealt with chemistry everywhere else to approximately 1700) to the early chemists from Beguin to Dalton. There 19th century, and treats the works of are two major figures, Lavoisier and Dalton, to whom one-fourth of the volume is quite properly devoted. There is in print today no comparable volume. Standard histories of chemistry can touch only the peaks of chemical achievement, whereas Partington has space for even the very minor figures. Monographs devoted to specific landmarks in the history of chemistry rarely can deal with more than a small part of the science at one time. Partington's work, therefore, will be indispensable to the historian of chemistry and may even prove of interest to the practical chemist to whom the history of his science is of only peripheral concern. Partington's contribution is an important one, but it is marred by his method and his presentation. What could have been an exciting and brilliant analysis of chemistry in the 18th and early 19th centuries, of interest to everyone concerned with chemistry and its development, has been turned into an essential, but rather dull, reference work.

The most severe criticism that can be made of this volume is its lack of selectivity. As in volume 2, Partington seems desperately in need of an editor, for he cannot throw away a note. For example, Quatremère-Disjonval receives a separate (though small) section, even though Partington himself proves the truth of the remark made by a contemporary (which he quotes) that Quatremère betrayed an "excessive ignorance . . . of the most common observations in chemistry" (p. 97). Why, then, one may legitimately ask, does Partington bother with him? On page 148, Partington reports that Heinrich Johann Nepomuk von Cranz was "according to Lavoisier [footnote] and Fourcroy [footnote] 'physician to the King of Prussia' but correctly according to Kopp [footnote] a medical professor in Vienna." What relevance does Lavoisier's and Fourcroy's error have to Cranz's chemical work? I seriously doubt that today there is any controversy over Cranz's position; would it not, therefore, have been more to the point to introduce Cranz simply as a medical professor in Vienna?

Finally, on page 209, Partington cites French [footnote] as saying that Scheele was "a foreign member of the Royal Society" and then goes on to point out that Scheele does not appear on Thomson's [no footnote] list. French also wrote a quite bad biography of Lavoisier which was filled with errors, and Partington must know this since his treatment of Lavoisier is infinitely superior. So, why quote French? And, cannot the foreign members of the Royal Society be determined by an inspection of the records of the Royal Society to which Partington, I am sure, has easy access?

These are but three examples, yet they could be multiplied. The effect of this sort of erudition is to expand one's material beyond its natural bounds; 850 pages could have been reduced to 600.

The second major flaw in this work is Partington's (seeming) refusal to become involved. He is a witness, not the judge. Hence, he admits all sorts of evidence that a judge would throw out. This is reflected in the bibliographical material appended to each important chemist's life and works. French's work on Lavoisier is one example; another is Harriet Martineau's description of Joseph Priestley's grave, duly cited on page 239 and totally worthless as far as Priestley is concerned. What Partington *could have done* was to cite relevant articles; what he has done is to cite every article that he knows on the subject. He could have culled, but preferred not to. Researchers cannot but be grateful for his thoroughness; others may weary long before they reach the end.

A third point of criticism involves Partington's philosophy of science. This centers about his discussion of the phlogiston theory and Lavoisier's refutation of it. While reading the early parts of the book, I was quite annoyed by Partington's slighting references to the phlogiston theory. For example, in discussing Cavendish's work on the composition of water, Partington writes that "We should have expected Cavendish to have concluded that: 'when inflammable air and dephlogisticated air unite together they produce water, which is a compound of these two substances,' but he was under the influence of the phlogiston theory . . ." (p. 334).

This example, which could be fortified by other quotations citing the silliness of the phlogiston theory, would seem to indicate that otherwise intelligent men were literally "under the influence" of a subtle spirit that is today somewhat more specifically defined. Yet, one of the impressive aspects of Partington's discussion of Lavoisier's revolution in chemistry is his recognition of the fact that the phlogiston theory *did* account for certain aspects of chemical reactions (heat and light) which the new theory found somewhat embarrassing. This treatment can only confuse readers who are unable to meet Partington on his own grounds.

These criticisms, and they are serious ones, should not prevent one from appreciating the virtues of this volume. They are, quite simply, these: (i) Its bibliography of chemistry, although unselective, is, nevertheless, of prime importance. (ii) It contains a discussion of every chemist who published during the period under consideration. Partington's volume must be the starting point for any further investigations. (iii) Most importantly, Partington provides the finest treatment available in English of Lavoisier's remarkable career. Specific aspects of Lavoisier's work in chemistry have been better described, but nowhere will one find a more extensive and more analytical treatment of his total output in chemistry. Indeed,

I might suggest that if Lavoisier had been the model for the whole volume, the result would have been superlative.

The book is handsomely printed, with very few printing errors, and with appropriate illustrations. The index greatly enhances the utility of the volume, although it is not without fault. Wiegleb, for example, who receives separate treatment in the text, is not to be found in the index. The price of the volume—$25—seems excessive.

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Experimental Phycology

Physiology and Biochemistry of Algae. Ralph A. Lewin, Ed. Academic Press, New York, 1962. xxvii + 929 pp. Illus. $32.

Ralph Lewin, the editor of this volume, states that "It is designed as a guide book, primarily for research workers and advanced students. . . ." That purpose has been well-fulfilled. Anyone who wishes to learn about any aspect of experimental phycology will begin here to gain access to the literature through May, 1960, as well as to a few more recent papers. There is no other inclusive treatment of this field in any form; this book's precursors are restricted either in scope or in size—Fogg's monograph on the metabolism of algae (Methuen, 1953), Blink's brief article on the physiology and biochemistry of algae in the *Manual of Phycology* (Chronica Botanica, 1951), and Myer's review of the physiology of algae in volume 5 of the *Annual Review of Microbiology* (1951).

The text proper (826 pages) consists of 55 separate articles contributed by 57 authors. The average chapter contains 12 pages of text and 3 pages of references (about 65 references per chapter). In keeping with the purpose of the book, the references include full titles. The longest article (31 pages) is by Stadelmann on permeability; the shortest (4 pages by McLaughlin and Zahl) is devoted to endozoic algae.

The articles are grouped into four sections. These sections and randomly chosen illustrative chapters are: Nutrition and Metabolism, consisting of 17 chapters covering such topics as light reactions in photosynthesis by Marcia Brody and Seymour Brody, fermentation by Gibbs, enzyme systems by Jacobi, nitrogen fixation by Fogg, nucleotides and nucleic acids by Iwamura, and inorganic micronutrients by Wiessner; Composition of Cells and Metabolic Products, with 13 chapters including those on storage products by Meeuse, mucilages by O'Colla, chorophylls by Bogorad and volatile constituents by Katayama; Physiology of Whole Cells and Plants, made up of 19 articles on such topics as salt and osmotoic balance by Guillard, intracellular movements by Haupt, cell division by Hase, nuclear-cytoplasmic interactions by Richter, sporulation by Erben, and biochemical genetics by Ebersold; and Physiological Aspects of Ecology, made up of six articles including those on freshwater algae by Talling, seaweeds by Biebl, and lichens by Ahmadjian.

The last 100 pages of the book are devoted to three appendices and an author index, a subject index, and a taxonomic index. Appendix A, prepared by Silva, lists all algae mentioned in the book according to their taxonomic positions, with notes on taxonomic questions. Appendices B and C are each two-page afterthoughts, one on the uptake of radioactive wastes, by Eppley, and the other on antibiotics from algae by Ralph Lewin, the editor.

The consistent style of the chapters is a tribute to the editor, who must have done rather more rewriting than is implied in his apologetic statement—"The more abstruse syntactical features of some of the contributions were smoothed over as far as possible." English is not the native tongue of 18 of the contributors.

There is little point in commenting on the problems an author faces in attempting to discuss respiration or the light reactions in photosynthesis more or less strictly in terms of work done with algae; the difficulties are self-evident. Many of the articles reflect the fact that most facets of biochemistry and many of physiology are universal among life forms and assume an air of artificiality when considered only on the evidence derived from particular kinds of organisms. Nor is it worth much comment to chide the editor for his slightly supercilious dismissal (in his preface) of the continuing progress in the older, established aspects of phycology—taxonomy and the anatomy and morphology of life cycles. The need for competent people in these areas has perhaps never been so pressing as it is now that the intensity of research on the oceans has been increased at the behest of the United States government. The space devoted to taxonomy in the volume belies the impression given by the editor in his opening remarks.

This book attests to the mass of information available on the physiology and biochemistry of algae. It indicates that the time is ripe for some ambitious or dedicated scholar to prepare a unified and fully integrated textbook on the physiology of the algae, a book like those already available for the higher plants and the fungi. Such a textbook is needed for use in those undergraduate or graduate courses in algal physiology that already exist and also to stimulate the development of more courses on this subject in the colleges and universities.

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Studies on Speciation

The Taxonomy and Speciation of Pseudophonus. A subgenus of *Harpalus*: Harpalini: Carabidae, known to occur in North America. George E. Ball and Joseph N. Anderson. Catholic University of America Press, Washington, D.C., 1962. xii + 94 pp. Illus. $3.95.

Few detailed studies of "problem" groups of invertebrates are available to the nonspecialist speciationist. This one, which deals with a group of widespread and readily obtainable ground beetles, opens a fertile field for investigation. Beetles include one-fourth or more of the known species of animals, yet their study has been disproportionately neglected. *Pseudophonus* is the subgenus of *Harpalus* (Coleoptera: Carabidae) that includes the ubiquitous and extremely common H. *pennsylvanicus*. Before Ball and Anderson made this painstaking study, even a specialist could differentiate *H. pennsylvanicus* from its close relatives only with considerable difficulty and uncertainty.

The authors treat only North American representatives of the subgenus, of which 12 species are recognized. The taxonomy of the group is difficult, and a unique feature of this monograph is a special chapter entitled "Problems of identification." The unusually complete discussion of taxonomic characters employed makes the book readily intelligible to the nonspecialist. The final