## The Man Who Made the Atomic Theory Usable

**John Dalton and the Atom.** FRANK GREENAWAY. Cornell University Press, Ithaca, New York, 1966. 254 pp., illus. $6.95.

John Dalton, the Cumberland Quaker who provided chemistry with one of its most powerful conceptual tools, poses some difficult problems for the biographer. He is not an immediately attractive personality; nor is there much romance or drama in his provincial, rather humdrum life. The destruction of his scientific notebooks in an air raid on Manchester in 1940 has meant the loss of the most important primary source for a reconstruction of the ideas and experiments that led up to the familiar postulates of his atomic hypothesis. This new biographical study by the deputy keeper in the Department of Chemistry at the Science Museum, London, is a welcome addition to the literature of the history of chemistry. The author modestly claims in the preface that he has attempted to give the general reader a complete picture of Dalton and his atomic theory in their historical context and to provide the more serious student with an introduction to the specialized literature on the subject. He succeeds admirably in both these objectives.

Dalton was not, of course, the first to propose an atomic theory of matter. In a comprehensive chapter, Greenaway traces the history of atomism from Democritus (5th century B.C.) to Dalton's contemporary William Higgins. The advance of Dalton's theory beyond those of his predecessors and contemporaries was in focusing attention on the relative weights of elemental atoms *and* providing a scheme for their determination. One of the several ironies of Dalton's life was that this important chemical contribution arose out of his work on the physical properties of gases. Particularly valuable, therefore, is the author's analysis of Dalton's early work on meteorology, vapor pressures, gaseous expansion and diffusion, and the solubility of gases, which led him finally to a consideration of the "weight and number of the ultimate particles of the several gases." Greenaway draws attention to the recurrent theme of water-vapor in this early work and suggests, by a historical application of Dalton's "rule" of greatest simplicity, that he made his first calculation of relative atomic weights from Lavoisier's figures for the combining weights of the elements of water. Not all Dalton students will agree with this last view.

Caricature of Dalton holding a measuring cylinder from a rain gauge. [From an engraving by J. Stephenson, reproduced in *John Dalton and the Atom*]

Greenaway draws a sensitive portrait of Dalton the man: a simple, retiring, independent Quaker teacher, who gave the first account of his own disability, color-blindness. Although an individualist, Dalton was not a recluse. He carried out most of his scientific work in Manchester, where he was a leading member of the local Literary and Philosophical Society, whose *Memoirs* provided him with a convenient means of publication. The activities of this group form a notable chapter in the history of English provincial science. Perhaps more might have been said on their links with Scottish scientific circles, in view of the importance of Dalton's association with Thomas Thomson, who, in the third edition of his *System of Chemistry* (1807), first introduced Dalton's theory to a wide chemical audience.

The immediate success of the atomic theory in providing a rationale for stoichiometry completely submerged the structural content of the original theory. How this aspect was to reemerge with new force in the 1860's and 70's, following Cannizzaro's restatement of Avogadro's hypothesis and the development of the valence concept, is recounted in a later chapter.

References to the original papers and important secondary sources for each chapter are collected at the back of the book. There are a few errors, mainly typographical. One criticism that might be made is that the introductory chapters are unduly long—Dalton does not make his appearance until page 57. Nevertheless, this is a highly readable and often penetrating study of John Dalton and his place in the history of science. It is recommended to the general reader and the specialist alike.

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## Surface Coatings

**The Chemistry of Organic Film Formers.** D. H. SOLOMON. Wiley, New York, 1967. 381 pp., illus. $14.95.

The surface-coatings industry is making the change from art to science, and any book which can accelerate that trend is of value. *The Chemistry of Organic Film Formers* is such a book. It is comprehensive, covering all of the important macromolecules that are used as coatings. The subjects are not treated thoroughly, but a large number of references are supplied. The literature is covered through 1965. The book gives detailed chemical formulas and reaction schemes, information which is especially important for an introductory book. The author is careful to use common terms as well as official chemical nomenclature so that one can relate older literature to recent publications. The book also gives, in an appendix, 16 practical coating formulations and manufacturing methods. The index is detailed enough to make the book useful as a reference.

A few words of caution are in order. Oversimplification occasionally leads to incorrect statements and lack of precision in this book. The first chapter, in which a complete description of polymers and their properties is attempted in only 30 pages, is the least satisfactory. With more care the use of several symbols and terms without definition might have been avoided. It is understandable that a book as comprehensive as this one cannot be critical in all aspects of its coverage.

For those engaged in surface-coating work who have not had formal training in synthetic polymers, and for those with polymer training who are just entering the coatings field, this book should be of major interest.

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