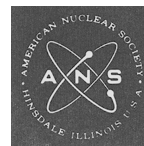


BOOK REVIEWS

Selection of books for review is based on the editors' opinions regarding possible reader interest and on the availability of the book to the editors. Occasional selections may include books on topics somewhat peripheral to the subject matter ordinarily considered acceptable.



ANTHOLOGICALLY SPEAKING

Title The World of the Atom

Editors and Commentators Henry
A. Boorse and Lloyd Motz

Publisher Basic Books, 1966

Pages Vol. I, xxvi + 859; Vol. 2,
xx + from 861 to 1873

Price \$35.00

Reviewers Don M. Yost and Señora
Lupe de Sinaloa

In an inspiring foreword to the two volume book now under our (= the reviewers') eyes, Professor I. I. Rabi of Columbia University aptly refers to it as an "anthology". The word anthology derives from the Greek word *ανθολογια* which means a collection of flowers, a nosegay, and that is just what the book is, in a figurative sense of course. The individual flowers are the original writings or journal articles by those physicists and chemists who made the most fundamental contributions to the concept and experimental proof of the existence of material atoms. Their collection into this anthology becomes a guide to landmarks in atomic chemistry and physics research. Those articles which were originally published in some foreign tongue have been nicely and accurately translated into English by the editors or by other capable persons. The editors, Drs. Boorse and Motz, are professors of

physics and astronomy, respectively, at Barnard College.

Most of the articles and writings are preceded by a few pages of valuable and welcome commentaries by the editors. Each commentary not only sets the stage for the article that follows but also includes a biographical sketch of the article's author (or authors). The commentaries alone make very interesting and worthwhile reading; the biographical sketches make it abundantly clear that physicists and chemists are more human than the humanists and other public figures.

The concept, development, and consequences of atomic theory constitute one of the greatest accomplishments of the human mind. At every stage was the unrelenting requirement that an idea or theory be repeatedly verified by more and more careful experiments or observations. Accordingly, it is not surprising to find that our book contains ninety-six chapters, with each chapter containing from one to three journal articles or extracts from books, in addition to the commentary by the editors. For further harmony the chapters are distributed into sixteen parts, where the chapters in each part bear some relevance to each other. The overall order of the subject matter is mainly historical, but the level of the material in the various chapters varies enormously. A number of the chapters could be read with pleasure and advantage by a housewife; there are others which equate to the learning of a banker or a bishop; still others would be understandable only to a professional

chemist or physicist; and there are a few chapters that demand a knowledge of much mathematics, including the more exotic algebras, for their complete understanding. The World of the Atom should fit into any household, whether of high or low estate.

But now let's look at some of the flowers. Chapter 1 contains, besides an enlightening commentary by the editors, a prose translation of some of the verse by the Roman poet Lucretius (ca. 99-55 B.C.). In the verse chosen Lucretius sets forth with considerable spirit and logic the reasons why the 'atoms' postulated by Democritus (ca. 480 B.C.), and earlier by Thales of Miletus (ca. 600 B.C.), really exist. But it never occurred to Lucretius that he could bolster or modify his position with carefully chosen experiments, and therefore his impact on our culture didn't amount to much until nearly eighteen centuries later. If he were living now and were a professor at Columbia or Caltech, he would probably be making important contributions to the theory of quarks and the Eightfold Way.

The next five chapters jump to the seventeenth century, with articles by Descartes, Boyle, Hooke, Huygens, and Isaac Newton, and to the eighteenth century with Bernoulli, Bosovich, and the Hugginses. The reason for this large time jump was that during the Roman period and the Middle Ages there just weren't many concerned scholars. People were busy ranching, fishing, fighting each other, or devising governments. Such scholars as did exist spent

their efforts attempting to determine the number of standard angels that could stand on the head of a pin and other such problems, none of which were easily subject to experimental verification. There was some important exploration of the earth's surface however, and this stimulated some scientific events that followed.

We go to Part II which contains chapters 10 to 13. Here we find articles by Dalton, Gay-Lussac, Avogadro, and Prout; the time is now the eighteenth-nineteenth century. Atomic and molecular theory is finding firmer but not yet rigorous support. In Part III with its chapters 14 to 18 by Herapath, Brown, Waterston, Joule, and Maxwell, all working in the nineteenth century, and in Part IV, with articles by Cannizzaro and Mendeleev, the existence of atoms and molecules and their motions, as well as the classification of the chemical elements into a periodic table, are well established as far as the chemists are concerned. In chapter 16 on the work by Waterston one learns that two referees for the Royal Society, one uppity and the other not too bright, blocked the publication of Waterston's paper on kinetic theory in 1845, and hence delayed this science and many others for 15 years; in 1860 Maxwell published his first paper on the subject.

This brings us up toward the end of the nineteenth century and to the end of page 312, with over 1500 pages to go.

The latter half of the nineteenth and the beginning of the twentieth centuries saw many remarkable discoveries in both experimental facts and in theories which played important roles in the understanding of the atom. There was the magnificent work of Faraday and of Maxwell on electricity and magnetism, Crookes' tubes, the Balmer Series for hydrogen, and the death of the ether theory at the hands of Michelson and Moreley, one a physicist and the other a self-trained chemist with a large red mustache. As the better class of people now know, the Michelson-Moreley experiment set the stage for Einstein's far reaching theory of relativity.

But this was not all. The discovery of the electron, the accidental discovery of X-rays by Röntgen, the discovery of radioactivity, of the quantum theory and the Rutherford-

Bohr-Moseley electronic structure of atoms, and the numerous consequences of these discoveries were the beginning of a torrent of knowledge and its practical applications. History making articles and their authors in ever increasing numbers—from the turn of our century down almost to the present day—appear in the remainder of the book. The subjects covered range from an emphasis on the apparently simple hydrogen atom and its stable isotope deuterium to radiations, neutrons, positrons, mesons, spinning particles, nuclear structure, nuclear fission, cyclotrons, accelerators, piles, antiparticles, and the more recently discovered and numerous elementary particles (hadrons). We cannot resist the temptation to list some of the authors. Among others there are Planck, Millikan, Dirac, Anderson, Born, Oppenheimer, Shroedinger, Pauli, Goudsmit, Condon, Heisenberg, Yukawa, and Feynman; we catch our breath and add Urey, Fermi, Hans Bethe, Lise Meitner, Gamov, and Chadwick; we press on to Lawrence, Segré, the Joliot, Cockroft, Walton. Van De Graaf, Hofstadter, Weisskopf, Lee, Yang, and the editors. And so on.

Many of the authors are Nobel prizemen, and the rest are the next thing to it. We personally feel as if we were sitting on a spectators' bench overlooking Mount Olympus and watching the gods at their various activities. Once there we are loth to leave our bench.

The book takes us from the beginning of the atom down to the present day when we have so many new elementary particles that we cannot easily get acquainted with all of them. Since the book is a collection of original articles and writings, and since an original article is intended to convince the readers of the truth of its contents, it is apt to be very clearly written in such a way that the reader will not soon run away from the author's earnestness or enthusiasm. Most of the articles in the book make very fascinating reading.

Because the editors have happily included short biographical sketches for each of their authors one gets some estimate of the human side and background of great scientists. Only three women are noted among the over one hundred scientists included in the book. Several of the men were

confirmed bachelors, but most of them took attractive wives and managed to hang on to them, and vice versa. Several of the scientists were born rich or became rich through their own efforts, but most of them were—or are—dependent on stipends from universities or firms. Except during times of war all had attractive dwellings. None were ever involved in serious duels or scandals. Most of the married scientists fathered a few children. They all understand politics, but not uniformly well. We found no mention in the book of Rolls Royce motor cars, William F. Buckley, Jr., Peyton Place or the comely lass who promotes the Dodge Rebellion. The book does contain adequate references and a first-class table of contents and index.

The editors have done a highly commendable thing in putting together *The World of the Atom*; it is a splendid and much needed contribution to the literature of science. May the anthology flourish.

About the Reviewers: Professor Emeritus Don M. Yost of Caltech needs no introduction to a chemist or to a reader of the book review section of either of the American Nuclear Society Journals. This is fortunate because a proper introduction would put us well over our page budget.

About his co-reviewer we can furnish the following information lifted from his letter of transmittal: "Señora Lupe de Sinaloa. . . is a graduate in chemistry from the University of California at Berkeley, she has had practical experience in the subject, and she has pursued graduate studies in library science and in cybernetics. On the side, she enjoys hiking, swimming, and exploring; she has tried her hand at fishing.

"We (= the reviewers) are much indebted to my half-Irish wife and to Mrs. Ruth E. Hanson for much help in correcting and typing the various and inevitable drafts of our review. We are also glad to express our deep appreciation to our inimitable capitalist friend, Señor Pancho P. Gomez of Boise, Idaho for enlightening discussions along technical and philosophical lines."

[We (= the Editors) can add that Señor Gomez also illustrated the book, A Memoir on the Origin of the Iron Nail Club.]