Book Reviews

Atomic Quest. Arthur H. Compton. Oxford University Press, New York, 1956. xix + 370 pp. Illus. $5.

This book is a personal history of the release of the atom's energy. The author was a central figure in this great drama, and the meticulous care and wisdom with which he conducted his own scientific research is reflected fully in his writing in this book. It is without doubt the most authoritative source available on many aspects of the atomic bomb project. Men who worked from the beginning learn new facts about the early decisions and motivations behind those decisions.

Better than in most histories the real factors underlying one of mankind's most important developments are set forth in this work. The author's understanding of the essentials of scientific research and development, as well as his deep human feeling and perception, qualify him ideally to write this story. The more technical points in the essential fabric are described with clarity and brevity. One is given a feeling for the significance of fast neutron cross sections and the relation between these numbers and the critical mass of fissionable material. One learns the awful truth—that two harmless looking pieces of metal, when put together, rapidly can release enormous quantities of energy.

The story is a personal one, which is fortunate. It gives the book a Churchillian authenticity which otherwise could not exist. For those of us who know Arthur Compton, the reading of the book becomes a very pleasant personal experience. His wide acquaintance with scientists and his breadth of interests make it possible for him to move throughout most of the story in his personal manner. One has a feeling it will be a long time before the world again sees a congregation of men as capable and attuned to their opportunities and responsibilities as were the guiding scientists in the project. Most of the story can now be told, for sufficient material has been declassified. There are still gaps, however, and it may be that they will be filled before the memory of living men who can relate these experiences fades away. It is to be hoped that this will be so, in order that the great drama which Compton's book sets forth in principle and in considerable detail can finally be complete. No historian will ever dare to neglect this volume in writing the history of World War II. It is beautifully written, carefully documented, and thoroughly interesting from cover to cover.

W. F. LIBBY

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Kernmomente. H. Kopfermann. Akademische Verlagsgesellschaft, Frankfurt, 1956. 462 pp. Illus.

Among the increasing number of books on nuclear moments, Kopfermann's second edition of his earlier *Kernmomente* represents a particularly valuable addition. As he states in the preface, great progress has been made in this field during the 15 years since the first edition and, although it was before a special branch of optics, engaging only a small group of physicists, it is now the object of vastly ramified research in many laboratories. Kopfermann is not only one of the outstanding pioneers in the work on nuclear moments but also one of those who have contributed toward its further progress in recent years. It is, no doubt, this rare combination that has enabled him to give a comprehensive account in which the perplexing multiplicity of aspects is woven into a single unit.

Rather than being chosen according to the very different methods employed, the chapters of the book are characterized by the objects under investigation. Dealing with the simplest objects—that is, with free atoms—it is logical that most of the basic considerations appear in the first chapter. This chapter contains the discussion of those investigations which were historically the first —that is, those of optical hyperfine structures and of atomic beams. Nevertheless, it accounts also for more recent investigations on free atoms, such as those of Kastler, Brossel, and Bitter, based upon the simultaneous use of optical and high-frequency resonances. Besides the description of the experimental methods and the interpretation of the data, this chapter contains also the necessary theoretical considerations which lead to the values of nuclear spins, magnetic dipole moments, and electric quadrupole moments. Although all the necessary formulas are given, this is done without an overburdening mathematical apparatus; the derivations are, as far as possible, based on correspondence arguments, and quantum-mechanical proofs, where necessary, are merely indicated. Proper attention is also given to the isotope effect and to the conclusions which it permits.

The second chapter deals with free molecules as the next more complicated objects, introducing in particular those features which arise from their rotation and, among the newer methods for their investigation, that of microwave spectroscopy. Although free neutrons are even simpler than atoms and can hardly be labeled as molecules, the determination of their magnetic moment is likewise mentioned in this chapter.

The investigations of nuclear moments in bulk matter, notably in liquids and crystals, are treated in the third chapter. In view of the specific character of the methods, due emphasis is given to the various electronic arrangements which have been employed. Nevertheless, it is gratifying to see that the presentation of their basic features is not overshadowed by the discussion of circuits. Nuclear magnetic and quadrupole resonances are discussed as well as paramagnetic resonances insofar as they have a bearing on nuclear moments.

The last chapter contains a brief discussion of the relation between nuclear moments and the models of the nucleus.

Not only does the book give a most helpful introduction into the subject, but it should also be of great value to those working in the field, insofar as it is a guide through the vast literature, mentioned in ten pages of references.

F. BLOCH

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Automation. A report of the technical trends and their impact on management and labor. Department of Scientific and Industrial Research. H. M. Stationery Office, London, 1956 (order from British Information Service, 30 Rockefeller Plaza, New York, N.Y.). 196 pp. $1.08.

Within its self-imposed limitations, this little booklet is the best general introduction to the subject that has yet been published. Written in admirably clear and simple prose, it presents a balanced picture of our experience so far with respect to automation. The conclu-

sions: automation is neither something entirely new nor yet just another name for something old; it will create some short-lived social dislocations but on the whole more jobs and higher-level jobs; it will create the need for major changes in the education of technologists, scientists, and managers; and the speed of its introduction will largely be controlled by the availability of technologists and managers equal to its demands, are a fair, judicious and objective summary of our knowledge and experience to date and are well supported.

But the limitations which this booklet sets for itself deprive it of some of its usefulness. In the first place, it is primarily concerned with automation in manufacturing industry. Yet the impact of automation on clerical work and on distribution is, we already know, much greater than on manufacturing work. The speed with which automation is being introduced outside of manufacturing is also very much greater. And the social and economic impact of automating the flow of information and ideas —as against the handling of physical things—is also likely to be very much more marked.

But even within the application of automation to manufacturing, this publication largely restricts itself to discussing automation as the application of new techniques and new tools to the production of already existing and already designed products. But our experience shows that the very least that automation demands is the redesign of these existing products rather than the mere replacement of preautomated by automatic tools for the same design. More important even, automation will make possible, may indeed demand, the design of entirely new products. Above all, it demands, as does every basic method of work, the rethinking and redesign of the business and its organization, its objectives, its risks, and its management. It is in this area that the major challenge of automation lies. It is in this area also that the major social, economic, and educational impacts will arise.

It is understandable that a publication like the present one which is clearly written for the layman—whether manager or engineer—decided to stay away from these subjects. In the first place, they would have involved fairly difficult discussions of such highly abstract matters as mathematical information theory, operations research and synthesis, or the logic of decision-making. Second, here we deal with matters which are still in the exploratory stage, still the subject of "speculation" rather than of performance. Yet tomorrow's technologist and manager will have to understand these areas—even if he himself need not be an expert in the new theoretical and conceptual knowledge required. That the ability and the skill of technologists and managers are likely to be the "controlling factors" in the speed with which automation is being introduced, and are likely to prevent any "automation revolution" from occurring overnight, is largely because "ability and skill" of technologists and managers mean, above all, understanding and knowledge of new conceptual and theoretical knowledge.

A major feature of this booklet is an extensive bibliography—the best that I have seen so far. Particularly noteworthy is the full coverage of the Russian contribution to the field.

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New Concepts in Flowering-Plant Taxonomy. J. Heslop-Harrison. Harvard University Press, Cambridge, Mass., 1956. 135 pp. Illus. $1.25.

As W. B. Turrill explains in the foreword to this little book, it is an "account of the impact of experimental and other intensive studies on orthodox plant taxonomy." It begins with a historical account of the development of what has come to be called "classical taxonomy." Here the author concisely but critically outlines the development of orthodox taxonomy and poses the problems that are to be considered in more detail.

There is a summary of the basic and pertinent facts of genetics as they bear upon variation in the phenotype, together with a discussion of how genetic effects can be distinguished from those of the environment. The breeding system or genetic system is discussed in relation to taxonomy and the population concept; and the conclusion that the "breeding system prevailing in any group of plants is always of enormous taxonomic importance" is adequately demonstrated. Then follow examples of the study of, and the means of study of, ecological differentiation of populations, geographical variation, reproductive isolation, and cytological variation. Various types of variation patterns are characterized and related to the factors influencing or accomplishing reproductive isolation or its breakdown. Cytological variation at various levels is discussed with familiar examples.

Finally, categories that have been proposed by various workers in experimental disciplines are examined, and these are compared with those of orthodox taxonomy. Possibly here the distinctions between "experimental" and "classical" taxonomy are overemphasized. There is, of course, important and useful work which bridges the gap, and I suppose that the majority of taxonomic work in the future will continue profitably to combine techniques and concepts from both approaches. In pointing out that classical taxonomy customarily deals with the *products* of evolution, while experimental taxonomy seeks to understand the details of the *process,* Heslop-Harrison, it seems to me, has put his finger on what is the basis for the most serious conflict between the two approaches. The question of whether any "categories" in the usual sense, even those of the experimentalists, can express the process of evolution has not been satisfactorily answered.

Although the "experimental" taxonomist, and probably even the modern "classical" taxonomist, will find little that is new in this book, he will undoubtedly appreciate the concise and general treatment of material elsewhere brought together only in the necessarily much more extensive *Variation and Evolution in Plants* by G. L. Stebbins. It should be an especially valuable adjunct to the teaching of taxonomy at even the lowest level. And nonbotanists should welcome it also as a painless introduction to some of the newer concepts in flowering-plant taxonomy.

There are a glossary and an index, together with a short list of suggestions for further reading. The book was first published in 1953 by William Heinemann Ltd., London, and is now issued by the Harvard University Press under the 1956 date but printed in Great Britain apparently without change.

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Modern Views on the Secretion of Urine. The Cushny memorial lectures. F. R. Winton, Ed. Little, Brown, Boston, 1956. 292 pp. Illus. $8.50.

This book represents the compiled series of lectures given at University College, London, in the summer of 1955 to honor A. R. Cushny, who held the chair of pharmacology at that institution from 1905 until 1918. The ten lectures which go to make up this volume might be regarded, as the editor points out, "as modern views on various aspects of the secretion of urine." They were given by present and former workers at University College on the 50th anniversary of Cushny's appointment to the chair of pharmacology.

It is not until one sees papers by these outstanding persons that one realizes what a weight of study of urinary secretion has centered around University College Hospital. The lectures here presented also attest to the diversity of approaches to the subject, manifested by the several authors. These range from