Book Reviews

William Heytesbury. Medieval logic and the rise of mathematical physics. Curtis Wilson. University of Wisconsin Press, Madison, 1956. xii + 219 pp. $4.

Since the beginning of Pierre Duhem's work, in 1903, we have been aware that Galileo's mechanics was somewhat less miraculous than it had appeared to be, since 14th- and 15th-century logicians of the school of "Modern Logic" had deviated from Aristotelian physics in the same direction as that which the great Pisan was to explore so successfully. Deriving from William of Occam, these teachers, principally at the universities of Paris and Oxford, are gradually coming into clearer view through the exacting labor of the few scholars who possess the requisite training in mathematics, philosophy, and language. William Heytesbury, the subject of the present book, was described, as recently as 1955, in Gilson's *History of Christian Philosophy in the Middle Ages,* as being "little more than a name."

Whatever obscurity he may have fallen into, Heytesbury was once an influential teacher and writer and no slavish mouthpiece of the Aristotelian philosophy-cosmology which formed the intellectual environment of his time. The present study is concerned with the elucidation of a portion of one of Heytesbury's works —a portion in which he deals with physics and mathematics in a way that shows the same awareness of Aristotle's shortcomings as that which marked Galileo's thinking about two and a half centuries later. Two and a half centuries was a long time, even in the Middle Ages, and a perusal of Curtis Wilson's closely reasoned discussion at once illuminates the critical attitude of the 14th century toward traditional physics and the limitations of the academic environment, which precluded any leap at that time into "Galilean" physics. In Heytesbury's work, concludes Wilson, "mathematics is employed in the service of classification, *i.e.,* of the correction and elaboration of everyday speech." In this, Heytesbury differed from Aristotle, who, in his physics, showed no such awareness of any need for the correction of everyday speech, and from Galileo, to whom mathematics was the direct key to the world, without the intervention of everyday speech. Other aspects of Heytesbury's physics show affinities with the 19th-century discussions which led to the logical foundations of the calculus.

As in the case of a work of pure science, the popularity of this book is likely to be in inverse proportion to its originality. It is more likely to please the rare-book dealer of the next generation than the publisher of this generation. The University of Wisconsin Press is to be congratulated for considering the importance of the work ahead of the likelihood of its immediate popularity.

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Report of the Princeton Conference on the History of Philanthropy in the United States. Russell Sage Foundation, New York, 1956. 84 pp. $1.

American social philosophers have long agreed that wealth cannot expect public approval unless it contributes to the advancement of human welfare. "They should own who can administer, not they who hoard and conceal," wrote Ralph Waldo Emerson; "they whose work carves out the work for more, opens a path for all." More than any other people, Americans have turned their private fortunes to public account through philanthropy. They have relieved distress at home and abroad, have endowed schools and churches, have supported art galleries and museums, and have subsidized the quest for new social and scientific knowledge. Important as philanthropy has been in our national life, we know very little about it. Some of the great foundations now feel that they can profit by the discovery of new knowledge concerning the historical role of philanthropy in the United States.

At Princeton, on 3–4 Feb. 1956, a group of historians met with representatives of the Ford Foundation and the Russell Sage Foundation (sponsor of the conference) to discuss research possibilities in this field. *Report of the Princeton Conference on the History of Philanthropy in the United States* summarizes the results of that conference. Richard H. Shryock, of the Johns Hopkins University, and Henry Edward Guerlac, of Cornell University, who represented the history of medicine and the history of science, respectively, participated in the discussions. Their influence is revealed in the suggestions for further study of the role of philanthropy in the promotion of scientific research, in the creation of such agencies as the Smithsonian Institution and the Chicago Natural History Museum, and in the support of medical education, hospitals, and various public health programs. The conferees venture the opinion that the task of studying philanthropy in its scientific role belongs more properly to the historian of science than to the scientist, who may not be able to relate his specialty to broad historical movements and social goals.

The bulk of the report deals with the relation of philanthropy to government, law, the economy, the arts, education, religion, and other such matters. Interested parties will find a great variety of research topics suggested here, together with an extensive preliminary bibliography. Because of its comprehensiveness, the report is likely to fulfill the object of its sponsors by stimulating research in many different areas. Anyone who contemplates research in this field should also read the article on "The history of American philanthropy as a field of research" [*American Historical Review* (January 1957)] by Merle E. Curti, the distinguished historian who presided at the Princeton conference.

The Ford Foundation, which made an earlier grant for a study of English philanthropy, has recently awarded the University of Wisconsin $100,000 for American philanthropic studies. Curti, who will head the Wisconsin project, will undoubtedly welcome research suggestions from members of the scientific community.

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Introductory Psychosomatic Dentistry. John H. Manhold, Jr. Appleton-Century-Crofts, New York, 1956. 193 pp. Illus.

Introductory Psychosomatic Dentistry is a contribution to the expanding list of published materials that concern psychosomatic medicine and dentistry. The book introduces, at relatively great length, material on statistics and research methods for studying dental caries and for establishing a causal relationship to personality disorders. It is a moot question whether dental caries, because of the multiplicity of factors that participate in its causation, can be selected as the appropriate index for establishing a

causal relationship between personality disorders and dental disease. We should perhaps direct our investigation toward observing the musculoskeletal phenomena as exhibited in habit neurosis and other forms of occlusal trauma, such as bruxism, as well as peculiarities in general behavior.

Hypnosis is discussed early in the book in a section entitled "What is psychosomatics," where the emphasis is placed on what psychosomatics is *not*. The negative character of the discussion on hypnosis is neither warranted nor substantiated, and this section does not contribute to the main theme. The value of hypnosis is currently recognized by many experts as an aid in diagnosis of symptoms and disorders of psychogenic origin, such as conversion hysteria and other organ language disorders. The application of psychosomatics to dentistry is reserved for the final chapters and is presented without any attempt to relate sharply, for the dental practitioner, the body of information which is the substance of the book.

The book merits reading by interested persons because of the effort that is made to collate the material. It is to be hoped that it will stimulate more insight into psychosomatic investigation in dentistry.

More emphasis should have been placed on doctor-patient rapport and on the elusive problems in dentistry that, in many instances, *are* elusive because they have become entangled with emotional disorders of various types. All in all, the book is well written, makes for good reading, and contains many instructive pages for dentists who are interested in psychosomatic dentistry.

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Annual Review of Nuclear Science. vol. 6. James G. Beckerley, Martin D. Kamen, and Leonard I. Schiff. Annual Reviews, Palo Alto, Calif., 1956. 741 pp. Illus. $7.

As the journals that publish detailed accounts of individual experiments become thicker and proliferate in number, the importance of the review article steadily rises. Only the unusual researcher has time to read the original papers, as they appear, in other than the minute area of science in which he is at the moment working. For collateral information, he is dependent on reviews, and, as such, the articles in volume 6 of the *Annual Reviews of Nuclear Science* are very valuable.

The first article, by V. Sarabhai and N. W. Nerurkar, summarizes advances that have been made in the study and interpretation of the time variations in cosmic-ray intensity. Before multi-Bev particle accelerators became available, problems concerning the origin of cosmic rays and their variations were subordinated to the use of the rays as projectiles with which to initiate ultrahigh energy events. These neglected problems are now in the focus of scientific interest, and the article discusses such matters as the evidence for solar generation of part of the radiation and for the existence and location of interplanetary magnetic fields.

An article by L. Wolfenstein reviews material concerning the polarization of nucleon beams. The rather sophisticated formalism used in the mathematical description of polarized particle beams is presented, and the interpretation of recent data in the 100- to 400-Mev region of kinetic energy is discussed.

N. P. Heydenberg and G. M. Temmer, who have themselves contributed greatly to the field of the Coulomb excitation of nuclei, summarize the status of such investigations in a very valuable review. J. E. Mack and H. Arroe, two able spectroscopists, review recent work on the isotope shift in atomic spectra in a highly condensed article which, nevertheless, lists 158 original papers.

The Nuclear Data Group at the National Bureau of Standards, headed by K. Way, present an exhaustive summary of recent material on the ground-state spins, magnetic moments, quadrupole moments, energy levels, and gamma-ray lifetimes of "medium weight nuclei," assigning nuclei with $22 < N < 90$ and $114 \leq N \leq 134$ to this category. A discussion of the bearing of these data on various current nuclear models is included.

An article by R. A. Horne, C. D. Coryell, and L. S. Goldring discusses the role of acidity in certain types of radiochemical separations, notably those involving the hydrolysis of metals and the precipitation of their hydroxides or sulfides. A generalized concept of acidity is used in extending the review to nonaqueous solutions and liquid salts.

An extensive review of the masses of light nuclides by a group at the Max Planck Institute for Chemistry at Mainz, Germany, headed by J. Mattauch, attempts to derive the most probable masses from mass spectroscopic and nuclear data and discusses their differences. The tables in this article have been so drastically reduced in the reproduction process that they cry for the use of a magnifying glass, at least, so I thought.

Nuclear radiation effects in solids is the subject of an article by H. Brooks. Since 1942, when E. P. Wigner first anticipated that the graphite used in the Hanford piles might deform under the intense fast neutron bombardment, the field has grown tremendously, owing to its vital importance in reactor design and its interest to solid-state physicists.

Applications of oxygen isotopes in chemical studies are discussed by H. Taube. The article stresses the applications to chemical phenomena in homogeneous solution.

E. C. Anderson and F. N. Hayes discuss recent advances in low-level counting techniques. Brilliant success in radiocarbon dating was achieved by means of these techniques, and they are now being applied to the fundamental problems of the detection of the neutrino and of double beta decay.

"Nuclear reactors for electric power generation" is the subject of a review by L. Davidson, W. A. Loeb, and G. Young. After discussing various types, here and abroad, they attempt to answer the vexing question of the cost per kilowatt hour of electricity that must be anticipated.

The volume closes with two review articles on radiobiology. The first, on cellular radiobiology, by L. H. Gray, has two subheads, "Radiobiology of the cell" and "Radiobiology of cells and tissues," with an imposing list of 380 original papers. The second radiobiological article, by J. P. O'Brien, is titled "Vertebrate radiobiology: embryology" and discusses the development of vertebrate embryos after high-energy irradiation in the fetal state. It contains a brief statement concerning human infant development as observed in post-World War II Hiroshima and Nagasaki.

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Fusion Methods in Chemical Microscopy. Walter C. McCrone, Jr., Interscience, New York, 1957. 307 pp. Illus. $6.75.

Fusion Methods in Chemical Microscopy is a useful handbook of techniques for methods of microanalysis that depend on the combination of microscope and temperature control. The methods generally involve melting and are referred to collectively as "fusion methods." Temperatures generally employed are in the range $-100°$ to $+350°$C, but with special apparatus the range can be greatly extended. The techniques are usable for any substances that can be heated on a microscope stage, but emphasis in this book is on applications to organic compounds.

The microscope has long been used to some extent in inorganic analysis for identifying precipitates, and it is of course the principal tool for mineralogic analysis of rocks. In organic chemistry, neither the simple recognition of pre-