Book Reviews

Thomas Bradwardine His Tractatus de Proportionibus. Its significance for the development of mathematical physics. H. Lamar Crosby, Jr., Ed. and Trans. Univ. of Wisconsin Press, Madison, 1955. xi + 203 pp. $3.50.

The study of the history of science slowly is coming to be a recognized discipline in university instruction. There are at least three American institutions, Cornell, Harvard, and Wisconsin, that grant the doctorate in this field; and at the last named there has been an emphasis on research in the history of medieval science. The present work is another welcome product of the active group that has been working at the University of Wisconsin under the able leadership of Marshall Clagett.

Traditionally the origins of modern dynamics have been found in the work of Galileo, although it now is half a century since Pierre Duhem argued persuasively that the source should be pushed back two and a half centuries to the Buridan school at Paris. H. L. Crosby here proposes a backward shift of a few more years to the activities of Merton College at Oxford, and more especially to 1328, the date of Bradwardine's *De proportionibus*.

The reputation of Bradwardine, "Doctor Profundus," never has needed apologists. He was elected Archbishop of Canterbury about a month before he died of the Black Death in 1349; and Chaucer's Nun's Priest mentions him in the same breath with Boethius and St. Augustine. Histories of mathematics cite with respect Bradwardine's contributions to the study of star-polygons, continua, and proportions. Only quite recently, however, has the significance of *De proportionibus* for the history of physics been appreciated, for the language of the original Latin has been difficult and obscure to readers brought up on modern tongues and mathematical symbolism. Now the treatise is available in a handy form with Latin and English on alternate pages, together with notes and index and an excellent introduction of more than 50 pages. The book is photographically reproduced from typescript, but it is done with exceptional neatness and clarity.

The *De proportionibus* is perhaps the earliest treatise to propose a general law of physics the expression of which called for transcendental functions rather than simple direct or inverse variation. Aristotle had assumed that velocity of motion V is determined by a proportionality between motive force F and resistance R; but the older use of the word *proportion* (or *analogia*) was so general as to make it practically equivalent to the modern function concept. Natural philosophers consequently had argued for centuries whether Aristotle's proportion should be "arithmetic" (of the form $kV = F - R$) or "geometric" (that is, given by $kV = F/R$). Bradwardine refuted both of these forms as well as the hybrid $kV = (F - R)/R$, showing that they are inconsistent with other Aristotelian axioms of motion. (Aristotle had assumed that halving both the motive force and the resistance would leave the velocity unchanged; and he had denied that there can be motion if there is equilibrium between the motive forces and the forces of resistance.) Then, having "put to flight" these "fogs of ignorance, these winds of demonstration," Bradwardine stated his own law that "the proportion of the speeds of motions varies in accordance with the proportion of the power of the mover to the power of the thing moved" (p. 111). His exposition shows, in words rather than symbols, that he had in mind the exponential relationship $n^V = F/R$, where n is constant. Later Mertonians applied this type of function, not only to uniformly accelerated motion, but also to problems of variation in psychology, ethics, and even theology.

Crosby's "Introduction" is a perspicuous interpretation of the place of *De proportionibus* in the growth of science. Among other provocative theses, it is argued that the origins of modern science are to be found less in the vaunted *Platonic* movement than in Bradwardine's mathematical treatment of the *Aristotelian* principles of motion (p. 17). And again, Crosby holds that Bradwardine's association of force with instantaneous, rather than average, velocity led directly to the work of his successors on uniformly accelerated motion, and that in this respect the Mertonian kinematics "seems closer to the modern point of view" than the impetus theory of the Paris school (p. 52). Such bold suggestions may undergo subsequent modification, but they afford a far more challenging picture of the history of science than does the stultifying and discredited idea that dynamics was created single-handedly by Galileo.

CARL B. BOYER
Department of Mathematics, Brooklyn College

Morbidity in the Municipal Hospitals of the City of New York. Report of an exploratory study in hospital morbidity reporting. Marta Fraenkel and Carl L. Erhardt. Russell Sage Foundation, New York, 1955. 229 pp. $4.50.

This work contains (i) a description of the procedures by which data on age, sex, race, marital status, religious affiliation, length of stay, diagnoses, surgical intervention, and condition on discharge were obtained for 121,952 patients discharged during May–October 1952 from 31 hospitals operated by the city of New York; (ii) 55 tables that mainly summarize data on the frequency of diagnosis in relation to one or more of the other aforementioned characteristics; and (3) general comments on the findings. In view of the kinds of hospitals studied, it is impossible to generalize the findings to all hospitalized patients in New York, let alone in other cities. The authors have wisely refrained from making any such generalizations.

The purpose of this "exploratory study" was "to test a plan for morbidity reporting." The test has apparently been considered successful, because the city of New York was able to obtain, process, and tabulate data from some of the hospitals it controls. It is surprising that a doubt existed about achieving this, especially when the authors state in the preface: "A morbidity reporting system of this kind has long been recognized as practicable for New York City but budgetary restrictions have prevented its establishment."

As reported here the study contributes little to the solution of the problems of measuring the incidence and prevalence of diseases in a community. Data on the characteristics of hospitalized patients are needed for this purpose, but until these data can be related to a well-defined population base and to nonhospitalized morbidity they are not very in-

formative. The contributions of this study to methodology are also limited, inasmuch as it was not designed to reveal how the nonmunicipal hospitals can be integrated into a community-wide reporting system and, most of all, because it was not designed to compare the several procedures that could be used for the several possible objectives of a community-wide hospital reporting system. Apparently the main contribution of this study is directed at the administrative problems of New York. In their foreword, the Commissioner of Health and the Commissioner of Hospitals write, "the study findings have been of great value to the operations of both departments."

ANTONIO CIOCCO
Department of Biostatistics,
Graduate School of Public Health,
University of Pittsburgh

Introduction to Psychiatry. O. Spurgeon English and Stuart M. Finch. Norton, New York, 1954. viii + 621 pp. $7.

This is the first textbook of psychiatry to be completely oriented along psychoanalytic lines. The subject matter is covered in 592 pages with appended bibliography and index in 9 sections: "Concepts of dynamic psychiatry," "Child psychiatry," "Psychoneurotic disorders," "Personality disorders," "Psychophysiological disorders," "Functional psychotic disorders," "Organic brain disorders," "Mental deficiency," and "Therapy." The text is largely a compilation of lectures given to medical students, and each section is illustrated with well-chosen case material. The authors have attempted to follow the new revision of nomenclature of the American Psychiatric Association. This should be of help to board candidates in preparing for their examination. Psychoanalytic terms are briefly defined and easily memorized.

The theoretical approach is strictly Freudian, in that the authors adhere to the traditional description of libidinal stages of personality development from infancy to maturity. Neglect, however, to define specifically, to enumerate the variety of instincts, and to describe their state of fusion makes for a vague introductory orientation. In this connection, there is a tendency to neglect the importance of hereditary factors and to overemphasize environmental influence, which leads to a psychiatry without biological foundation and may result in a separation from the other branches of medicine. There is a lack of clarity, if not contradiction, in the discussion of the mechanisms of ego defense; for example, sublimation is said to be the only defense mechanism that can be considered well within the limits of normality, yet, of rationalization it is stated, "this mechanism of defense is one of the most common of all and is utilized to a certain degree by almost everyone."

Although the chapter on history taking and examination is extremely detailed, it is written so as to stimulate the medical student to develop and to use his intuitive endowment. The section devoted to child psychiatry neglects the importance today of juvenile crimes. However, it is clear, concise, well illustrated with case material, and devoid of repetition. Handling of the formal psychiatric disorders leaves little to be desired, and the therapeutic approach is eclectic. The manuscript was probably out of the authors' hands before the therapeutic value of the two new drugs chlorpromazine and reserpine was reported. The chapter on mental deficiency, although telescoped, is adequate as an introduction. The final section on therapy is constructively repetitious and includes an informative chapter on mental hygiene.

Despite my critical remarks, the book is a valuable textbook, not only to psychiatrists, but to physicians in other branches of medicine, to medical students, and to persons in related fields such as nursing, social work, psychology, and anthropology.

ROY D. CRAIG
Department of Psychiatry,
Columbia University College
of Physicians and Surgeons

Bibliography on Physical Electronics. Prepared by Wayne B. Nottingham and staff. Research Laboratory of Electronics, Massachusets Institute of Technology, Cambridge, 1954 (distr. by Addison-Wesley, Cambridge Mass.). iv + 428 pp. $8.50.

This publication is literally what the title suggests, a bibliography and no more. Completeness is a necessary attribute of such an offering, and I tested this by using spot checks. References on thermionic and photoelectric emission in the second edition of Dow's *Fundamentals of Engineering Electronics* were used, together with the references on semiconductor literature included in "The new electronics" by K. Lark-Horovitz, a chapter in the book, *The Present State of Physics,* and the *Abstracts of the Literature on Semiconducting and Luminescent Materials and Their Applications* (1953 issue) compiled by Battelle Memorial Institute.

The conclusion is that, while the bibliography is almost but not entirely complete, its 428 pages contain a large share of the references in the field and comprise a worth-while contribution. Many headings and subheadings are listed in the table of contents to assist in searching references. I prefer the format of the Battelle compilation for the brief abstracts that accompany each reference and for the paper-backed ring binding, which seems more appropriate for a book that is destined to become out of date so soon, but this is just a matter of taste.

The Nottingham bibliography and Battelle abstracts both eloquently demonstrate the magnitude of recent activity in the field of electronics.

B. R. GOSSICK
Department of Physics,
Purdue University

Atomic and Nuclear Physics. Robert S. Shankland. Macmillan, New York, 1955. xv + 529 pp. Illus. $7.75.

This book has been prepared from material used in a course for undergraduate physics majors and first-year graduate students. About half of the book is concerned with the topics usually described as "atomic physics"; there is a chapter on the solid state, and the remainder is on nuclear physics. A very wide range of topics is covered, including some rather up-to-date material—for example, on Lamb shift, antiferromagnetism, the transistor, nuclear magnetic resonance, production of elements up to $Z = 100$, nuclear chain reactors, and production and properties of mesons. Numerous subjects are described in historical development, and some of these stories are of the kind that will catch up the student in the excitement that is physics.

On the debit side, there are several features of the book that might leave one unhappy. For one, the treatments of certain basic concepts are wanting in carefulness and thoroughness. The Heisenberg uncertainty principle is discussed only briefly, although Brownian motion receives five pages. The terms ψ and *wave-function* are introduced without discussion, and without any mention of the Schrodinger equation; the term *parity* is used but not defined. Several topics suffer from the book's omission of any discussion of matrix elements or overlap integrals.

A second item concerns the referencing. A very large number of references is given to the original literature, but only in a few instances is the student referred to sources that might help him obtain the background necessary to understand the many sophisticated papers referred to.