been notable. Only through such joint authorship could so authoritative a volume have been produced. There is no common index, and cross references are few. Nevertheless, owners of volume I will certainly wish to own volume II, and members of the new group who have been led, because of special interests, to purchase volume II, will soon find a strong compulsion to make their sets complete.

ARTHUR W. MARTIN, JR.
Division of Biological and Medical Sciences, National Science Foundation

Veterinary Toxicology. Formerly *Lander's Veterinary Toxicology.* R. J. Garner. Bailliere, Tindall and Cox, London, 1957 (order from Williams & Wilkins, Baltimore). 415 pp. $7.50.

This unillustrated book deals with a study of the origin, properties, and effects of poisons, with their detection, and with the treatment of their effects. This is a complete revision of the third edition of *Lander's Veterinary Toxicology,* as revised by Nicholson, which was published in 1945. The new author, Garner, refers to Nicholson very frequently in the voluminous references, for which, as the book shows, Garner has done an enormous amount of research. Much of the original text has been rewritten and rearranged. The botanical description and illustrations of plants have been deleted from the section on poisonous plants. Newer subjects, such as chemical pesticides and radioactive substances, have been added and given proper consideration and importance by the devotion of a section to each. The data on chemical analysis for poisons have been brought together in another section.

There is much documented evidence, with references, to support what the author says, and it is well arranged. There is a good index, which makes the book valuable as a ready reference. Although considerable space is very appropriately devoted to the toxicology of both chlorinated hydrocarbon and organic phosphorus insecticides, it does not seem as though the list of references is correspondingly long, and I believe that the U.S. Department of Agriculture's *Technical Bulletin 1122* on these subjects is worthy of reference. In the section on poisonous plants there is no mention of greasewood and halogeton, two oxalic acid plants, or of milkweed and locoweed, all of which have received considerable publicity in American literature. There also is little information given about a number of poisonous plants important in the United States, such as larkspur, arrow grass, fescue, and astragalus. However, the book brings together a wealth of information, arranged in such a way that it is easy to find. Moreover, a book on this subject has been urgently needed. In the changing field of agricultural chemicals, with new chemicals reaching the farms, the animals, and the animal feeds, veterinary toxicological problems may appear or be suspected in connection with numerous agricultural practices. Veterinarians, research workers, students, and others interested in toxicology will find this book of value.

HOWARD W. JOHNSON
Agricultural Research Service, U.S. Department of Agriculture

On the Utility of Medical History. Monograph I, Institute on Social and Historical Medicine, New York Academy of Medicine. Iago Galdston, Ed. International Universities Press, New York, 1957. ix + 73 pp. $2.

Iago Galdston, one of the country's most articulate promoters of the writing of medical history, has written or edited many volumes dealing with current medical issues in which the historical background is fully set forth because he believes that medical history, by illuminating the present, provides a basis for judgment about the future. To inquire whether this belief is well founded and, if it is, how the potential utility of medical history may be more fully exploited, he organized the conference or institute reported in this book. Other contributors besides himself are George Rosen, Owsei Temkin, Gregory Zilboorg, Erwin H. Ackerknecht, and Paul Schrecker. In a series of essays they define and discuss purposes, values, goals, and uses of medical historiography, teaching of medical history, and medical history itself.

After finishing the essays, my first reaction was to write a review article on the utility of medical history, exploring the distinction between the *value* of history studied for itself and the *utility* of history as an aid to solving current problems—reasserting the cultural and humane values in history which the essayists seem reluctant to expound and urging medical historians in search of self-justification to admit their interest in the subject for its own sake and to say less of the utility of medical history, which cannot be proved, lest they promise more than they can produce. Lacking space, I set my essay aside unfinished. But the reader may judge from this how thought-provoking I found the book.

Although the uses of history in general have been discussed more fully by a number of other historians, and although earlier articles by Temkin, Rosen, and Ackerknecht on the usefulness of medical history and its role in medical education are as good as if not better than their contributions here, anyone who is particularly interested in medical history may gain new insights from these stimulating essays. The book's chief value, however, will be realized if it is able to reach and influence the unconverted who can profit from it most. If it does, it will have performed a useful function.

JOHN B. BLAKE
Division of Medical Sciences, Smithsonian Institution

Metabolic Aspects of Transport Across Cell Membranes. Q. R. Murphy, Ed. University of Wisconsin Press, Madison, 1957. xxiv + 379 pp. Illus. $7.50.

Movement of substances across the boundaries of living cells is obviously necessary for their continued existence. In recent times it has become apparent that some substances do not always move simply down concentration gradients or gradients of chemical or electrochemical potential; that there are net movements against such gradients is now indeed a well-established fact. Elucidation of the mechanism underlying this type of transport and the way in which it is coupled to required energy sources is the current goal of much physiological research and is the central topic of this book.

The volume contains the reports and discussions of a symposium held at the University of Wisconsin in August 1955. Brief specific mention of the principal topics will indicate the scope of the subject matter: regulation in fluid exchange (E. F. Adolph); ion exchange in clinical medicine (D. C. Darrow); principles and theories of transport (H. H. Ussing); movement of water and electrolyte across intestinal epithelia (M. B. Visscher); transport of ions in skeletal muscle (E. J. Conway), in cardiac tissues (S. Weidmann), in vertebrate nerve (A. M. Shanes), in renal tubules (R. W. Berliner); gastric acid secretion—the present position (R. E. Davies); gastric acid secretion—metabolic aspects (H. W. Davenport); and gastric acid secretion—compatibility of theories with electrophysiological findings (W. S. Rehm and W. H. Dennis). Additional brief reports preface each discussion.

Areas of discussion are: (i) ion transport in muscle and nerve, (ii) ion transport across renal epithelium, (iii) transport of organic compounds across renal epithelium, (iv) gastric acid secretion, and (v) correlation of clinical problems and basic information relating to membrane transport. Transport in plant cells is not considered.

Although many of the observations described here have already been published elsewhere and although several of the principal speakers have outlined their views in other recent symposia, the book remains fresh and valuable on the basis of the discussions alone. Provocative speculations are plentiful, but so are earnest and pertinent warnings about experimental procedures and hidden assumptions. The discussions emphasize further the diversity of current opinion as to the nature and sequence of molecular events that permit cells to maintain their ionic steady states or to function as secretory units.

C. M. CONNELLY
Rockefeller Institute for Medical Research

Biochemie der Ernährung. K. Lang. Steinkopff, Darmstadt, Germany, 1957. xv + 411 pp. Illus. DM. 54.

Many futile attempts have been made to expound the subject of nutrition with a minimum regard for chemistry. This volume certainly does not belong in this class. It is a worthy and very substantial book which treats in an excellent and thorough manner the chemistry of many food constituents. The treatment of carbohydrate chemistry (9 pages), the chemistry of fats (17 pages), and protein chemistry (50 pages) is less elementary than might be supposed but not, in general, as adequate as is the treatment of the vitamins, which occupies approximately one-half of the volume and has to do not only with the chemistry of the vitamins themselves but with their functional derivatives. The lack of attention to carbohydrate chemistry, for example, may be justified on the grounds that other books dealing with this subject are available and advances in the carbohydrate field do not impinge very directly on current advances in nutrition. There are about 650 excellent references cited in the volume, and it constitutes a sound piece of work.

In recent years it has become evident that nutrition cannot be treated in a thoroughgoing manner without reference to genetics. It is clear that genetic variations cause different species, strains, and individuals to have differing nutritional needs. This book has, from my standpoint, a serious fault in that the relationship of biochemical genetics to nutrition is not discussed. The time has already come, in my opinion, when the biochemistry of nutrition cannot be treated in a scholarly way with a disregard of the role that genetics plays.

ROGER J. WILLIAMS
Department of Chemistry, University of Texas

History and Philosophy of Science

Copernicus. The founder of modern astronomy. Angus Armitage. Yoseloff, New York, 1957. 236 pp. Illus. + plates. $5.

Many American readers already know Angus Armitage as the author of *Sun, Stand Thou Still,* a popular account of the life and work of Nicolaus Copernicus, first issued in 1947 and recently more widely circulated in paperback under the title *The World of Copernicus.* Fewer are aware that that elementary volume was itself the by-product of an earlier and more scholarly study, *Copernicus: The Founder of Modern Astronomy.* Since the earlier volume was and is the only serious and detailed study of Copernicus' astronomical research in English, this revised and expanded edition is very welcome.

Armitage begins his book with a condensed sketch of the development of planetary astronomy in antiquity and the Middle Ages. His second chapter recounts most of what is known of Copernicus' life, the progress of his astronomical research, and the composition of his *De Revolutionibus Orbium Coelestium.* Then follow four chapters dealing in detail with Copernicus' astronomical system. Two closing chapters and an epilog (all added for this edition) discuss the gradual acceptance of the new astronomy, its physical verification, and, very briefly, its subsequent fate. There are also three useful appendices and a brief index.

The five chapters dealing with Copernicus and his work are the heart of the book, and they are uniformly readable, reliable, and illuminating. But three of them—those that discuss Copernicus' treatment of the motion of the earth, the moon, and the planets—are also something more. Readers unwilling or unable to grapple with the complexities of the *De Revolutionibus* itself will find in these chapters the only reasonably full account of Copernicus' real contribution to modern astronomy: a sun-centered, mathematical planetary system able to compete with the earth-centered system of Ptolemy. In the 16th century the concept of a moving earth was not novel. It was the mathematical demonstration that a moving earth was compatible with existing standards for predictive planetary astronomy that gained for Copernicus enduring fame.

But Copernicus gave a strange demonstration. Armitage shows what others have mentioned—the *De Revolutionibus* was modeled, both in organization and in mathematical detail, upon Ptolemy's *Almagest.* To describe the earth's orbital motion about the sun, Copernicus compounded three perfect circular motions; three more were required to describe the moon's motion about the earth; two or more circles (epicycles and eccentrics) were used to trace the motions of each of the planets about the moving center of the earth's orbit. When he was through, Copernicus' system was quite as good as Ptolemy's, but it was neither more accurate nor appreciably simpler. Copernicus' single concrete improvement (one which attracted many later astronomers to his work) was in lunar theory, and to this, ironically enough, the concept of the earth's motion was irrelevant.

Armitage's account of Copernicus' life and of the acceptance of his theory are less unusual. But they are appropriate appendages to his central study, and they are admirably done. The same is not so clearly true of his opening and closing chapters. The first seems far too condensed and simplified to achieve its purpose. Readers can and must find elsewhere both the historical and the conceptual background of Copernicus' work. The last chapter, dealing with the physical verification of the Copernican theory, adds even less to the volume and will very probably mislead. The physical problems raised by Copernicanism are scarcely discussed in earlier parts of the volume. Collected in this summary form, without either historical or technical context, they become almost a parody of the sort of history to which other parts of the book make such notable contributions. But these criticisms are directed only to the frame of Armitage's study. They do not at all reflect on its central chapters. These remain an invaluable aid to all those wishing to learn more about Copernicus and about the astronomical system he designed.

THOMAS S. KUHN
University of California, Berkeley

Science and Human Life. J. A. V. Butler. Basic Books, New York, 1957. 162 pp. $3.95.

The book under review is a work with a philosophical keynote, written by a British scientist whose special field is biophysical chemistry. The author starts from the questions, What are we? What is the basis of human life?, and tries to discover what science, which has revealed so much of the constitution of the universe, can contribute to the answer.

Human beings, who in the prescientific era thought of themselves as the dominant figures in the universe learned, first, that they were only the top members of the earthly animal kingdom, which, in its turn, is an infinitesimally small dwarf among the billions of islands of organic life that may exist on planets of the stars. Second, doubts were even