

ations research in general and linear programming in particular in their organization. Research workers in many fields will find this a rapid and fairly painless introduction to another field.

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British Pharmaceutical Codex, 1959.
Pharmaceutical Press, London, 1959
(order from Rittenhouse Book Store,
Philadelphia, Pa.). 70s.

The appearance of a new edition of the *Codex* is a welcome event to the pharmaceutical profession in the United States and in Great Britain. The 1959 edition maintains the high standard of excellence and utility which one has come to expect of this compendium.

The general format of monographs and appendices has been retained, with necessary additions and deletions reflecting current therapeutic trends. The discussions of the actions and uses of, and the symptoms and treatment of acute poisoning by, each drug, are especially noteworthy and generally excellent.

New appendices dealing with milliequivalent strengths of solutions for intravenous use, bioassays for chloramphenicol and for neoarsphenamine ophthalmic ointments, and uniformity of the diameter of tablets may be of interest to the American drug industry.

Although the *Codex* has no legal status in the United States, pharmacists, physicians, and many chemists will find it a valuable reference work in the general area of therapy.

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Ancient Mexico. An introduction to the pre-Hispanic cultures. Frederick A. Peterson. Putnam's, New York; Allen and Unwin, London, 1959. 313 pp. Illus. + plates. \$7.95.

In 1842 and 1843, John Stevens published his *Incidents of Travel in Central America* and *Incidents of Travel in Yucatan*, giving to the general public its first view of the great ruins of the Maya region and paving the way for future archeological work in this fascinating area.

At the same time, 1843, William

Prescott published his classic *History of the Conquest of Mexico*, performing the same service regarding the Aztecs and their neighbors. The stream of books that appeared during most of the next century added but little to what these two scholars had to say, since all relied primarily on the same sources: early Spanish and native accounts. While these accounts contained an abundance of material, they were vague in historical perspective and naturally emphasized the two powers dominant at the time of the conquest, the Aztecs and the Maya. The Spanish records, in most instances, were strongly slanted to the conquerers' point of view.

Studies of Maya epigraphy led to the deciphering of the native calendar and, eventually, to a fairly accurate estimate of the development of Maya civilization over ten centuries of time.

It was not until George Vaillant began his series of stratigraphic excavations in the Valley of Mexico (1928) that a similar time perspective began to emerge for this region. During the past 30 years, scientific work in archeology has gradually filled in the picture to a point where it is now possible to present, in skeleton form, a prehistoric sequence for Middle America, reaching back to 10,000 B.C.

For the most part, in recent years, professional archeologists have confined their writings to special topics or areas; there have been many books on the fashionable subject of pre-Columbian art, but no one has seriously tackled the formidable task of preparing a general work.

This year two publications have appeared which attempt to present this complex picture to the lay reader. One, published in Mexico, is *Esplendor del Mexico Antiguo*, a massive two-volume work in Spanish, written by many specialists; the other is *Ancient Mexico*, the subject of this review.

Frederick Peterson, a trained archeologist, has done a fine job of organizing and presenting, in compact form, a mass of material covering 10,000 years in time and dealing with such diverse topics as music, engineering, agriculture, art, religion, war, education, dress, political organization, and astronomy. These and many similar subjects are treated in satisfactory detail with due regard to space and time.

The book is divided into two main subdivisions. The first deals with the succession of cultures from the earliest mammoth hunters, through the begin-

nings of simple sedentary societies and the eventual rise and fall of a series of civilizations, and it culminates with the Spanish conquest, which almost completely destroyed native culture.

The remainder of the book describes the activities and accomplishments of the ancient Mexicans as recorded by native and Spanish chroniclers and as deduced from archeological investigations.

In spite of the mass of factual material presented, *Ancient Mexico* is written in readable and entertaining style. As an authoritative, popular account of Mexican prehistory, it fills a real need and certainly will serve its intended purpose as a general introduction to pre-Columbian Mexico.

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Information Theory and Statistics. Solomon Kullback. Wiley, New York; Chapman and Hall, London, 1959. xvii + 395 pp. Illus. \$12.50.

Information Theory and Statistics, a combination text and treatise, is a carefully written volume on mathematical statistics; it is filled with excellent examples and exercises, and augmented by a glossary of terms. Written for the advanced, mathematically trained student, it is not a book for casual reading, nor is it a book for a reader unfamiliar with matrices, probability theory, and some measure theory.

The novel aspect of the book is its illustration of the process by which science fills the gaps between previously distinct disciplines. The gap filled here is that between information theory and mathematical statistics. That information theory is "a branch of the mathematical theory of probability and mathematical statistics" was self-evident from Shannon's work. But this was lost sight of. Information theory was initially studied not by the statistician but by the communications engineer. The combination of the concept of entropy (until then exclusively in the domain of physics and chemistry) with concepts of communication, messages, and "information," seemed remote from the discipline of mathematical statistics, but Kullback shows, with a wide range of examples and applications, how the logarithmic measure of information can bring new order back into the field from which many of Shannon's tools were borrowed. Starting with a simple deri-

vation from Bayes' theorem, Kullback develops the logarithmic measure and related concepts into a unifying principle in testing hypotheses and in sampling theory. As he writes in the preface, "There is currently a heterogeneous development of statistical procedures scattered through the literature. In this book a unification is attained by a consistent application of the concepts and properties of information theory." Thus, the book contributes both to the teaching of mathematical statistics and to the advance of the subject.

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Critical Problems in the History of Science. Proceedings of the Institute for the History of Science at the University of Wisconsin, September 1-11, 1957. Marshall Clagett, Ed. University of Wisconsin Press, Madison, 1959. xiv + 555 pp. Illus. \$5.

The history of science has two kinds of "critical" problems: the finding of facts and the manner of their presentation. History could thus be divided into two branches; since no distinctive word exists for the first, perhaps we should call its histories (or historiology) as the partner of historiography. Both branches are illuminated in this collection of 16 papers, accompanied by 19 commentaries containing the formal conference discussions. In many of the papers, the problems of historical facts are dominant, and the several areas in which more facts must be collected are indicated. The problems of historiography remain in the background in the first sections of the book, but they are fully and broadly brought out by Father Joseph T. Clark, who discusses "the philosophy of science and the history of science." From there on, the discussions of historiography continue.

Great emphasis is given to the Scientific Revolution—the emergence of the new scientific attitude up to the time of Galileo and Newton. More than 40 percent of the book is devoted to this topic, and it appears that the greatest recent progress in the history of science has been made here. Mainly through the efforts of A. C. Crombie, E. J. Dijksterhuis, Rupert Hall, and Giorgio de Santillana (all were participants in this symposium) the stature of such men as Grosseteste in the 13th century, and Oresme in the 14th, has become more

clearly defined. Yet, as Rupert Hall wisely says, we need not "admire Galileo less, because we admire Oresme more than people did in the days when everything in the *Discorsi* was assumed to have sprung unheralded from his brain" (page 195). Our admiration for historical figures is not governed by a law of conservation which would allow only an equivalent shift in distribution of a constant quantity.

One of the highlights in this section is de Santillana's discussion of the role of art in the scientific renaissance. His hero is Filippo Brunelleschi (1337-1446), and although Brunelleschi's singular significance is doubted by Crombie, neither Crombie nor the other commentators act with the intent, or effect, of demolishing real enthusiasm.

After an interlude covering teaching of the history of science, about 70 pages are given to the topic science and the French Revolution. In particular, Charles Coulston Gillispie talks about the Jacobin leadership that regarded intellect as the enemy of freedom and "misunderstood science with a particularly damaging moral enthusiasm for nature" (page 268). All this is not a mistake that belongs only to the past; it has too much resemblance to a recurring kind of animosity that politicians direct against science even in our times. One of the interesting details in Gillispie's story is the remark on the French patent law that still retains the spirit of 1791 in favoring mechanical inventors against scientifically informed and acting judges (examiners in our language).

The next 80 pages deal with the law of conservation of energy. Here, even when compared with Thomas S. Kuhn's artful writing and I. B. Cohen's erudition, the best part is Carl B. Boyer's comment. In wit combined with wisdom, he matches the comments made by Richard H. Shryock and Conway Zirkle concerning the next two papers on biology by J. Walter Wilson and John C. Greene.

Chemistry has been allowed only the last 60 pages. This is certainly too little, particularly since Cyril Stanley Smith treats only the structure of metals, and the only really chemical topic is a paper by Marie Boas on the structure of matter and chemical theory.

In the preface, Marshall Clagett admits that science in the 19th century is not adequately presented. The reason he gives for this is weak and should certainly not be guiding when a subsequent symposium on the history of science is organized. In the meantime,

we can be extremely grateful for the present volume. Its rich material is very successfully discussed in thesis and antithesis which bring the subject out in full plastic form. The words that Ernest Nagel used, "Despite my doubts about some points in Father Clark's paper, I cannot conclude these comments without once more expressing my admiration . . ." (page 150), similarly apply to other comments. The authors do not hide their enthusiasm and love for the beauty of their science, and the reader is made to share this feeling with them.

The index, although brief, deserves a special word of praise for its informative value, and so does the National Science Foundation whose grant made it possible to publish this important book at such a modest price.

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Experimental Surgery. Including surgical physiology. J. Markowitz, J. Archibald, and H. G. Downie. Williams and Wilkins, Baltimore, Md., ed. 4, 1959. xii + 931 pp. Illus. \$12.50.

This book covers a wide range of experimental surgery, from the many procedures used in studying gastric physiology to the construction of arteriovenous fistulae, Starling heart-lung preparation, and organ and tissue transplantation. In general, the operative techniques are adequately described, so that one need not necessarily consult original references, and the book may be used as a text and guide by the surgeon making experimental preparations and as a reference source to literature on experimental surgical subjects. The writing is lucid, easy to read and follow, and it is frequently punctuated by quotations, usually appropriate and always interesting and entertaining, from the classics and from popular and current literature.

The book will be extremely helpful to those in experimental laboratories, particularly in those that concentrate predominately on work on dogs. The authors have physiological and veterinary interest and orientation and have presented material pertaining particularly to animals which is not readily available elsewhere. One or two decades ago human physiology was largely based upon such animal work. Though it is still influenced by such work, a