Book Reviews

Archeology

Maya Archaeologist. J. Eric S. Thompson. University of Oklahoma Press, Norman, 1963. 301 pp. Illus. $5.

The author is perhaps the greatest contributor to our knowledge of the ancient Maya culture of Middle America. His new book brings to mind his *Rise and Fall of Maya Civilization* (1954), a prime source for specialists and laymen alike, but it is quite different from the earlier book. In Thompson's own words *Maya Archaeologist* "is not a history . . . but an account of incidents of excavation of the Maya's ancient cities [*sic*] and of contacts with their descendants. . . . the scenes are as I saw them one third of a century ago." The reader is offered entertaining reading that leads him about the Maya area as Thompson recounts the highlights of his numerous journeys into country which has since begun to change profoundly.

Thompson's method of presentation is similar to that of John L. Stephens, whose famous books of a century ago pay much attention to people, customs, and beliefs and to the difficulties of travel in remote areas. Of course, much description of ancient Maya sites and culture, as now known, is worked into the geographically oriented narrative as occasion arises. One is informed as well as entertained, but the data on the Maya are not organized as such. Many a reader will be desirous of knowing more, but there is no bibliography. There are, however, several references in the text to fuller treatments in *Rise and Fall.*

Among specialists on the Maya, Thompson is especially famous for his work on the hieroglyphic inscriptions, not only with the dates and time patterns but also with the many less well-understood noncalendric signs for which he has recently compiled a monumental catalog. A few of these hieroglyphs appear on the cover of this issue of *Science.*

Younger Mayanist readers will probably be surprised at the amount of new raw hieroglyphic material that Thompson discovered. They might note that this was not accomplished with the aid of aircraft and jeeps for travel, or with the help of bulldozers and trucks in moving excavated debris. Possibly one or two may ponder Thompson's remark "Now, with the enormous increase in knowledge, fields of specialization are so narrow that archaeologists are in mortal danger of becoming technicians."

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Heterocyclic Chemistry

Advances in Heterocyclic Chemistry. vol. 1. A. R. Katritzky, Ed. Academic Press, New York, 1963. xii + 476 pp. Illus. $15.

Physical Methods in Heterocyclic Chemistry. vol. 1, *Nonspectroscopic Methods* (358 pp. $12); vol. 2, *Spectroscopic Methods* (410 pp. $14). A. R. Katritzky, Ed. Academic Press New York, 1963. Illus.

These three new books on heterocyclic chemistry, all edited by A. R. Katritzky, add considerably to the literature in this important area.

Volume 1 of *Advances in Heterocyclic Chemistry* is the first of a new series of "Advances in . . .," a literary form that seems destined to spread to all areas of science. The present offering appears to be thoroughly justified, however; the magnitude and relative inhomogeneity of heterocyclic chemistry make it very reasonable to compile a series of advanced essays on special subjects. The particular value of this collection, especially for the American reader, is that all of the contributors are from outside the United States and that they write on subjects which deserve to be better known and for which no other good summaries are available.

S. Gronowitz leads off with a magnificent review of recent advances in the chemistry of thiophenes; he systematically covers the important work of the past 10 years on molecular structure, synthesis, reactions, and reactivity of thiophenes. The contributions made by Gronowitz's own group at Uppsala stand out in this review. R. M. Acheson follows with a clearly written discussion of the curious reaction of nitrogen heterocycles with acetylene dicarboxylic acid and its esters, a fascinating reaction which leads to the synthesis of a variety of other heterocyclic systems. Acheson's own laboratory was largely responsible for the elucidation of this reaction. D. Beke provides a short discussion of the structure of pseudo bases of dihydroisoquinolines, and J. Gut surveys the synthesis of aza analogs of the pyrimidine and purine bases of nucleic acids. W. L. F. Armarego presents a well-organized and thorough discussion of the chemistry of quinazolines. Finally, Katritzky and J. M. Lagowski summarize the methods of studying prototropic tautomerism of heteroaromatic compounds; following the summary they present a specific discussion of the results of these studies in six-membered heteroaromatic rings.

With the exception of a few typographical errors and some incorrect numbering, the book is carefully done. The general organic chemist will find most of these topics somewhat specialized for his taste, but his interest will certainly be aroused by many of them.

The other books are a two-volume set entitled *Physical Methods in Heterocyclic Chemistry.* Volume 1, on nonspectroscopic methods, includes discussions of ionization constants (A. Albert), heteroaromatic reactivity (J. Ridd), x-ray diffraction (W. Cochran), solubility (W. Pfleiderer), dipole moments (S. Walker), and electrochemical properties (J. Volke). Each chapter gives only the briefest introduction to theory and experimental detail and concentrates on assessing the utility of the method in research on the structure and reactivity of heterocyclic compounds. Applications are illustrated by specific examples, and the literature is generally covered through 1961. The book is only partially successful; the

inclusion of a section on heteroaromatic reactivity is curious, since the section does not deal with a physical method at all, but with calculations of electron densities and localization energies. The chapter on x-ray diffraction, which is restricted essentially to the heterocycles present in nucleic acids, is so short that it is of limited value. Perhaps the most valuable chapters are those on ionization constants and polarography and potentiometry; numerous tables of data provide thorough coverage of the most important heterocyclic systems.

Volume 2, on spectroscopic methods, is an extremely well-done and worthwhile volume. Three really first-rate chapters—on infrared (Katritzky and A. P. Ambler), ultraviolet (S. F. Mason), and nuclear magnetic resonance spectroscopy (R. F. M. White)—constitute the bulk of the book. Each is systematic and thorough, with many tables of relevant data; these chapters are sure to make this volume a standby for the many chemists working on heterocyclic compounds. The sections on infrared and ultraviolet spectra in particular are characterized by high-level discussions of the fundamental origins of absoption bands, discussion that is rare in books on spectroscopy for nonexperts. The only error that I noted is an unfortunate mistake in the definition of tau in the chapter on nuclear magnetic resonance. A discussion, necessarily brief, of nuclear quadrupole resonance in heterocycles (E. A. C. Lucken) rounds out a volume that can be highly recommended, a book that every organic chemist would find worthwhile.

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Physiology

Physiological Measurements of Metabolic Functions in Man. C. Frank Consolazio, Robert E. Johnson, and Louis J. Pecora. McGraw-Hill, New York, 1963. x + 505 pp. Illus. $14.50.

In the preface this book is described as a compilation of procedures which have worked satisfactorily in the authors' laboratories. This means that the selection of material was not necessarily based on its physiological importance, and the scope of the book is thus limited.

I should have liked to find more about measuring isotope concentration, more about new types of gas analysis by gas chromatography, spectrometry, and heat conductivity, and a more thorough explanation of Pauling's magnetic oxymetry. On the other hand, several equations seem superfluous, and various passages could have been shortened—for example, the 5-page discussion of an article in which "Weir showed by computation that the energy expenditure can be approximated closely from only two measurements, the volume of the expired air and its oxygen content." This appears less formidable, if one remembers that several generations of physiologists have approximated energy expenditure from oxygen consumption alone and that even beyond the field of bioenergetics this simple estimate, which is based on "Thornton's rule," is still used.

The book seems to be written mainly for instructors who are engaged in training laboratory technicians. It contains very detailed checklists of the apparatus and materials necessary for each measurement described; even notes about where the listed items can be purchased and helpful hints on what pitfalls to avoid are included. But some trivialities, such as "be very careful," should have been avoided. The illustrations are very good. One shows various respiratory valves, whose air resistance is indicated in a plot and a table. The section on preparing anticoagulant solutions and their minimal concentration is bound to be especially useful.

The checklists for materials and the directions for the procedures do not seem to afford much leeway for the instructor's own ingenuity, but the book leaves a lot of opportunity for a teacher to explain principles, to evaluate methods, and especially to clarify the physiological meaning of results. Only rarely do the authors express their own opinions. One such exception is their question at the end of a 27-page chapter that involves nearly 100 references: "Is it possible to measure fitness performance and stress?" The question seems to remain open.

There are several slips that escaped editorial attention, among them, for example, an index given as the sum of a time, a frequency, and a concentration (p. 390) and this statement "If the weight factor had an unusually large volume of extra cellular water . . ." (p. 258). The first sentence on page 1, "The production of heat or energy" conflicts with the law of conservation of energy, which is mentioned on the same page, but could be made to agree with that law by the statement "heat or *other forms* of energy."

Because this book, which is rich in useful detailed information on physiological measurements, is intended as a teaching aid, it is especially important that semantics should be carefully considered.

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Francis Bacon

Francis Bacon and the Modern Dilemma. Loren Eiseley. University of Nebraska Press, Lincoln, 1962. vi + 98 pp. $3.

Loren Eiseley, anthropologist and interpreter of science, invokes the image of a great "statesman and strategist of science" of 400 years ago, Francis Bacon. With ardour and poetry Eiseley rekindles the importance of Bacon's thought and evokes its depth as well as its modern relevancy.

Bacon beheld a world "where the unexpected and coruscating illumination" constitutes our faith in reality, but where the mind of man, "by the help of art," can make "a match for the nature of things." He saw that it was man's destiny "to vex" nature, "not just to live in nature, but to create a new nature." Bacon was "a kind of lens . . . through which thought gathered, was reorganized, and radiated outward again in new forms."

Bacon, one of the first cultural relativists, understood the role of technology even before the tide of industrialization swept across the Western world. The differences of human conditions, he wrote, come "not from soil, not from climate, not from race, but from the arts." Lighting the torches of inductive thinking and empiricism, he drove back the shadows of medieval dogma, posing "a new set of questions to mankind."

At the same time, Bacon foretold the ambiguity of science, both for good and for mischief, and the need for reference to "the uses of life," for which science must be ever "an enlightened servant."

Eiseley, author of such prize-winning books as *Darwin's Century* (1958) and