9-(3-Thienyl)anthracene.—This compound was obtained essentially as was the '2-isomer' above in 80% yield from the corresponding ketone using hydrobromic acid as the catalyst. Recrystallization from absolute ethanol gave an analytical sample as yellow needles, m.p. 122.0–122.5°, which fluoresced green under ultraviolet light.

Anal. Calcd. for $C_{18}H_{12}S$: C, 83.03; H, 4.65; S, 12.32. Found: C, 83.10; H, 4.76; S, 12.06.

The black 1:2 adduct with 2,4,7-trinitrofluorenone melted at 167–168°.

Anal. Calcd. for $C_{44}H_{22}N_6O_{14}S$: C, 59.33; H, 2.49; N, 9.43; S, 3.60. Found*: C, 59.44; H, 2.53; N, 9.38; S, 3.37.

Book Reviews

The Neomycins and Related Antibiotics. By KENNETH L. RINEHART, JR. John Wiley and Sons, Inc., New York, N. Y. 1964. 136 pp. 12 × 18 cm.

The antibiotic neomycin was discovered in 1949 and the fact that its gross architecture and stereochemistry were not completed until 1962 attests to the degree of difficulty this type of problem presents. The chemical and medical literature has desperately needed clarification in the neomycin field due to the large number of similar and identical antibiotics which have been reported throughout the world. To this end Professor Rinehart has done an excellent job and yeoman service in identifying and correlating these substances. It was fortunate perhaps that two closely related antibiotics, kanamycin and paromomycin, appeared on the clinical horizon in the late fifties since techniques used in the degradative procedures of one aided progress in the others.

The book offers many interesting examples in the application of periodate oxidation, Hudson's rotational rules, and nuclear magnetic resonance to the elucidation of oligosaccharide structures. In some instances, however, structures have been postulated by presumptive rather than conclusive evidence but are interesting nonetheless in that they offer the reader a mental exercise in sugar conformational analysis. Of particular interest is the novel use of cuprammonium rotation data to the determination of absolute configuration of monosubstituted deoxystreptamines. A welcome addition to the chemical studies is a chapter on biosynthetic considerations. Although incomplete, it should offer the microbiologist valuable information relative to antibiotic precursor studies.

PARKE, DAVIS AND COMPANY THEODORE H. HASKELL
ANN ARBOR, MICHIGAN

Experimental Chemotherapy. Volume II. Chemotherapy of Bacterial Infections. Part I. Edited by R. J. SCHNITZER and F. HAWKING. Academic Press Inc., New York, N. Y. 1964. xvii + 614 pp. 16 × 23 cm. $23.00. [For a review of Vol. I, see *J. Med. Chem.*, **6**, 825 (1963)].

In almost all fields of chemotherapy the triumphs of the late 1940's and the early 1950's have been dampened by the emergence of drug-resistant organisms, and the flare-up of nearly forgotten infections in less treatable, or even untreatable, forms. Moreover, systemic antibacterial therapy is mostly bacteriostatic rather than bactericidal, and as G. P. and A. S. Youmans put it in the present volume (p. 394), "there is, therefore, a real need for new and more eradicative drugs." This should not detract from the magnificent achievements of the antibiotics and the synthetic antibacterial agents which have contributed so much to increased longevity and healthier living. Nevertheless, the appearance of a new treatise on all aspects of bacterial chemotherapy is a timely event and should guide the investigator to future needs of researches in this field.

The antibacterial dyestuffs, with emphasis on acridine derivatives, are reviewed by C. H. Browning. This section is the only connection to the early history of antibacterial agents in this book. It is to be regretted that space did not permit the inclusion of many other older antibacterial agents which were tried and discarded before the advent of decisively active drugs for a given infection. Many valuable "leads" are stacked away among those forgotten compounds. In a time when radical departures from useful drugs are being sought to overcome problems of bacterial resistance and persistence, some of those old studies may well have been unearthed again.

H. J. Rogers considers the structure and functions of bacteria *vs.* mammalian cells, and derives from these facts theories of action of the sulfonamides and antibiotics which affect the synthesis of the bacterial cell wall. In a well-written chapter, R. Knox discusses theoretical aspects of the strategy and tactics of antibacterial chemotherapy, from serendipity through *in vitro* to *in vivo* requirements. D. J. Kushner writes about the resistance of bacteria to harsh and destructive environmental conditions such as heat, chemical concentrations, radiation, pH, heavy metals, enzyme inhibitors, surfactants, and disinfectants Special topics include the chemotherapy with sulfonamides (L. Neipp) and the pharmacology of these drugs (R. E. Bagdon) the nitrofurans (H. E. and M. F. Paul), topical antibacterial, (R. J. Schnitzer), and therapeutic agents for tuberculosis (G. Ps and A. S. Youmans) and leprosy (P. C. Eisman). These special chapters are searching and critical evaluations of available methodology and the meaning of the procedures, and should satisfy the demanding reader as well as those who look for overall information on one of these subjects.

UNIVERSITY OF VIRGINIA ALFRED BURGER
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Metabolic Inhibitors—A Comprehenisive Treatise. Volume II. Edited by R. M. HOCHSTER and J. H. QUASTEL. Academic Press Inc., New York, N. Y. 1964. xvii + 753 pp. 15 × 21.5 cm. $29.00.

We know that the multitude of natural metabolites in a given "living" system balance each other to produce the "normal" condition of the system. A deletion of one or several metabolites upsets this balance. This situation may remedy itself by the establishment of a new balance in which an induced overproduction of a previously less active metabolite makes up for the deletion of the lost vital factors. Or else, an extraneous chemical, a drug, or an internal chemical arising through an induced physical change of the biochemical environment may restore the upset balance, occasionally upsetting another facet in an undesired side effect. Whatever we insert into a biological system, be it a nutrient or a corrective medicinal agent, will preoccupy enzymes, tie up other natural chemicals, or cause them to react chemically, and thereby temporarily or permanently remove them from the integrated biochemical scene. All these substances are metabolic antagonists. They range from the irreversible inhibitors to the kinetically most unstable antimetabolite systems; they interfere with the biosynthesis of needed metabolites, or compete with the finished product for a reactive site of a macromolecular biocatalyst.

The present volume, the second and the last one in this series, attempts to cover the kaleidoscopic variety of all grades of antimetabolites which have not been discussed in Volume I [see *J. Med. Chem.*, **6**, 828 (1963)]. Expert authors have been chosen for each chapter, and each appears to have done his level best to survey critically, broadly, and with restraint his assigned field about which he knows so much. The editors must have had a hard task coordinating these interwoven and overlapping chapters. Just as even an experienced biochemist will be troubled by the relative lack of specificity of the vast majority of antimetabolites, thus the editors must have suffered from the overlapping of chapters. However, this could have been corrected had the editorial work been done more carefully. To take a specific point, the well-presented chapter on mono- and polyamine analogs by E. A. Zeller is followed by a survey of inhibitors of catecholamine metabolism (T. L. Sourkes and A. D'Iorio) which

repeats (pp. 89–90) some of the facts discussed by Zeller, but in an incomplete and out-of-date way. Obviously, this reviewer is not expert in the 22 different topics which make up this volume, but was left uneasy by this and similar examples of lack of unity and uniformity.

The reader who expects to learn all about the antimetabolites surveyed in each chapter should realize that a two-volume treatise cannot cover a subject which would require 38 monographs for comprehensive coverage. The metabolic inhibitory aspect of each compound has been stressed, justifiedly, at the expense of a general survey. As long as this is kept in mind, the reader will find a wealth of information suggestive of hundreds of new ideas in all fields from biochemistry to special areas of biology and medicine.

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Absorption and Distribution of Drugs. Edited by T. B. BINNS. Foreword by SIR CHARLES DODDS. The Williams and Wilkins Co., Baltimore, Md. 1964. xi + 270 pp. 14.5 × 22 cm. $7.50.

In 1963, the British Association of Medical Advisors in the Pharmaceutical Industry held a symposium on factors affecting the absorption and distribution of drugs. The papers presented on that occasion are collected in this little volume. They range from two superb surveys of B. B. Brodie (physico-chemical factors in drug absorption, and distribution and fate of drugs: therapeutic implications) to such practical matters as chemical (N. J. Harper) and pharmaceutical (K. E. Lees) manipulation and therapeutic efficacy. There are good discussions on physiological barriers, the blood-brain barrier (M. W. Bradbury), and the placental barrier (J. Ginsburg). Several chapters deal with alimentary absorption (D. H. Smyth; J. A. L. Gorringe and E. M. Sproston; J. M. Payne), and others with the absorption of specific drugs like steroids, spironolactone, hypotensive agents, salicylates, hematinics, and chemotherapeutic (especially spiramycin and isometamidium) and amebicidal agents. Thus, the reader will find chapters on fundamental questions of passage through diverse membranes, specific answers to such problems as the absorption of quaternary salts, and new ideas about formulation procedures which might retard or facilitate absorption as the need arises.

Symposia reflect, naturally enough, the opinions of those experts whom the arrangers have been able to persuade to participate. In the present case, both the program chairman and the editor of the volume have done an unusually good job, as a result of which the whole picture of drug absorption has been presented with clarity and detachment. Any pharmacologist, physician, or chemist concerned with problems of absorption will profit from this compact book.

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Interpretation of Mass Spectra of Organic Compounds. By H. BUDZIKIEWICZ, C. DJERASSI, and D. H. WILLIAMS. Holden-Day, Inc., San Francisco, Calif. 1964. xiii + 271 pp. 26 × 19 cm. $8.75.

In addition to its established use in the determination of stable isotopes, mass spectrometry remained for years an analytical tool of the petroleum chemist until Stenhagen, Ryhage, Beynon, McLafferty, and others realized its potentialities in structure elucidation of organic compounds. More recently, Biemann applied mass spectrometry to the structure determination of complex indole and related alkaloids, demonstrating the fact that physical methods can become extremely useful tools in the practice of organic chemistry when an organic chemist himself becomes acquainted with physical methods and learns to interpret physical data available to him through the use of sophisticated electronic instruments.

This statement particularly applies to Djerassi and his colleagues who have been conducting extensive work in mass spectrometry of various classes of organic compounds and are making their own results as well as those of other workers available in the present book. It represents the first one in the series to be followed by "Structure Determination of National Products by Mass Spectrometry," Vol. I, Alkaloids; and Vol. II, Steroids, Sesquiterpenes, etc., the areas in which the Stanford group has made massive contributions.

The detailed consideration of fragmentation patterns as influenced by the presence of various functional groups is projected very clearly and presented with great confidence. A newcomer in the field, however, should not overlook the fact that some spectra are full of pitfalls. The authors warn and caution against lack of discrimination. They also point out several plausible but as yet unproved mechanisms which could be understood better by proper labeling of compounds with isotopes and re-examination of their mass spectra.

The book is lucidly written and its format is attractive. These considerations coupled with a low price make the book a very important addition to the library of an organic chemistry laboratory.

LILLY RESEARCH LABORATORIES NORBERT NEUSS
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The Chemistry and Therapy of Disorders of Voluntary Muscles. By E. G. MURPHY, University of Toronto, with an introduction by G. R. WILLIAMS. Charles C Thomas, Publisher, Springfield, Ill. 1964. xiv + 123 pp. 16 × 23.5 cm. $6.50.

The sheer fact that a clinician, introduced by a biochemist, will write a book on the chemistry as well as the therapy of muscular diseases shows the impact of modern medicinal and biochemical thought on complicated medical problems. After decades of fruitless trials and errors, using every type of drug, vitamin, hormone, amino acid, sugar, and what-have-you, and every mechanical and electrical treatment, a rational scientific approach holds the best promise of success in devising therapies for these crippling and killing disorders.

The introductory chapter sets forth in simple language the known facts about the biochemistry of muscle fibers, contraction, and relaxation. The remaining chapters are devoted to muscle diseases: muscular dystrophy, the myotonias, periodic paralysis, McArdle's syndrome, acute myoglobinuria, polymyositis, myasthenia gravis, and assorted myopathies. In each of these chapters the pathology and any known chemical abnormalities of the disorder are discussed, followed by the almost pitiful methods of treatment available. The small book is a veritable invitation to research on all facets of muscle diseases and is recommended to all those who wish to try their wits in almost virgin territory.

UNIVERSITY OF VIRGINIA ALFRED BURGER
CHARLOTTESVILLE, VIRGINIA

Molecular Pharmacology. The Mode of Action of Biologically Active Compounds. Volume I. By E. J. ARIENS, G. A. VAN OS, J. M. VAN ROSSUM, and A. M. SIMONIS. Edited by E. J. ARIENS. Academic Press Inc., New York, N. Y. 1964. xxi + 503 pp. 16 × 23 cm. $17.00.

This book is an ambitious attempt to present almost all the facets of drug action under one cover. Although monographs on selected topics of chemical pharmacology have appeared in the last 20 years, no serious, critical, and well-documented comprehensive treatment of the whole subject has appeared since Clark's "General Pharmacology" in 1937. There are five major sections: Distribution of drugs in the organism; Drug metabolism; Drug–receptor interaction by (a) one or more drugs with one receptor, and (b) with different receptor systems; and the Relation between stimulus and effect. Each section contains several chapters. Among those in the sections on drug–receptor interaction, for example, are discussions on dose–response curves, competitive, noncompetitive, and "uncompetitive" interactions, chemical antagonism, "functional interaction," affinity and intrinsic activity, receptors, effects of pH and stereoisomerism, etc. Notice that quotation marks have been placed around some of these terms by the reviewer: the Dutch authors are well known for new word creations, and this book abounds with unusual terms. The American reader will recognize many of