ribosomes was determined in 0.50-mL reaction mixtures which contained 0.01 M Tris–HCl (pH 7.2), 0.1 M KCl, 0.004 M $MgCl_2$, 0.01 M NH_4Cl, 13.6 A_{260} units of NH_4Cl-washed *E. coli* ribosomes, 1.2 μM [^{14}C]erythromycin A, and various concentrations of leucomycin or related compounds as indicated. Incubations were performed at 24 °C for 30 min. At the end of the incubation, reactions were stopped by diluting the reaction mixture with 3 mL of cold solution A (0.005 M $MgCl_2$, 0.15 M KCl, and 0.01 M Tris–HCl, pH 7.2). The diluted reaction mixture was filtered through a 25-mm diameter membrane filter (HAWP, Millipore Corp.); the tube and filter were immediately washed an additional three times with 3 mL of cold solution A. The filters were dried under an infrared lamp and radioactivity was determined with a scintillation spectrometer.[10] The concentration of each derivative which produced 50% inhibition of [^{14}C]erythromycin binding to ribosomes was determined as described in previous reports.[3,7]

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Book Reviews

Hormones, Behavior, and Psychopathology. Edited by Edward J. Sachar. Raven Press, New York, N.Y. 1976. xviii + 307 pp. 16.5 × 24 cm. $24.00.

For the last few years, the interrelations between the central nervous and endocrine systems have been intensely studied, and much progress has been made. Evidence is rapidly accumulating that the hormones derived from the brain (pituitary and hypothalamic peptides) and from the outer endocrine glands can exert direct brain effects, which may have behavioral consequences, entirely independent of their endocrine effects. Thus, increasing attention is being paid to the brain as a possible target organ for hormones. The brain, in turn, modulates its own environment inside the body via the pituitary gland. This timely book concerns the effects of hormones on brain function and the influences of the brain and behavior on endocrine function. The 24 chapters were presented at the 65th Annual Meeting of the American Psychopathological Association in March 1975.

The progress in integrating psychiatric and endocrine relations deserves recognition by all investigators involved in planning the therapy of mental diseases and many of the endocrine disorders. The symposium published in this book gathered a selection of topics and authors to illustrate many of the facets of psychoendocrinology.

Studies of the roles of hormones in behavior have been greatly aided by the isolation, purification, and, in some cases, synthesis of hypothalamic, pituitary, and peripheral hormones. Evidence that many of these hormones and their analogues may be psychoactive is presented and discussed. Furthermore, certain fragments and analogues of hormones, practically devoid of endocrine activity, have been shown to affect the brain. The effects of hormones and analogues on the brain have important implications; hormonal defects (with or without endocrine manifestations) may cause neuro- and psychopathology, and hormonal and antihormonal therapy may be applied to neurological and mental illnesses.

This book is a brief but good introduction to behavioral endocrinology. The first nine chapters (143 pp) mostly concern recent studies of psychotropic activities (in animals and man), and potential and experimental psychotherapeutic applications, of hormones and hormone-related drugs. Besides recent experiments, it has been known for a long time that natural, normal, or pathological changes in the endocrine system can effect mood and behavior, and the findings in this area—both old and recent—are reviewed, and their implications are well discussed, in several of these chapters. The next 14 chapters (145 pp) mostly concern the other aspect of the network—the influence of the central nervous system and psychotropic drugs on endocrine functions. The separation of these two types of psychoendocrine relations is only to group the chapters, and the *interdependence* of behavior and hormones is not at all lost sight of. For example, it is theorized that various hormones (e.g., the gonadal hormones) may affect the enzymes involved in monoamine metabolism in the brain; several chapters in the second half of the book concern studies of the roles of monoaminergic neurons in regulating the secretion of hypothalamic and pituitary hormones.

A substantial bonus of this book is that many of the chapters would be good material for medical, pharmacy, nursing, and allied health students to overcome the dichotomous view of mind separate from body. In this context, the final chapter, Dr. Shagass' Presidential Address, titled "The Medical Model in Psychiatry", should be read because it is a gem of an appropriate addition.

Each chapter is carefully written and edited. Some of the chapters are very concise, but all are well referenced. There is a thorough subject index at the end of the book.

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The Juvenile Hormones. Edited by Lawrence I. Gilbert. Plenum Press, New York and London. 1976. 17.5 × 26 cm. x + 572 pp. $45.00.

This volume includes the Proceedings of an International Symposium on the Chemistry, Metabolism, and Modes of Action of the Juvenile Hormones of Insects held at Lake Geneva, Wis., in Nov 1975. Despite the year's delay in publishing these papers, they are still quite up to date since they contain references to numerous papers published in 1975 and refer, in many cases, to original work whose reports are still in press.

Much of the data presented at the symposium have not been published previously, and this book thus serves very well to update Menn and Beroza's "Insect Juvenile Hormones: Chemistry and Action", which appeared in 1972. The volume is subdivided into five sections: I, Chemistry of the Juvenile Hormones and Juvenile Hormone Analogs (four papers); II, Biosynthesis and Metabolism of Juvenile Hormone (five papers); III, Juvenile Hormone Effects at the Cellular Level (eight papers); IV, Juvenile Hormone Effects

at the Molecular Level (Binding and Transport) (five papers); V, Effects of Juvenile Hormone at the Molecular Level (Protein Synthesis) (seven papers). Each section is preceded by an excellent summary of the papers presented in that section; these were provided by the section chairmen and are critically treated in some cases. Of special interest to those concerned with insect control is a paper by Bowers on the chemical nature and action of two antijuvenile hormones ("precocenes I and II") isolated from the plant *Ageratum houstontonianum* which induce precocious metamorphosis.

Approximately 25% of the volume is devoted mainly to the actual isolation, synthesis, and biosynthesis of insect juvenile hormones and their mimics, with the remaining 75% covering their biological effects on a variety of insect organisms. It is somewhat unfortunate that color photographs and plates illustrating biological effects were not included, but these would have necessitated a significant increase in the price of the volume.

In summary, this volume serves the valuable purpose of "bringing together the most recent research on the chemistry, physiology, and biochemistry of the juvenile hormones of insects."

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Marihuana: An Annotated Bibliography. By C. W. Waller, J. J. Johnson, J. Buelke, and C. Turner. Macmillan, New York, N.Y. 1976. xii + 560 pp. 18.5 × 25.5 cm. $13.95.

This comprehensive, annotated bibliography is meant to serve researchers and persons interested in the technical literature on marihuana. It contains 3045 entries covering the international scientific publications since 1964. The author and subject indexes are carefully prepared with reference to annotation numbers. The subject index has been arranged by main topics and subtopics to assist in finding the desired reference.

Researchers associated with this field should consult this volume and will find it a useful and readily available source of information.

Staff Review

Pharmacology of Marihuana. Volumes 1 and 2. Edited by M. C. Braude and S. Szara. Raven Press, New York, N.Y. 1976. xviii + 865 pp. 16 × 24 cm. $50.00.

This two-volume set represents the proceedings of an NIDA sponsored meeting held in Savannah, Ga., Dec 3–6, 1974. It is a compilation of the work to that date of many workers in marihuana research mainly in the United States but also from some other countries including Israel, Sweden, and Great Britain. As such, it is a valuable edition for the library of any researcher working in this area. It is regretable that it took almost two years to be published. There are nine sections which deal with background, chemical and metabolic aspects, cellular, autonomic, and neuropharmacological effects, behavioral pharmacology, long-term effects, genetic effects, and therapeutic effects. The preliminary section on the background is made up of short articles by leading scientists at NIDA and outlines the history and reasons for government involvement in marihuana research. These chapters provide a refreshingly open-minded view of the whole subject. Section IX, which deals with the therapeutic aspects, is probably the most interesting section for the medicinal chemist and evidence is presented showing a real potential for marihuana in some areas, e.g., glaucoma. No mention is made of the newer synthetic heterocyclic analogues, but this subject is beyond the scope of the book.

The book does not attempt to solve the problem of whether marihuana is safe or not but does present factual evidence on the actions and toxic effects of the drug. The long-term effects of marihuana in clinical and preclinical studies are presented in Section VII and effects on genetics and reproduction in Section VIII. The reader may draw his own conclusions on the safety of the drug from these sections. The book is well set up and nicely indexed and is recommended to anybody seriously interested in the facts about "pot".

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The Alkaloids. Volume 6. M. F. Grundon, Senior Reporter. Specialist Periodical Reports. The Chemical Society, London. 1976. x + 310 pp. £19.5.

This annual publication attempts to review the literature on the chemistry of alkaloids which has been published between July 1974 and June 1975. M. F. Grundon is the Senior Reporter of this volume. All classes of alkaloids are surveyed except the Amaryllaceae, *Erythrina*, imidazole, purine, and peptide alkaloids. The opening chapter, by R. B. Herbert, reviews the papers relating to the biosynthesis of alkaloids, classifying them according to the heterocyclic rings they contain (structure 5, p 5, for nicotelline is incorrect). Several nitrogen-containing microbial products (α-cyclopiazonic acid, gliotoxin, actinomycin, ansamycins, penicillin, prodigiosins) are also "claimed" as alkaloids. The rest of the chapters are concerned with the isolation, structure elucidation, and synthesis of the following types of alkaloids: pyrrolidine, piperidine, pyridine (A. R. Pinder); tropane (G. Fodor); pyrrolizidine (D. H. G. Crout); indolizidine (J. A. Lamberton); quinolizidine, quinoline, quinazoline, acridone (M. F. Grundon); β-phenethylamines and isoquinolines (N. J. McCorkindole); aporphines and related compounds (e.g., aristolochic acid), indoles (J. E. Saxton); lycopodium (W. A. Ayer); diterpenoids (S. W. Pelletier and S. W. Poye); steroids (F. Khuong-Huu, R. Goutarel, and D. M. Harrison).

The book is expensive, even with the current devalued state of the English pound. In using this book and the previous ones in this series, I miss not having a subject index.

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Trace Amines and the Brain. Volume 1. Psychopharmacology Series. Edited by Earl Usdin and Merton Sandler. xiv + 301 pp. 16 × 23.5 cm. $29.75.

This book consists of papers from a conference on brain micro or trace amines. Although a small minority of nerve endings in the mammalian brain utilize the classical monoamine transmitters (dopamine, norepinephrine, and serotonin), the trace amines are present at even lower concentrations than the transmitter monoamines and could not be measured accurately until recently. These amines (tyramine, octopamine, phenylethylamine, phenylethanolamine, and tryptamine) are thought to be formed because of the ubiquity and relative lack of substrate specificity of aromatic amino acid decarboxylases. The microamines have behavioral effects when administered in high doses and have been shown to act presynaptically to release endogenous neurotransmitters. Whether any may function as synaptic transmitters themselves is unclear.

Many of the papers are surveys of regional content of the various amines. The paper by Molinoff and Buck includes not only measurements of octopamine but also shows that it can be released from splenic nerve by nerve stimulation suggesting that octopamine is a naturally occurring "false transmitter" in the sympathetic nervous system. Goldstein et al. present not only quantification of PNMT (phenylethanolamine *N*-methyltransferase, the enzyme which makes epinephrine from norepinephrine) activity but also immunohistochemical data indicating the location of this enzyme in nerve cells. Epinephrine, although present in brain at a concentration similar to that of the microamines, belongs in a different category because it is an established transmitter in the periphery and is produced by a specific enzyme. The lack of histochemical and cellular localization for the microamines contributes to our poor understanding of their function, although it is known that tyramine content decreases after denervation, suggesting that it is concentrated in nerve-like octopamine. Several papers stress the sensitivity of these mi-

croamines to deamination by the enzyme monoamine oxidase (MAO), an area of current interest because MAO activity in human blood platelets may correlate with susceptibility to some forms of mental illness [*Science*, 194, 339 (1976)]. The microamines enter brain more readily from blood than do the classical transmitter monoamines, so a decrease in peripheral MAO could permit greater delivery of behaviorally active substances to the brain.

Several papers refer to the now-discredited concept of methyltetrahydrofolic acid as a methyl donor for methylation of brain amines [*Life Sci.*, 19, 625 (1976)]. Furthermore, the symposium suffers from a failure to distinguish between pre- and postsynaptic effects of these amines. None of the papers mention the volatile amines (dimethylamine, piperidine, etc.) found in brain at concentrations exceeding those of the microamines [*Anal. Biochem.*, 48, 460 (1972)]. Although the microamines are now less topical than the rapidly expanding area of peptide neurotransmitters, many questions in this area have not been resolved and it is likely that microamines may be relevant to human diseases including migraine, psychoses, and Parkinsonism. This book is somewhat dated but will be useful for reference.

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Lectures in Heterocyclic Chemistry. Volume 3. Edited by R. N. Castle and M. Tisler. HeteroCorporation, Orem, Utah. (Supplement to *J. Heterocycl. Chem.*, Vol. 13.) 139 pp. 21.5 × 28 cm. $12.00.

This volume contains the invited lectures presented at the Fifth International Congress of Heterocyclic Chemistry, held in July 1975 at Ljubljana, Yugoslavia. It contains work by internationally recognized leaders in the field and should have interest for all organic chemists whose interests impinge on heterocyclic systems. Medicinal chemists will be especially interested in the review by A. K. Bose and M. S. Manhas on β-lactam antibiotics, in the work of Yoshio Ban on alkaloid total synthesis, and in the work of R. B. Moffett on new benzodiazepine analogues. Mechanistically inclined chemists will find the chapters on ring cleavage of pyrimidine derivatives (J. Clark), on rearrangements of unsaturated amines (A. Lattes), and on intramolecular substitution and addition reactions of alcohols (M. Lj. Mihailovic) of interest to them, while those whose interests are in structural work may find the chapters on aziridines and azetidines (N. Cromwell), aromatic boron-containing heterocycles (S. Gronowitz), new heterocyclic conjugated π-electron containing systems (K. Haffner), and organometallic compounds as reagents in heterocyclic chemistry (A. Marxer) to be the most noteworthy. There is, in this book, something for everyone, whether heterocyclic chemist or practitioner in another area of organic chemical research. In general, the book is well produced, although sometimes the tendency to reproduce slides from lectures and meld them to the text leads to confusion. The book will be consulted by a large number of chemists.

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Alicyclic Chemistry. Volume 4. W. Parker, Senior Reporter. Specialist Periodical Reports. The Chemical Society, Burlington House, London. 1976. v + 511 pp. 13.5 × 21.5 cm. £27.50, $75.75.

This volume provides a review of the literature during 1974 of the chemistry of saturated carbocyclic compounds. The coverage is divided according to the ring size. The chapters are further subdivided into a consideration of structural theory, synthesis, and reactions of the alicyclic rings. The discussion is divided into four chapters on Three- and Four-Membered Rings, Five- and Six-Membered Rings, Medium and Large Rings, and Bridged Carbocyclics.

There are no extensive discussions of topics specifically slanted toward the interest of the medicinal chemist, although two sections on prostaglandin syntheses, the syntheses of three types of novel steroid derivatives, and the preparation of several nitrogen heterocycles are described. Numerous new reactions are described and provide exciting approaches for synthetic problems. A new method of preparation of seven-membered rings from methyleneoxiranes and -dienes is described on p 180. The formation of several bicyclic systems from *N*-nitroso lactams (p 411) also provides an interesting new procedure for syntheses.

The review contains more than 2150 references and has a convenient table of contents and author index but lacks a subject index. It is still a valuable reference source.

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Antimetabolites of Nucleic Acid Metabolism. Second Edition. By Peter Langen. Translated by T. A. Scott. Gordon and Breach, New York–London–Paris. 1975. xii + 273 pp. 17 × 24 cm. $23.00.

This is the second edition of a work of proven value first published in 1967. The author has retained the original format of a large first section dealing with fundamental and general aspects of antimetabolite action, followed by a much smaller special section devoted to brief specialized consideration of individual agents. In this reviewer's opinion such an approach has great merit in that principles of chemotherapy can be considered without being unduly cluttered with details.

The general section begins with an outline of the special features that distinguish antimetabolites from other cytotoxic drugs, the principles of inhibitory enzyme kinetics, and a list of enzymes that are inhibited by antimetabolites. This is a useful chapter for students and those new to cancer chemotherapy. Next there follows a discussion of incorporation of analogues into nucleic acids and the biological repercussions in terms of radiosensitization and effects on protein synthesis. The tables presented here summarize a mass of data that is otherwise quite widely dispersed throughout the literature. In my view this chapter is the most valuable in the book for workers in basic areas of cancer chemotherapy, especially those interested in multimodality approaches. In the chapter on resistance, the various biochemical mechanisms are dealt with in workman-like fashion with most emphasis on loss of lethal synthesis. Here I feel more attention should have been paid to other mechanisms, and it would have been of value to discuss the role of combination chemotherapy in attempting to avert the development of resistance. Degradation of antimetabolites forms the topic of the next chapter and is dealt with in adequate fashion. The final general chapter on biochemical problems associated with the use of antimetabolites is a heterogeneous presentation. It includes biochemical factors in selectivity and sensitivity, design of antimetabolites with emphasis on active-site-directed irreversible inhibitors, cell cycle kinetics, fractional kill, principles of combining cell cycle specific and nonspecific agents, and host protection by administration of normal metabolites. The treatment of the combination of cycle specific and nonspecific agents is probably the best to be found anywhere, and it is a pity the author did not extend this quality approach to other aspects of combination chemotherapy.

The special section includes a variety of agents, many quite unfamiliar. Since most of the major drugs have already been liberally treated as examples in the discussion of general principles, their presentation in this section is appropriately brief. Minor agents are represented by their formulas and a few references detailing their antitumor effect and biochemical mechanism of action. The chief use of this section will be as a reference source.

There is an appendix that presents the biochemical pathways for purine and pyrimidine biosynthesis, 1940 references and 13 pages of supplementary information, and recent results published after the main text was written.

I believe this book will be of value to those working in the broad area of cancer chemotherapy, including clinicians interested in the basis for such therapy and radiobiologists involved in drug-radiation interactions. The translation appears to be ex-

cellent and the book is generally very readable. A spot check reveals, however, that there are numerous errors in the voluminous bibliography, principally in connection with names of authors.

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Advances in Cyclic Nucleotide Research. Volume 7. Edited by P. Greengard and G. A. Robison. Raven Press, New York, N.Y. 1976. 16 × 24 cm. x + 292 pp. $25.00.

The number and variety of biological processes in which cyclic nucleotides have been implicated continue to increase at an undiminished rate. This "Advances..." series has been an excellent source of reviews of the various facets of cyclic nucleotide research. This volume contains seven well-written reviews on the role of the cyclic nucleotides in bacteria (Peterkofsky), the control of cell aggregation (Gerisch and Malchow), the cell cycle (Friedman, Johnson, and Zeilig), interconvertible enzymes in adipose tissue (Steinberg), gastric secretion (Jacobson and Thompson), and phosphodiesterase mechanisms (Chasin and Harris). The chapter on cyclic nucleotide immunocytochemistry (Steiner, Ong, and Wedner) summarizes the developments and techniques of this method and presents some beautiful color plates of cAMP and cGMP immunocytochemical localization in rat liver. Although probably a reflection of its research status, cGMP does not seem to merit as much attention as is given to cAMP in these review articles.

It has become virtually impossible to remain abreast of all the advances in this field so this book, like the others in the series, offers a method to researchers to keep aware of current information. These are the goals of the review articles and they are successfully met. These chapters do not, however, offer any type of introduction to the field for those to whom it is unfamiliar territory. In addition, each chapter attempts to review only recent research and thus is not encyclopedic in scope. Nonetheless, the information contained in this volume can be applied to specialized fields of interest and will bring the fields under discussion up to date.

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Progress in Drug Metabolism. Volume 1. Edited by J. W. Bridges and L. F. Chasseaud. Wiley, New York, N.Y. 1976. xiii + 286 pp. 15 × 22.5 cm. $24.00.

This volume is the first of a new series, "Progress in Drug Metabolism", concerned with newer developments, progress in established areas, and review of disseminated literature on particular subjects. In the present work, advances in certain fundamentals of drug metabolism have been thoroughly reviewed in a readable fashion. Background material is quickly provided to allow the novice as well as the expert to enjoy each chapter. The first chapter, "Newer Developments in the Mass Spectrometry of Drugs and Metabolites" (B. J. Millard), discusses mass fragmentography, stable isotopes, and recent methods of sample ionization. The second chapter, "Bioactivation and Cytotoxicity" (T. A. Connors), begins with alkylating agents and proceeds to unfold the story of the pursuit of selective anticancer agents. Through the description of these compounds, certain of the principles involved with the design of prodrugs in general are highlighted. The third chapter (R. C. Garner) addresses the topic of metabolic epoxidation and its role in carcinogenesis, an area of considerable renewed interest. The final two chapters deal with enzyme induction (J. Hunter and L. F. Chasseaud) and plasma protein binding (J. W. Bridges and A. G. E. Wilson). While providing ample reference to preclinical studies, their emphasis is at the clinical level making both chapters somewhat unique and particularly relevant.

Since each review is heavily referenced, the inclusion of both an author index and subject index to the volume is an asset. This book should be an enjoyable and informative reading experience for anyone interested in drug metabolism and offers fine promise for the new series.

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Essentials of Medicinal Chemistry. By Andrejus Korolkovas and Joseph H. Burkhalter. Wiley, New York, London, Sydney, and Toronto. 1976. vii + 697 pp. 15.5 × 23.5 cm. $22.50.

According to the authors of "Essentials of Medicinal Chemistry", the book is to serve to "conduct the student of pharmacy from basic chemistry over a bridge of medicinal chemistry to pharmacology". They go on to state that "Succinctly stated facts which hopefully will be palatable yet provide information useful to the student...". The authors concede the absence of preparative methods and recommend the Merck Index as a source for the student wishing to know more of chemical methods relating to drugs. This is a somewhat misleading suggestion since the Merck Index itself does not contain descriptions of chemical methods but only references to the literature where procedures may be found.

Apparently the whole field of medicinal chemistry is treated in this text. The material is organized into eight parts, which are further subdivided into a total of 42 chapters. The eight major sections are labeled: introduction, drugs acting on the central nervous system, drugs stimulating or blocking the peripheral nervous system, drugs acting on the cardiovascular, hemapoietic and renal systems, chemotherapeutic agents, vitamins, hormones, and miscellaneous agents.

There are some strange ideas of emphasis in the book. Probably the best chapter in the volume is the one on antimalarials to which 20 pages are devoted, whereas the whole topic of drug metabolism is covered in about 3 pages of text. However, the major faults of this book are, first, the essentially superficial treatment of many vitally important subjects and, second, the numerous errors of omission and commission. A few illustrative examples follow.

(1) Several figures in the text purport to show the genesis of drugs from a major prototype. In one of these (Figure 2.2, p 17) alphaprodine, whose discovery date is given as 1937, is shown to be derived from morphine. In fact, alphaprodine was first described in a patent issued about 1950 and then appeared in the chemical literature in 1957. It was designed as a reverse ester of meperidine, the first totally synthetic strong analgesic introduced into medicine. Meperidine, which is not even shown in Figure 2.2, was prepared prior to World War II and was not designed as an analgesic at all. It was only after its pharmacological properties were recognized that its chemical similarities to morphine were appreciated.

(2) Figure 2.6 (p 24) is intended to show how the introduction of bulky groups converts agonists to antagonists. In some of the examples (e.g., histamine and diphenylpyraline, norepinephrine and moxisylyte) the chemical similarities between the agonists and antagonists are difficult to discern. An outstanding exception to this bulk concept is not mentioned, namely, morphine and its antagonist nalorphine.

(3) On p 27 the authors show a nitrogen mustard alkylating agent furnishing an aziridinium ion, which is fine, but then they have it open to give a *primary* carbonium ion prior to attacking nucleophiles.

(4) On p 33 the authors discuss chemical modifications which tend to prolong the action of drugs and cite as an example the conversion of cortisone to prednisone. They fail to mention either there or in the section on steroids that prednisone is a more potent antiinflammatory agent than cortisone without a corresponding increase in mineralocorticoid activity.

(5) On the next page the authors give the impression that alkylating agents such as uramustine (uracil mustard) and melphalan (phenylalanine mustard) localize in target tissues. On p 40 they point out that alkylating agents "lack desired selectivity."

(6) The discussion of the mode of action of α-methyl-Dopa is

confusing (p 37). The authors allege that the drug owes its antihypertensive action to its ability to inhibit Dopa decarboxylase, a statement of highly questionable accuracy. They then state that it yields α-methyldopamine which "may act as a false transmitter." Not only do the authors not define what a false transmitter is but they neglect to resolve the apparent paradox of how α-methyl-Dopa, an apparent inhibitor of Dopa decarboxylase, can itself be decarboxylated to α-methyldopamine. Later on (p 241) they state that α-methyl-Dopa acts as a preferential substrate (of what enzyme?) thus decreasing catecholamine biosynthesis—another dubious statement—and finally on p 267 they point out that α-methyldopamine is a substrate for dopamine α-hydroxylase to give α-methylnorepinephrine which is also called a false transmitter.

(7) Equally confusing is the diagrammatic representation of the intercalation process (Figure 3.1, p 60). The authors do not define intercalation and it is puzzling why the authors did not use Lerman's model or several others available in the literature to illustrate the process. The diagram suggests that drugs can intercalate between successive base pairs, which is not true. The relationships of mitomycin to DNA as shown in this diagram are misleading. One can easily get the impression that the drug alkylates the backbone rather than the bases of DNA.

(8) On p 68 the authors state that isofluorophate is a noncompetitive inhibitor of cholinesterase. On p 218 they state that it phosphorylates the serine hydroxyl group of the enzyme but is not truly irreversible "as will be seen later". They do not indicate when "later" is nor do they explain what they mean by not truly irreversible.

(9) On p 73 there is a diagram showing DNA replication and its relationship to RNA synthesis and protein synthesis. Interspersed are markers showing steps that are inhibited by various drugs. The absence of highly significant details from this scheme makes it difficult to understand the processes involved. It is not clear from the diagram what some of the abbreviations are or what the steps in protein synthesis are. They have a figure labeled 30S and 50S and do not even call this a ribosome! Terms such as translation, translocation, etc., are bandied about, but these are not defined. On pp 532–535 inhibitors of protein synthesis are discussed but again the authors fail to define such terms as A site and initiation phase. They state that puromycin and chloramphenicol are mutually antagonistic but they do not show clearly their interrelationship or how each interferes with protein synthesis. Earlier (p 531) antibiotic inhibitors of nucleic acid biosynthesis are discussed but the biosynthetic pathways of these important macromolecules are not presented.

In one of the numerous tables (p 550) they list 5-fluorouracil and 5-FUDR without mentioning in the text that 5-FU is metabolically converted to 5-FUDR which is a potent inhibitor of thymidylate synthetase.

(10) In the discussion of nicotinic receptors (p 224) the authors state that "the essential structure of nicotinic agents is a quaternary ammonium group on a carbonyl group." Of course, neither of these features is present in nicotine itself, whose formula is shown on the next page. In the same section they classify strychnine as a nicotinic agent (which ought to surprise some pharmacologists), yet earlier (p 188) they call the alkaloid a spinal cord stimulant.

(11) In their very brief discussion of drugs acting on trematodes the authors list five but neglect to mention that four of these are schistosomicides while the fifth is not. They state categorically that the anthelmintic action of lucanthone and hycanthone is due to their intercalative properties but all available evidence suggests that this is not the case. They omit mentioning that hycanthone is the active biotransformation product of lucanthone.

With the exception of the chapters in Part One, almost all the others have one or more tables listing drugs having the activity discussed in that particular chapter. These tables list the official, proprietary, and chemical names as well as structures for each of the drugs. Of the total of 16 pages in the chapter on analgesics more than five are devoted to tables of this sort. Almost half the chapter on anticholinergics consists of tables. Another waste of valuable space are the thumbnail descriptions of various drugs scattered throughout the book. Color, crystallinity, solubility, utility, and side effects are briefly summarized. It seems to this reviewer that the space devoted to material of this nature could be put to far better use correcting errors of omission as indicated above.

Finally a comment on the indexing is in order. There are three indexes: one is devoted to drugs in the fourteenth National Formulary, another to drugs in U.S.P. XIX, and the third is a general index. Dactinomycin is listed in the second index but not the third and puromycin which is also discussed in the text is not listed at all, as is the case of strychnine, despite the fact that its structural formula is shown once on p 188 and again on p 221.

It is difficult to make the customary recommendation that this book deserves to be a part of the library of medicinal chemists or their institutions.

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Immunopharmacology. Edited by Marvin E. Rosenthale and Herbert C. Mansmann, Jr. Spectrum Publications, Holliswood, N.Y. 1976. 332 pp. 16 × 23.5 cm. $25.00.

This book consists of the proceedings of a 2-day conference on immunopharmacology held in Jan 1975. It is divided into four parts, of which the first two provide a description of the effects of several agents on various immunopathological pathways that are considered to be amenable to therapeutic intervention and a review of the applicability of some animal models used in the search for new drugs. The remaining parts summarize the clinical utility of a number of agents, largely of the classical immunosuppressive type, in transplantation and in the treatment of rheumatoid arthritis, cancer, asthma, and dermatologic disorders.

The rapid publication of symposia proceedings frequently serves a useful purpose because important new information is not only disseminated quickly but also is presented within the framework of a unified theme that allows the reader to more adequately appreciate the significance of the subject matter. Unfortunately, this is not true in the present case. Much of the material either is not new or will prove to be of little interest to the medicinal chemist.

An excellent review of the role of lymphokines in mediating delayed hypersensitivity reactions is presented. However, no equally adequate discussion of immune complex mediated phlogistic phenomena is offered despite the remarkable progress that has been made in understanding the pathogenesis of these reactions. Similarly, while there are a number of reviews relating to areas such as the possible functions of serine esterases in cell activation, prostaglandins in immune processes, kinins, and histamine as a modulator (not mediator) of immediate hypersensitivity reactions and cell mediated immunity, there is little or no mention of topics such as complement, lysosomal enzymes, and anaphylactic mediators, all of which the medicinal chemist might find to be both more informative and substantive in nature. The descriptions of several screens used to identify potential new drugs and the pharmacologic profiles of some new and not-so-new agents are good, but some of these contributions duplicate similar reports published elsewhere.

Despite the suggestions of several authors that numerous new immunoregulants may shortly be forthcoming, progress in immunology and, particularly, in the identification of novel agents operating through highly specific, noncytotoxic mechanisms has not been rapid. In fact, if this symposium were held today most of the clinical material presented would pertain again to the use of drugs such as steroids, azathioprine, cyclophosphamide, and methotrexate in the treatment of various diseases.

The text is plagued by a profusion of spelling errors, omissions, unclear reference listings, and misassigned page numbers in the table of contents. Therefore, for numerous reasons, this book cannot be recommended as a worthy addition to the medicinal chemist's bookshelf.

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