REVIEW OF REVIEWS[1]

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Documentation of scientific material is now a major problem in the great nations; no longer can it be handled by a single person or private group. The American Medical Association stopped publishing *The Quarterly Cumulative Index Medicus,* and the National Library of Medicine assumed responsibility for indexing part of the flood of medical reports in the mechanized monthly, *Index Medicus* (New Series, Volume 1, No. 1, January, 1960). Time was (about 1865) when one man, John Shaw Billings, could confidently undertake to catalogue and index the whole of past and current medical literatue. That he did so successfully for so long is testimony to his own skill and persistence, and also to the relative trickle of medical publications during his time. It now takes many experts to cope with the flood. How can we find what is known and where?

In pharmacology the very large number of chemicals studied for their interactions with living material greatly complicates the problem of documentary control. In 1959 over 350 new drugs and drug mixtures were released for prescription use by the Food and Drug Administration of the United States Department of Health, Education, and Welfare. How can we digest the information available on them? The new *Index Medicus* may aid by indexing pharmacological information applicable to the health professions, but it does not index all reports in this field. Abstract services are also incomplete and highly selective, although *Chemical Abstracts, Biological Abstracts,* and *Excerpta Medica* fairly well cover the significant pharmacological reports. Patent literature on new drugs is bewildering, but is covered in part only in *Chemical Abstracts.*

There is now growing interest in critical reviews of pharmacological information, especially that dealing with drug types and mechanisms of action. *Physiological Reviews* started this trend in 1920. *Pharmacological Reviews* has well provided critical reviews since 1949. *The Journal of Pharmacy and Pharmacology* also offers useful reviews of pharmacological reports. Sometimes valuable reviews of pharmacological interest appear in *Science, Endeavour, The American Scientist,* and even in the more popular *Scientific American.* Similar reviews are to be found in *Arzneimittelforschung, Experientia,* and in clinical periodicals such as *The Journal of the American Medical Association.*

A significant indication of the growing importance of the reviewing effort is the increasing number of, and attendance at symposia at which recognized pharmacologists in a special field report and criticize each other's findings. The New York Academy of Sciences has sponsored many

[1] The survey of the literature pertaining to this review was concluded in July, 1960, and covers, generally, the preceding three years.

such symposia of pharmacological interest. A helpful new development is the publication of such symposia with critical discussion. This has gone further to the publication of volumes covering reports given at special conferences called by interested drug manufacturers on some particular new drug. Here can be brought together in one place all the available pharmacological information on the new drug, together with a critical analysis of its possible clinical applications or usefulness.

Publication of reviews, symposia, and conference proceedings is the best method now current for effective interscience communication. It is pertinent to suggest that, as this communicative activity increases, library workers in the experimental sciences may acquire as significant a status as the contributing laboratory workers themselves.

In one sense, textbooks in pharmacology comprise more or less comprehensive reviews of the whole field as it appeared at the date of issue. More detailed are the specific reviews in *Handbuch der Experimentallen Pharmacokolgie*. Beckman's *Yearbook of Drug Therapy* (**7**) is an excellent critical survey.

Special comment is deserved by *Pharmacological Reviews*. Started hesitatingly in 1949, after having been suggested more than a decade earlier, it now offers orientation in major areas of current pharmacological interest. Material in *Pharmacological Reviews* is selective, and invitations are sent to those considered to be competent to prepare the proposed reviews. Invitation reviews reflect the compromised interests, biases, and prejudices of the editors. In all of this, as in editing any scientific journal, there is danger of an insidious growth of an acceptable and conventional canon. This could be a threat to scientific freedom as the power of fund-granting agencies increases. *Pharmacological Reviews,* thanks to the scientific integrity of its editors, seems to have avoided this hazard so far. Now *Annual Review of Pharmacology* comes to help pharmacologists keep abreast of important advances in their science. The value of this extensive review effort depends on the extent of critical appraisal of data and conclusions as shown by individual reviewers.

Reviews of Basic Pharmacological Problems

The most general review of pharmacology's current status as a science is the effort by Leake (52) indicating the five historically characteristic scientific problems with which pharmacology deals and which are peculiar to it as an independent discipline: (*a*) dose-effect relationships; (*b*) the relation of absorption and distribution of chemicals in living material to their metabolism in and removal from this living milieu; (*c*) localization of the site of action of chemicals on living material; (*d*) mechanisms of drug action; and (*e*) relations between chemical constitution and biological action. This review included a consideration of the growing applications of pharmacology not only in the health professions, but also in agriculture, sociology, warfare, and law. It also contained a historical bibliography.

A current pharmacological problem of increasing interest concerns the

long known, but little studied placebo effect. A comprehensive and detailed review, which includes 1063 references, has been made by Beecher (8). This review is in two parts: the first part deals with the measurement of pain as a prototype for the study of subjective responses, and the second part considers the quantitative study of the effects of drugs on various subjective states. As Beecher suggests, studies in these fields are basic to the behavioral sciences. It might be pertinent then to use projective psychological tests, now so skillfully quantified by Harrower (40), as an adjunct to methods used to investigate subjective and emotional factors in the effects of drugs.

Beecher had previously reviewed the problem of the measurement of pain (9). Wolf (95) has more recently analyzed the pharmacology of placebos, detailing the technique and pitfalls of "double-blind" testing, and attempting correlations with interpersonal relations between subjects and service personnel, emotional and physical conditioning, and the general ecological milieu.

Waife & Shapiro (86) have edited a comprehensive survey of factors involved in the clinical evaluation of new drugs which considers general pharmacological principles, experimental design, the appraisal of subjective responses, the ethics and methods of human experimentation, the training of the investigator, clinical trials in practice, illustrative material from various medical specialties, and publication. Much of this is now stereotyped conventionality, but it remains basic for successful clinical pharmacology. The general principles were outlined years ago. Many remain honored in the breach, among them are (*a*) the ratio of the rates of absorption and distribution of the drug through the body to the rates of its disappearance from the body, (*b*) time-concentration relations, and (*c*) elementary dose-effect relations, especially between doses necessary for effectiveness and those which may cause unwanted toxic reactions in sensitive patients.

Absorption, Distribution, Metabolism, and Excretion of Drugs

An interesting review offering suggestions about placental transmission of chemicals has been made by Hagerman & Villee (36) in considering the transport function of the placenta. Renal tubular excretion of organic bases has been well reviewed by Peters (65). Active transport is involved with strong bases, whereas excretion of weaker bases varies inversely with urinary pH. Sperba (79) analyzed the factors concerned in the secretion of organic anions in the formation of urine and bile. Tobian (82) surveyed the interrelationships of electrolytes, juxtaglomerular cells, and hypertension.

A significant recent review on drug metabolism is that made by Young & Maw (96) on the metabolism of sulphur compounds. From a detailed, biochemical discussion, this well-organized little volume goes on to a consideration of various sulphur-oriented drugs. In the symposium on catechol amines, edited by Krayer (50), there are several short reviews on their metabolism and excretion.

Drugs Used in Diagnosis

It is not always appreciated that chemical agents which are used as diagnostic aids are really drugs and, thus, may have unexpected effects on living material when attention is focused merely on their diagnostic use. A symposium on radiopaque diagnostic agents has been held under the auspices of the New York Academy of Sciences, and the proceedings of this symposium have been edited by Poppell (69). Most radiopaque diagnostic agents contain iodine, which by its density affords radiographic contrast. It is the iodine in these compounds which contributes so greatly to the expense involved, and it is also the iodine that may contribute to the toxic effects.

An excellent review of radiopaque diagnostic agents is given by Knoefel (49). Citing over 400 references, this covers much relevant data on physical and optical factors in the interrelations of chemical compounds and x-rays with detail on various types of compounds in regard to visualizing the alimentary tract, the biliary system, the urinary system, the circulatory and respiratory systems, the spinal-subarachnoid space, the genital tract, and the reticulo-endothelial system. Miscellaneous procedures are indicated and toxicity is examined with special care.

Chemotherapy

Perennial interest in amebiasis is reflected in a review by Anderson of newer drugs for handling the disease (2). This well supplements his review of a decade ago. Newer agents are glycobiarsol [N-(2,4-dichloro benzyl, N-2-hydroxy ethyl)-dichloracetanide], a related compound [5,6-quinone-4,7-phenanthroline], and dipiperonyl derivatives. Pharmacological details are not readily available on many of these agents: judgment seems to be made chiefly on empirical clinical observations. Even here there seems to be little data on comparisons with such still widely used drugs as carbarsone and vioform which were introduced three decades ago.

That there is also continued interest in antihelmintics is clear from the survey by Brown of their actions and uses (16). Although effective drugs now seem to be available for all worm infestations, it is to be expected that efforts will be made to find even safer and more active antihelmintics.

Although a tremendous screening program is under way on antitumor drugs, no review of what is being accomplished has appeared. This is not surprising: the "crash" effort at the chemotherapy of cancer is as wild as hunting for honey in a hayfield; the methodology is about the same as Ehrlich's 60 years ago. Nevertheless, Mandel (56) has well reviewed the anabolic and catabolic action of certain antitumor compounds, such as analogues of purine, pyrimidine, and coenzymes, and derivatives of chloroethyl and ethyleneimine, urethane, podophyllin, and colchicine. An extremely comprehensive and detailed review on fundamental aspects of normal and malignant growth has recently been edited by Nowinski (63). This review is basic for any rational program directed toward effective chemotherapy of cancer.

An excellent general review of principles and methods of chemotherapy

has been made by McIlwain (58) in application to diseases of the central nervous system. In addition to the conventional aspect of the chemotherapy of specific infectious diseases, this discussion considers broader applications in noninfectious diseases. Chemotherapeutic considerations go a bit beyond conventional pharmacological and toxicological detail: they probe interactions between drugs and living material in regard to specific pathological factors which are present, and toward the correction of which the chemotherapy effort specifically aims. This volume thus offers background theory for neuro- and psychopharmacology.

Shaw has written an important review on caries-inhibiting agents (75). The paper emphasizes dietary restriction on fermentable carbohydrates and fluoridation of water. Dentrifices containing antibiotics, urea, and ammonium phosphate are not satisfactory for prevention of caries.

A helpful symposium review on the chemical control of plant and animal pests, which deals with a type of ecological chemotherapy, has been edited by Reitz (72).

The detailed analysis by Long (55) remains as the most satisfactory and critical review of the chemotherapy of tuberculosis. This considers sulfones, *p*-aminosalicylic acid, thiosemicarbazones, isoniazide, pyrazinamide, cortisone, hormones, and antibiotics.

There is continued vigorous exploitation of antibiotics—some of it highly questionable, as public hearings have shown. Three recent symposia are especially interesting: one, edited by Goldberg (33), deals with chemistry and nonmedical uses; a second, edited by Subrahmanyan (80), gives much information on antibiotics used in India; the third, edited by Waksman (87), deals with neomycin. A brief review of streptomycin and dihydrostreptomycin was prepared by Weinstein & Ehrenkrantz (91).

Toxicology

Several interesting toxicological reviews have recently appeared. Curry briefly surveyed the application of new analytical techniques to the identification and quantitative estimation of poisons (21). Barnes & Stoner offer the first systematic survey of the toxicology of tin compounds (5). In a detailed analysis of the biochemistry of animal poisons, Kaiser & Miehl give much valuable toxicological data (46). This volume is helpful in its survey of the mechanisms of action of the many poisonous substances elaborated by animals. The Wielands have prepared a definitive survey of the complex chemistry and toxicology of the toxins of *Amanita phalloides,* the poisonous toadstool (93).

The Actions of Drugs on Particular Systems

Pharmacological orientation toward mammalian physiological systems continues. Currently it is focused chiefly on the central nervous system; however, circulation remains interesting enough to draw several recent reviews. Aviado (3) suveys the pharmacology of the pulmonary circulation, a study long overdue. Price (71) analyzes the ways that circulatory homeo-

stasis is maintained under the stresses of general anesthesia, and how it may fail with particular substances. The complex actions of many different types of drugs on cerebral circulation are surveyed by Sokoloff (78).

Hypotensive drugs are reviewed in a symposium edited by Harington (39). This deals with veratrum alkaloids, amidine derivatives, iminazolines, reserpines, ganglionic blocking agents including mono- and bis-onium salts, and haloalkylamines. The chemistry and pharmacology of hypotensive drugs is discussed in relation to their clinical use. Hormones in relation to atherosclerosis are surveyed in a symposium edited by Pincus (66).

An important recent review is Baker's on the effects of drugs on the fetus (4). This stresses the paucity of precise information on the potential dangers to feti from various types of drugs given to pregnant females. The muscle-relaxing pharmacological action of quaternary ammonium compounds, both depolarizing and nondepolarizing, is reviewed by Foldes (29) in a summary considering their use in anesthesiology.

Enzymes and Enzyme Inhibitors

Greenberg & Harper (35) have edited a comprehensive review of enzymes in health and disease that covers chemical properties and mechanisms of enzyme action, energy transformations, relations to hormones, inborn metabolic errors, lipid metabolism, enzyme aspects of neuronal, mental, and eye disease, effects of drugs on enzyme systems, tumor enzymology, and the clinical use of enzymes as drugs. Here are discussed trypsins, deoxyribonuclease, collagenase, hyaluronidase, thromboplastin, fibrinolysins, and penicillinase. There is even a discussion of the use of enzymes as diagnostic drugs. The volume is well documented but not indexed.

Clinical aspects of enzymology and the use of various enzyme preparations were reviewed by Martin (57). He also edited a symposium on proteolytic enzymes and their clinical application. This included information on plasmin, trypsins, anti-inflammatory enzymes, and use of enzymes in veterinary medicine.

Of increasing pharmacologic interest are the heparin derivatives. Robinson & French have neatly reviewed the subject of heparin, fat transportation, and the clearing factor lipase (73).

The general field of anticholinesterases remains very active, but many aspects of it are unavailable for review, since they relate to chemical warfare. Holmstedt has fully reviewed the available material on the pharmacology of organophosphorus choline esterase inhibitors (42). Zeller edited a survey of amine oxidase inhibitors (97). Fundamental to an understanding of the relation of metals to enzyme action is the symposium edited by Crook (20). Coenzymes derived from water-soluble vitamins were reviewed by Brown (15).

Diuretics

Several summaries of the current status of diuretics have recently appeared. Buchborn & Bock edited an international symposium on diuresis and diuretics (18). This was duplicated in large part by a more extensive

symposium discussion edited by Moyer & Fuchs (62). The latter deals chiefly with mechanisms of edema and their management, whereas the former is concerned mainly with mechanisms of diuresis. Both give much pharmacological detail. Symposia treatment is well suited to this co-ordination of physiological and pharmacological considerations.

With greater emphasis on physiological aspects on pharmacological, Pitts (67) nevertheless offers a keen discussion for rational diuretic therapy. Handley & Moyer, however, place prime emphasis on the character and mode of action of diuretic drugs (38). All discuss the diuretic aspects of carbonic anhydride inhibition, xanthines, mercurials, triazine and thiazide compounds, antialdosterones, and steroids.

A special symposium on aldosterone antagonists was held in Chicago in 1958, and Bartter recently edited the discussion (6). It dealt with spirolactones which oppose the action of aldosterone and other sodium-retaining steroids. This occurs at dosages which have no other physiologic effect. The most effective antialdosterone is called spironolactone (Aldactone).

Oral Antidiabetic Drugs

The development of orally effective compounds for the treatment of diabetes mellitus has been reviewed by Duncan & Baird (25). This review considers the pharmacology, toxicity, mechanisms of action, and clinical use of various sulphonylureas and guanadine derivatives. Many modifications of compounds of this type have been prepared, and clinical evaluation progresses slowly. Toxicity has been observed in continued use of some of these agents, and various kinds of untoward effects have been described. The action of these types of compounds seems to be at cellular levels. The aryl sulfonamides directly stimulate beta cells in the pancreas to put insulin into the blood, and there is some evidence that they may increase the number of beta cells. Blood assay of insulin, which could be used to evaluate the effects of aryl sulfonamides, has been reviewed by Vallance-Owen & Wright (84).

The chief aryl sulfonamides useful as antidiabetic drugs were developed by Loubatieres in Montpelier. They are 1-butyl-3-sulfonilylurea (carbutamide), 1-butyl-3-p-tolysulfonylurea (tolbutamide), and 1-propyl-3-(p-chlorobenzenesulfonyl) urea (chlorpropamide). The latter is effective in low dosage and is long acting. A special symposium dealing with this drug was edited by Goldner (34).

Aromatic Alkylamines

An outstanding symposium on the pharmacology of catechol amines was edited for publication by Krayer (50). This covers information on their metabolism, and the consequences thereof, with discussion on all aspects of their biological activity. The symposium was a pertinent reflection of pharmacological interest in the pathochemistry of mental disorder, and was directed toward ways for correction of chemopathology.

The amphetamines were reviewed by Leake (51), with detail on ac-

tions, toxicity, and clinical use, and with comment on sociological considerations in regard to their possible abuse. This review deals chiefly with amphetamine, dextro-amphetamine, and methamphetamine. It does not include diethylproprion, an amphetamine derivative used for depressing appetite.

Lewis edited an international symposium on 5-hydroxytryptamine, in which its biochemistry, physiology, pharmacology, and possible clinical significance were considered (54). Von Euler has reviewed the actions of epinephrine and norepinephrine, and their use in humans (85).

Related to the pharmacology of amines is the increasingly significant investigation of amine oxidase inhibitors. These compounds resulted from detailed studies by Brodie and his companions at the National Institutes of Health on the enzymatic metabolism of various amines. Most of the monoamine oxidases are amino acid and fatty acid hydrazides, typified by iproniazid. However, many conjugated types of hydrazides exhibit amine oxidase inhibition. The New York Academy of Sciences symposium on amine oxidase inhibitors, edited by Zeller (97), gives details on the biochemorphology, general pharmacology, toxicity, and clinical evaluation of amine oxidase inhibitors as "psychic energizers."

Specifically dealing with the action of various drugs on the secretion, distribution, and excretion of epinephrine and norepinephrine is the excellent summary prepared by de Schaepdryver (22). He analyzes the influence of such drugs as ganglionic stimulants, histamine, morphine, caffeine, reserpine, insulin, nicotine, and iproniazid.

Specific Drugs

Many symposia and reviews have recently been published on specific drugs. A stimulating symposium was edited by Berger on non-narcotic drugs for relief of pain (11). This included much data on proposed mechanisms of action, together with psychological factors of intensification or reduction of the sense of pain. He dealt with such drugs as carisoprodol, zoxazolamine, phenyramidol, and phenylbutazone. Another symposium dealing solely with carisoprodol was edited by Miller (59). As in the case of similar symposia designed to assemble together in one place available information on a new drug, it is long on clinical testimony and short on pharmacological science. This comment also applies to the two volumes published as reviews on trifluoperazine, a new phenothiazine "tranquilizer," one edited by Brill (14), the supplementary volume by Moyer (61). Nevertheless, these volumes do save a great deal of searching through scattered periodicals to find the separate reports. Further, they save space in both scientific and clinical periodicals, and they save much trouble in documentation and retrieval. There is much to commend the publication as a symposium of the available information on a new drug—provided always that the survey is critical and that unfavorable observations are emphasized and discussed as fully as favorable ones. This is the case in the symposium on meprobamate, edited by Berger (10).

Interesting in this regard is the symposium edited by Brust (17) on triparanol, a nonfeminizing estrogenic agent which blocks the biosynthesis of cholesterol. Here unfavorable opinion was expressed not only on the theory that cholesterol is responsible for many cardiovascular disorders, but also on the possible untoward effects of increasing desmosterol concentration. Nevertheless, empirical clinical opinion indicates potential usefulness of the drug in coronary disorder.

Digitalis has recently been reviewed in a volume edited by Dimond (23) This includes much pharmacological data on related cardiac glycosides. A more systematic pharmacological review on the cellular basis of cardiac glycoside action was made by Hajdu & Leonard (37). Much stimulation for fundamental pharmacological research may be found here. It is rather peculiar that pharmacologists have not often been attracted to studying the action of drugs at a cellular level using the tissue-culture method, with phase-contrast microscopy and time-lapse movies, as developed so well by Pomerat (68).

A very extensive review of curare and curare-like agents has been made by Bovet and associates (12). This is a detailed consideration of the chemistry and biochemorphology of these compounds, as well as a discussion of their mechanisms of action and toxicity.

The pharmacology of plant phenols has been systematically reviewed by Fairbairn (26). Dealing primarily with plant estrogens, flavonones, and photodynamic compounds, it also considers various types of anthraquinones. These agents are discussed from the standpoint of their fate in the body and their potential toxicity. Porter has edited an important symposium on the biological activity of growth substances (70). A comprehensive review prepared by Gilbert (32), recently appeared on the mechanisms of the hemodynamic effects of endotoxin. One may question whether or not endotoxin is a matter for pharmacological consideration, but certainly endotoxin does have significant effects on living material, and as its chemical constitution is more clearly established, it may suggest related and competing pharmacological agents of clinical usefulness.

Chelating agents are becoming increasingly important in pharmacological application, particularly in connection with the hastening of the excretion of radioactive material. A general, comprehensive symposium on metal binding in medicine has been edited by Seven & Johnson (74). This covers the pharmacology and toxicity of various types of chelating agents and discusses particularly the value and use of disodium ethylene diamine tetraacetate.

The management of various anemias with iron compounds remains clinically important. The general pharmacological and clinical aspects of iron in clinical medicine has been reviewed in a symposium edited by Wallerstein & Mettier (88). The symposium contains much helpful information on the absorption and metabolism of iron.

Local anesthesia has long been a favorite field for synthetic studies by organic chemists and for routine pharmacological screening. The mode of

action of local anesthetics is more complex than is ordinarily considered to be the case. This matter has now been well surveyed by Watson (89).

In relation to the extraordinary population explosion which is disturbing the whole world, there is increasing interest in various types of antifertility agents. Many of these are compounds which interfere with ovulation and are progesterone competitors. Experimentation has only recently begun on other types of compounds that may alter fertility by other mechanisms. The field of antifertility substances has been reviewed by Jackson (43).

Neuro- and Psychopharmacology

As a result of the initial excitement beginning in 1953 over the effectiveness of Rauwolfia compounds and chlorpromazine in calming disturbed mental patients, a most extraordinary recent scientific development has been the tremendous interest in neuro- and psychopharmacology. The most extensive and systematic reviews in neuropharmacology have been the Macy Conferences edited by Abramson (1). Five such conferences, from 1954 to 1959, have been held, with published transactions. These conferences on neurophysiology covered most of the important aspects of the current activity in the field. The value of the Macy Conferences consists largely in their critical nature. The free and open discussion helps to clarify issues as they arise and clearly points out the inadequacies of data for anything more than tentative conclusions.

The problem of evaluating studies in psychopharmacology was carefully reviewed in a special symposium held under the auspices of the National Research Council, and edited by Cole & Gerard (19). This was a discussion of primary importance for the establishment of basic principles for judgment in studies on psychopharmacology.

Many special symposia, often of an international nature, have been held that deal with various aspects of psychopharmacology. Featherstone & Simon edited an interesting conference using a pharmacologic approach to the study of the mind (27). A similar symposium held in Milan to deal with psychotropic drugs, was edited by Garattini & Ghetti (30). Another symposium devoted chiefly to tranquilizing drugs was edited by Himwich (41). Kline edited a special symposium dealing with psychopharmacology (47), and another international symposium held in Zurich which considered psychopharmacology frontiers (48). Both of these symposia brought together a large amount of new material concerned with the psychological and behavioral effects of various types of drugs.

An international symposium dealing only with a special amine oxidase inhibitor, nialamide, was held in Lisbon, and the proceedings were edited by Leitao (53). A considerable symposium on psychopharmacology, with 41 contributors, was edited by Pennes (64). This considers basic mechanisms, clinical applications, the serotonin hypothesis of psychomimetic action, electrophysiological analyses of drug action, the effects of indoles on the central nervous system, and psychoanalytical aspects of tranquilizing drugs. Another general symposium dealing with neuropsychopharmacology and

held in Nuremberg has been edited by Flügel (28). This was largely a review of current German work relating to psychopharmacology.

An interesting review of certain aspects of neuropharmacology was made by Gibbs (31). This relates to amines in regard to brain function and behavior, and then considers the use of ACTH in hypsarhythmia, the lightning-fast major seizures which occur in children.

A number of short reviews on the pharmacology of psychotropic drugs have appeared. Jacobson reported on the comparative pharmacology of certain psychotropic compounds (44). Miller & Berry (60) have reviewed the motivational effects of drugs, considering methods which illustrate general problems in psychopharmacology. Sidman made a brief but helpful review on behavioral pharmacology (76). The action of drugs on the cerebral circulation was covered by Sokoloff (78), and Weinstein has given an interesting survey of language in respect to psychopharmacology (90).

Zeller has edited a general symposium and conference on amine oxidase inhibitors in relation to their use as antidepressants in psychotic states (97). Brill (14) and Moyer (61) have edited review symposia on the phenothiazine "tranquilizer," trifluoperazine.

The most satisfactory, detailed, and critical review on the relation of psychiatry to pharmacology has been made by Wikler (94). This review covers 889 references and is specially indexed. It considers specifically the effects of various drugs on human behavior, with comment on theories and mechanisms. Wikler's review will remain a standard of excellence for detailed critical analysis of drug action on the central nervous system.

Among other reviews dealing with neuro- and psychopharmacology to appear recently is the comprehensive volume edited by Braceland (13). A brief orienting review of psychotherapeutic drugs is offered by Welsh (92). Useful for quick reference to names, formulae, doses, and untoward effects is the tabulated summary of psychopharmacological agents used in psychiatry as prepared by the Psychopharmacology Service Center of the U.S. Department of Health, Education, and Welfare (83).

Continuing Drug Reviews

In addition to the *Annual Review of Pharmacology,* there now appears *Progress in Drug Research* (45), edited by Jucker of Basel. The first two volumes (1959, 1960) contain significant reviews of current problems of pharmacological research.

A special series of continuing reviews on medicinal chemistry is under the editorial direction of Blicke & Cox for the American Chemical Society. These are prepared with tabulated detail, extensive bibliographies, and excellent indices. A recent example is the comprehensive survey of barbituric acid hypnotics by Doran, with 230 tables and 1204 references (24). Another series has been sponsored by the Institute for the Study of Analgesic and Sedative Drugs. The fourth in this series is Smith's well-prepared review of acetophenetidin, with 529 references (77).

Annual surveys of new drugs may become increasingly useful as the

number of new drugs increases each year. Tice has made such a listing for 1959 (81).

Prospect

Critical reviews of pharmacologic information are becoming increasingly important in digesting the plethora of pharmacological and toxicological data and opinion accumulating on the myriad of new drugs now flooding us. Such reviews are indispensable to the rational clinical use of new drugs. It is an indication of the growing responsibility of drug makers that they are supporting symposia directed toward the preparation of such reviews. The publication of symposia on new drugs in a single volume helps greatly in saving laborious literature searching through many periodicals in order to obtain the information available. The value of these symposia volumes will continue to depend on their critical attitude, especially in regard to toxic effects.

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