chapters, which taken in moderation, one or two at a time, are most rewarding. The scope of the volume is wide, and it should be read by all those with a broad interest in Antarctic research.

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Pharmacology of Mental States

The Biochemical Basis of Neuropharmacology. JACK R. COOPER, FLOYD E. BLOOM, and ROBERT H. ROTH. Oxford University Press, New York, 1970. viii, 220 pp., illus. Cloth, $6.95; paper, $4.50.

Neuropsychopharmacology and the Affective Disorders. JOSEPH J. SCHILDKRAUT. Little, Brown, Boston, 1969. xviii, 112 pp., illus. $10.50. New England Journal of Medicine Medical Progress Series.

Diagnosis and Drug Treatment of Psychiatric Disorders. DONALD F. KLEIN and JOHN M. DAVIS. Williams and Wilkins, Baltimore, 1969. xx, 480 pp., illus. $11.75.

During the 1950's, existing theories regarding the treatment of emotional disorders were found to be of more limited usefulness than had been believed. Psychotherapy and the theories from which it was derived helped to explain the neuroses and at times to relieve or cure them, but those same therapies were mostly ineffectual for schizophrenia, mania, and severe depression. At the same time that their inadequacy was being recognized, serendipitous discoveries produced drugs—particularly chlorpromazine—which were remarkably effective in the treatment of psychotic states. These three books, taken together, give a sense of the revolution that has been going on since then in our understanding of the chemical and pharmacological aspects of behavior.

Each of these books presents a different part of the picture, with some overlap. The book by Cooper, Bloom, and Roth describes basic neuropharmacological principles, the stuff of which the Nobel-prize-winning work of Axelrod and Euler was made. The Schildkraut book applies this basic material to affective disorders. Klein and Davis, alternating chapters describing clinical states with chapters on the drug treatments of those states, focus on the psychopharmacological treatments of mental illness. Each book is extremely good, all are addressed to the graduate or medical student's level, and all have become popular as supplementary textbooks. Any scientist who is interested in the biochemistry and pharmacology of mental processes will find them readable and comprehensive. There is a tendency in all of them to accept current results and theories more uncritically than might be expected, but perhaps that is a common characteristic in rapidly developing new fields.

Cooper, Bloom, and Roth have presented a basic review of neurotransmission in the central nervous system, beginning with electron micrographic studies of the synaptic cleft and carrying the reader through the complicated processes of transmitter synthesis, storage, uptake, and degradation. They relate psychopharmacologic activity to drug effects on neurotransmission, with an emphasis on brain amines. In defining a broader neuropsychopharmacology of the future, they discuss the biochemical aspects of memory and learning, as well as prostaglandins and adenosine 3′,5′-monophosphate (cyclic AMP). It is natural that these authors, each of whom has vigorously developed new areas, should present such a futuristic orientation, and this orientation may account in part for the excitement students find in their text. The authors might well have expanded their bibliography and also some of their shorter sections, such as those on prostaglandins and cyclic AMP, and it might have been of further benefit to give chemical structures in all their excellent diagrams. The high quality of their writing reflects an influence of the late Nicholas Giarman and his long-time collaborator at Yale, Daniel X. Freedman.

Schildkraut's book, most of which was published as a series in the *New England Journal of Medicine*, deals with those aspects of neuropharmacology that are relevant to the affective disorders, using the catecholamine hypothesis as a frame of reference. The catecholamine hypothesis specifically postulates a relative deficiency of brain catecholamines (which include norepinephrine) as a crucial factor in depression. More recent speculations deal with the broader class of brain amines, and although the catecholamine hypothesis was a valuable notion for research in the 1960's one would hope for a somewhat broader theoretical base in future editions of these books. During the coming decade, further research and hypotheses on brain amines and behavior may be expected to consider greater specificity of brain areas, balance of activity of amines, rates of formation, isoenzymes, coupling of nerve excitation to release, rate of release, reuptake, synaptic distance, synaptic receptors, and genetic factors. Finally, an understanding of the steps by which psychological events alter biochemical aspects of brain amines and those biochemical changes in turn alter further behavior, allowing for cyclical and interlocked processes, may prove crucial to an understanding of severe emotional illness.

The book by Klein and Davis presents a complete review of the clinical aspects of mental illness. It contains extensive data on drug testing and drug efficacy, which are nicely displayed in table form supported by a very complete bibliography. The authors' main contribution, however, is in delineating how new knowledge concerning psychochemical agents has altered our conceptions of diagnosis, thereby splitting and modifying nosologic designations. They suggest changes which, although they will be quarreled with, do indicate the potential for a nosology based on psychopharmacology. Further, the authors raise the issue that these medications are being insufficiently employed. They describe the serious potential consequences of inadequate dosages or short-term medication. While others stress the observation that some patients do better without drugs, or even take the position that all psychochemical treatment is dehumanizing and should be avoided, Klein and Davis argue strongly that some patients who do not receive adequate pharmacologic treatment may suffer permanent deterioration as a consequence. With Davis's pharmacological background, the book might well have included additional material on basic pharmacology.

In summary, each book serves to chronicle different aspects of the development of a new psychopharmacology, which has also been viewed in the context of basic research needs in psychiatry by Hamburg in *Psychiatry as a Behavioral Science* (Prentice-Hall, 1970). The random drug screening of the 1950's has given way to cogent theories of drug action on neurotransmitters and behavior. These three books should be read by all serious students of psychopharmacology, for they chronicle its revolution and offer blueprints for change that will affect psychiatry in no small measure.

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