with so detailed an account of Einstein's career, his travels, and especially his activities on behalf of the causes to which he committed himself. Clark follows Einstein's concern for peace from his dissenting opinion on the German war effort in 1914, through his pacifist activities in the '20's, to his advocacy of armed collective security against Hitler and his fight for nuclear disarmament and world government after 1945. Clark also treats Einstein's increasing concern with Zionism from his 1921 lecture tour on behalf of the new Hebrew University in Jerusalem to his declining the presidency of Israel in 1952. But once again Clark mars his narrative by his continual patronizing criticism of Einstein. He is as likely to object to Einstein's "naive" pacifism as he is to his being a "cool customer" and rejecting pacifism in 1933. It might be worth quoting what that very politically conscious author C. P. Snow has written on Einstein's views: "About politics in the widest sense, I don't think there has been a world figure in my time who has been wiser than Einstein."

Einstein has not yet found his proper biographer, but perhaps it is too soon to expect one. The great bulk of his correspondence is still unstudied. His scientific development awaits the detailed and thorough analysis it requires. Only when these fundamental scholarly tasks are completed can the biographer go to work. Let us hope that Einstein will not have to wait as long as Newton.

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Antarctica

Research in the Antarctic. A symposium, Dallas, Texas, Dec. 1968. LOUIS O. QUAM and HORACE D. PORTER, Eds. American Association for the Advancement of Science, Washington, D.C., 1971. xvi, 768 pp., illus., + loose map. $24.95; members' cash orders, $19.95. AAAS Publication No. 93.

The most effective international and interdisciplinary symposium on Antarctic Research that I have been privileged to attend takes place on a continuous basis each summer in the United States Antarctic Research Program quarters in McMurdo Sound, Antarctica. During several weeks of research at McMurdo one meets a constantly changing stream of visitors. Many are scientists, experienced or young and promising, en route to or returning from their specialized field researches and full of the interest and excitement of the field program. Others may be Senators and Congressmen, administrators or scientists from other countries, reporters, NASA officials and astronauts. The resultant atmosphere with such a varied group leads to questions and answers and an enthusiastic exchange of ideas far into the night that most symposium organizers would envy. *Research in the Antarctic* records some of the ideas that at one point in time (around 1969) one could hear at McMurdo.

The editors say that it is "an outgrowth from, but not a complete record of" a symposium held by the American Association for the Advancement of Science. What is such a symposium meant to achieve and does this volume show this achievement?

This symposium embraces many fields. The reader therefore should expect broad summaries outlining progress in fields selected as representing the wide range of research that is being carried out. The authors of perhaps two-thirds of the papers have borne this need in mind and avoided too much technical terminology and too many minor references. Two or three papers go into so much detail that, although they will become standard sources of information in their subjects, they will not capture the interest of scientists in related fields. However, the majority of papers do have a wider appeal, and will stimulate thought on an interdisciplinary basis.

One example of this is the growing conviction among some Antarctic oceanographers of the role of bottom melting or freezing beneath the Filchner and Ross ice shelves as a source of the Antarctic bottom water which spreads out under so much of the world's ocean. The mass of water involved makes the process sound unlikely to a glaciologist, but more knowledge is needed. This should come before too long from the planned project for drilling through the Ross Ice Shelf.

The biological papers deal at length with ecological problems in marine and terrestrial environments, and emphasize the ease with which the ecological balances could be upset. The subjects of the behavioral studies range from human beings at the South Pole—"this particular and unique ecological niche"—to penguins. These birds, released in the middle of a snowy desert far from the sea in the Antarctic, steer in a straight line to the north northeast by the sun, correcting automatically for its movement of 15° per hour across the sky. When released under similar circumstances in the Northern Hemisphere, they apply the same correction for solar movement, but because the sun moves from left to right instead of right to left their course swings around by 30° per hour. The reviewer, as another native of the Southern Hemisphere, feels much sympathy for such penguins, since he also lost his instinctive sense of direction when he moved to the Northern Hemisphere.

The glaciological section deals largely with the nuts and bolts of Antarctic glaciology, rather than presenting the exciting new results from deep drilling in the ice. It is a pleasure, however, to find that, as usual, an administrator as senior as A. P. Crary does not mention administration once but asks interesting questions about the effect of ice loads on the earth's crust and mantle in relation to current ideas on the distribution of viscosity in the interior of the earth. Other sections deal with weather systems on macro and micro scales, and there are illuminating contributions on the upper atmosphere and on Gondwanaland by authors distinguished for their work in these areas.

All the authors come from universities and research institutions within the United States. The American character of the volume is further emphasized by an opening tribute to and reprinting of some interesting papers by James Eights—"the first qualified naturalist to set foot on land south of the Antarctic Convergence." This American emphasis is natural for a symposium of the AAAS. It brings home the success of the National Science Foundation's policy of involving leading research scientists throughout the United States in the Antarctic program. International aspects of Antarctic work are not neglected, either by individual contributors or by the editors, who have included opening chapters on SCAR (the Scientific Committee on Antarctic Research) and the Antarctic Treaty. However, no opportunity is given for authors from other countries to express thanks for the tremendous opportunities created by the NSF and the U.S. Navy for their research in Antarctica.

Printing, illustrations, and diagrams are effective, and one does not at first realize that the volume contains 750 pages. There are many very interesting

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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