

chological and biochemical theory of "minimal brain dysfunction." Neither, however, constitutes the unifying concept he has promised us in earlier chapters. The psychological theory posits a few symptoms present in every patient from which all the other symptoms can be derived. His three primary symptoms are (i) decreased experience of pleasure and pain, (ii) generally high and poorly modulated level of activation, and (iii) extroversion. He hedges, though, when he states that these symptoms "do seem to appear in most MBD children and explain a large number of the other symptoms." Further on he admits that the scheme does not account for specific learning disabilities at all. His biochemical theory is even less satisfactory as a unifying concept of MBD, since the unifying feature rests on the therapeutic response to amphetamines. Here he draws heavily from the experimental animal (mainly rat) literature and proposes a model suggesting that MBD children have an abnormality of metabolism of biogenic amines and that this biochemical abnormality impairs the reward and activating systems in the brain. The action of amphetamines on the biogenic amines presumably could alter this situation. Wender's own data regarding the therapeutic response to amphetamines in MBD, however, indicate that this theory cannot explain all of "minimal brain dysfunction."

The book appears to have been hurriedly written. Much of the material is poorly organized; a number of important points are concealed in unrelated paragraphs or footnotes, and some clearly related material is separated by many pages. There are an annoying number of sweeping generalizations that later are contradicted or qualified. There are many unnecessary and unhelpful analogies and footnotes. The volume is beset by bibliographic errors (once considered a mortal sin in scientific writing).

Perhaps, though, the problem is as much with the subject itself. It is well to point out that a child's misbehavior or poor school performance need not be the result of willfulness, obstinacy, or daydreaming. Yet the whole notion of "minimal brain dysfunction" is badly in need of critical appraisal. One of the difficulties is with the term. Certainly for many parents and physicians the dysfunction is far more than "minimal," so that one might better speak of "moderate" or "maximal" brain dysfunction; or do some children have

"maximal minimal brain dysfunction" as contrasted with others? And there is the curious notion that the child with overt damage to his brain with, for example, a mild hemiparesis may or may not have "minimal brain dysfunction," depending on the presence or absence of the behavioral symptoms to which the term has now been attached. Yet what are those symptoms, and how many does one need for a diagnosis? Nowhere in this volume (nor in most accounts of this subject) is a clear definition of the syndrome provided which could assist in accurate diagnosis or allow for a correlation of data between different studies. Wender himself points out that different children may have different constellations of symptoms. Should the clumsy child with many abnormal neurological signs but none of the other symptoms of "MBD" fall into this category or not? I have already referred to the problem of quantitative variability of symptoms and indicated that normal children may have symptoms apparently identical to those constituting MBD. But where does the "abnormal" begin and the "normal" leave off? Are we likely to see a profusion of young children indiscriminately labeled MBD because they appear to be overactive and distractible? The "dyslexia" craze appears to have waned, but it was not unusual several years ago to see a three- or four-year-old brought in for a neurological consultation by a worried mother concerned that her child might have "dyslexia" because he reversed his letters and numbers (a normal phenomenon at that age). Might we now see the same with MBD? The whole syndrome has become so nebulous and definitions are so blurred that it is becoming another diagnostic wastebasket, and it is no surprise that attempts to determine the incidence of MBD among school children yield estimates ranging from 1 to 20 percent.

Labels tend to obscure rather than enlighten. I would suggest that we discard the label "minimal brain dysfunction" and concentrate on a more careful documentation of the clinical symptomatology and probable etiologic mechanism in each individual child who would now fall into this group. The identity of many of the symptoms between one child and another may be more apparent than real, and we would do well to look for differences. Wender, I think, provides us with some clues for a solution to this problem. For example, he suggests a number of etiolog-

ical pathways to this syndrome, and it is not inconceivable that they lead only to a remarkable simulacrum of symptomatology. The inconsistent response to medication and the fact that his psychological and biochemical theories fail as unifying concepts further suggest that we may be dealing with several diverse syndromes. He also hints that there may be a number of different mechanisms leading to motor hyperactivity.

A more careful study of this group of children following these leads and others, therefore, may reveal different clinical entities with similar but not identical symptomatology. We might then bring some order out of the present chaos, sharpen our diagnostic acumen, and render our treatment more effective.

THOMAS E. TWITCHELL
Department of Neurology, Tufts University School of Medicine, Boston, Massachusetts, and Department of Psychology, Massachusetts Institute of Technology, Cambridge

Useful Animals

The Life of Sharks. PAUL BUDKER. English version by Peter J. Whitehead. Columbia University Press, New York, 1971. xviii, 222 pp. + plates. \$12.50.

The original version of this book, *La Vie des Requins*, was published in 1936. For over 20 years it remained the only good general book on sharks written with the insight of a research scientist studying these animals. This new edition has been revised considerably to include summaries and critical evaluations of the studies and findings about sharks since that time. Budker has taken time off from his current work on whales and whaling problems (he is Director of the Laboratoire de Biologie des Cétacés at the Ecole Pratique des Hautes Etudes in Paris) to update this material with the help of Peter Whitehead, ichthyologist at the British Museum, for the revision and translation into English.

It is refreshing to find a popular treatise on sharks with less emphasis on their powers of attack and more information on their general biology. Of course, there are chapters on man-eaters and the myths and legends built on the dangerous aspects of sharks. We can learn many irrelevant bits of information such as how shark brains dried and grated into white wine were once

thought to be helpful during labor or how an anatomist views the possibility that it might have been a white shark, rather than a whale, that swallowed Jonah. And there are interesting digressions into the hydrodynamic explanation of the "dead water" phenomenon to dispel the ancient myth that remoras can suddenly stop a ship. The serious reader will appreciate the readable accounts of the classification, anatomy, and physiology of sharks. Many aspects of the behavior of sharks and the function of such special organs as the ampullae of Lorenzini are controversial and complex. Budker does not oversimplify the varying results of experiments and observations by scientists and divers but builds up to the final solution or remaining unsolved problem in a detective-story manner, bringing in his personal experiences and the observations of others in an intriguing, if sometimes verbose, account of the problems in shark biology. He criticizes, with expertise and with gentlemanly reserve, his colleagues' explanations for the caudal keels on some sharks, the long tail of the thresher, the peculiar shape of the hammerhead, the role of the cupula in connection with function of the pit organs, and swimming speed. On the whole Budker has done a remarkable job of presenting the array of evidence concerning the ways sharks are built and behave.

The book does not cover some recent research results (for example, the shark is less of a "swimming nose" than supposed since there is evidence that the huge "olfactory" lobes of the brain have functions other than olfaction) and the chapter on remoras is weakened by omission of the mounting evidence that the remora acts as a cleaner fish for sharks. The book also perpetuates a mystique about sharks by implying that, unlike other animals, sharks are unpredictable. If this were true the Cousteau, Dewey Bergman, and Peter Gimble teams would be out of business. In summing up sharks' uses to man, Budker paraphrases a saying that practically "everything about a shark is of use except the snap of its jaws and the lash of its tail." However, the popular full-length movie now showing in local cinemas, "Blue Water, White Death," indicates that man has learned to capitalize even on these aspects.

In the early 1950's, after the synthesis of vitamin A and the increase in the cost of hand labor, the shark industry collapsed. Liver oil, hide, fins, and flesh were no longer in demand or too costly

to supply. At present, sharks are hunted as movie stars, but as this industry passes its vogue, let us hope that sharks will still be valued as contributing to our understanding of many biological phenomena including the present structure and past history of the human body. If any one book can show the value of sharks as subjects for man's use and study, this one does, in simple and readable terms.

EUGENIE CLARK

*Department of Zoology,
University of Maryland, College Park*

Atmospheric Science

Precipitation Scavenging (1970). Proceedings of a symposium, Richland, Wash., June 1970. U.S. Atomic Energy Commission, Oak Ridge, Tenn., 1970 (available as CONF-700601 from the National Technical Information Service, Springfield, Va.). xii, 498 pp., illus. Paper, \$6. AEC Symposium Series, vol. 22.

In this symposium the concern of the Atomic Energy Commission extends beyond the study of what is removed from the atmosphere to the important questions of why and how aerosols and gases are removed. Various contributions to the symposium discuss the removal of radioactive and nonradioactive, chemically active and inert materials.

The proceedings volume is divided into five parts: Field Experiments, Laboratory Experiments and Techniques, Scavenging of Gases, Microphysics in Scavenging, and Models and Predictions. Each part contains a number of papers which either review a particular phase of research related to removal of material by precipitation or describe the results of experiments performed in this field.

In the section Microphysics in Scavenging, Hidy, Slinn and Hales, and other authors discuss various processes that affect the removal of aerosol particles and gases; the lack of agreement on some points is invigorating. The section includes a review of the theory of diffusive and impactive scavenging which covers the entire chain of microprocesses: attachment of trace substances onto aerosol particles, collision of those particles with liquid or solid aerosol particles (cloud droplets or ice crystals), transfer processes during water vapor condensation, and temporal changes in the size distribution of liquid cloud droplets.

Field and laboratory experiments, which provide numerical results applicable to models and predictions, constitute—as is appropriate—the largest section of the proceedings. Of particular interest are studies performed with cosmogenic radionuclides ^{38}Cl , ^{39}Cl , and ^{24}Na (Perkins *et al.*), which supply information on the rates and mechanisms of in-cloud removal of tagged natural aerosol particles. The hypothesis that submicron particles are scavenged by neutral and electrostatically charged water drops is advanced; the effect of the solubilities of gases on their removal by raindrops is discussed; and the removal of SO_2 , NO_2 , CO_2 , and halogens is treated in great detail. Models are presented which successfully predict the removal of radioactive species from the troposphere and the transfer of radioactive materials from the stratosphere into the troposphere.

The volume should attract a rather wide audience. It will serve meteorologists interested in processes taking place within clouds and should be of interest to those engaged in air pollution studies. It will serve physical chemists, physicists, and chemists as well. The reader will have ample opportunity to disagree with some of the statements made and to form his own opinions of how gas molecules, aerosol particles, cloud droplets, and ice crystals interact. The collection of articles is also a convenient point of entry into one of the most complex of fields, that of cloud chemistry and physics. The proceedings show both how little we know about processes involving water in our atmosphere and how rapidly we are progressing in this field.

JAN ROSINSKI

*National Center for Atmospheric
Research, Boulder, Colorado*

Books Received

Applied Statistics in Decision-Making. George K. Ckacko. Elsevier, New York, 1971. xvi, 494 pp., illus. \$15.

Architectural Structures. An Introduction to Structural Mechanics. Henry J. Cowan. Elsevier, New York, 1971. xii, 400 pp., illus. \$15.75.

Aspects of Manpower Planning. D. J. Bartholomew and B. R. Morris, Eds. Elsevier, New York, 1971. xii, 130 pp., illus. \$7.50.

Atlas of Neuropathology. Sumner I. Zacks. Harper and Row, New York, 1971. xvi, 394 pp., illus. \$18.

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