Book Reviews

Chemical Weed Control

Herbicides. Physiology, Biochemistry, Ecology. L. J. AUDUS, Ed. Academic Press, New York, 1976. Two volumes, illus. Vol. 1. xxii, 608 pp. $48. Vol. 2. xx, 564 pp. $38.25. Second edition of *The Physiology and Biochemistry of Herbicides*.

Chemical pesticides, now a multibillion-dollar industry and still growing vigorously, have revolutionized agriculture in the last several decades. Until the mid-1960's, insecticides were the sales leaders among pesticides, but since then they have been far surpassed by herbicides, whose dominance continues to grow year by year. If "more energy is still expended on the weeding of man's crops than on any other single human task" (vol. 1, p. 1) and if the burgeoning human population continues to challenge the ability of the earth to feed it, then chemical weed control deserves all the careful attention that these two volumes give it.

Audus, a pioneer in the study of herbicide metabolism, has assembled 32 encylopedic chapters written by experts in the United Kingdom, the United States, Canada, New Zealand, the Netherlands, and Sweden. They cover all aspects of the subject from the history of herbicide use and the effects of herbicides on the morphology, physiology, and biochemistry of higher plants to the behavior and effects of herbicides in the soil, their interactions with environmental factors, their role in ecology, and the toxicological problems generated by their massive use. Virtually no topic remains uncovered, and the only gaps are those occasioned by our incomplete or faulty knowledge.

It is sobering to learn that we still do not understand the mode of selective toxic action of most of the common herbicides and that almost all successful weed killers have been discovered as a result of empirical screening procedures. In the United States, about 63,000 new compounds were screened in 1970. Development of a successful new product entailed the screening of about 7500 compounds, took about 6.5 years, and cost about $5.5 million. Within the industry, research and development costs were almost 10 percent of sales, about four times the percentage for all manufacturing industry. Certainly, much is to be gained by a more rational approach to this vast and complex undertaking. This state of affairs is assessed in a chapter on the search for new herbicides.

Most recently, with the increasing attention paid to environmental preservation, some alarm has been generated by the teratogenic dioxin impurities found in all samples of 2, 4, 5-T, the mutagenic metabolites of atrazine in maize leaves, and the general toxic side effects of halogenated phenoxyacetic acids, phenols, and hydrocarbons. A chapter on toxic hazards in the use of herbicides appraises and probably somewhat understates these dangers. Nonetheless, the problem is faced and discussed fairly, an improvement over other recent volumes on this subject.

While acknowledging the occasional unevenness and repetitiveness characteristic of many-authored compendia of this type, I congratulate Audus on his impresario role in generating the single most important source book on herbicides currently available.

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Anniversary Compendia

The Nervous System. DONALD B. TOWER, Ed. Raven, New York, 1976. Three volumes. Vol. 1, The Basic Neurosciences. Roscoe O. Brady, Ed. lxii, 686 pp., illus. Vol. 2, The Clinical Neurosciences. Thomas N. Chase, Ed. xiv, 542 pp., illus. Vol. 3, Human Communication and Its Disorders. Eldon L. Eagles, Ed. xiv, 564 pp., illus. Each volume, $25; the set, $65.

In 1950 the 81st Congress authorized the establishment of the National Institute of Neurological Diseases and Blindness, which has evolved into the present National Institute of Neurological and Communicative Disorders and Stroke (NINCDS). Seeking "the most appropriate, tangible way to celebrate the Institute's silver anniversary," its administrative staff decided to organize the production of these three symposium volumes, each of which focuses on a principal concern of today's NINCDS. In view of the fact that there is no lack of reviews and symposia on the neurosciences, one may fairly ask about the substance of this celebration, its intended readership, and its degree of apparent success.

Volume 1 ("The Basic Neurosciences") presents several introductory essays on the history of NINCDS and of basic neurosciences, as well as a parade of more than 60 review chapters. These are brief, averaging about ten pages, and various in scope, approach, and timeliness. The coverage is broad but uneven, with emphasis on neuronal cell biology, membranes, synapses, neuropharmacology, and neurochemistry. Several important areas of research in which NINCDS support has figured prominently receive unjustifiably cursory treatment. Readers will find little evidence of the importance of research on invertebrate preparations, in the emerging field of neuroethology, or on the vertebrate visual system. Although research on vision has been the province of the National Institute of Eye Research since 1968 (when that institute separated from NINCDS), studies of the visual system were long supported by NINCDS. Moreover, a survey of advances in neurobiology that barely acknowledges vision omits some of the most exciting knowledge we have about how the brain works.

Constrained to deal with major topics in minor spaces, many contributors have succeeded admirably. Palay's essay on neurocytology and Kandel's introduction to the neurobiology of behavior exemplify especially appropriate approaches to the difficult task of writing a capsule review for a general but undefined readership. Many of the authors take a different course by presenting aspects of their topic with greater technical detail. While most of these specialized reviews are likely to be useful to at least some readers, certain contributions give excessively personal views of their fields. For example, a chapter on the possible involvement of glycoproteins in learning and memory gives disproportionate attention to hypotheses that have yet to be adequately tested or generally accepted. Another chapter purporting to provide an overview of the history of our understanding of the role of GABA (gamma-aminobutyric acid) in the nervous system ignores the decisive research on crustacean preparations through which the neurotransmitter function of GABA was established.

Volumes 2 and 3 ("The Clinical Neurosciences" and "Human Communication