# Book Reviews

*The Ustilaginales of the World.* Contrib. No. 176, Dept. of Botany. George Lorenzo Zundel. Pennsylvania State Univ., State College, Pa., 1953. 410 pp. $3.50.

In this book are descriptions of more than 1000 species in 30 genera of the two families of smut fungi. The genera within the families and the species within the genera are arranged alphabetically. For each species are given: the scientific name and author, synonyms and their authors, descriptions of the sorus and chlamydospores, the type host and locality, and the host range, both taxonomically and geographically. None of the fungi are illustrated. Following the text is an index of species of hosts with the species of smut fungi attacking each, and an index of synonyms and species of smut fungi mentioned in places other than their alphabetical order in the text. The text proper is preceded by an introduction, historical review, general description of the Ustilaginales, a selection of 52 references on the group, and a key to the genera. It should be a useful manual, especially for those specialists in the group who work mostly with herbarium material.

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*Epilepsy and the Functional Anatomy of the Human Brain.* Wilder Penfield and Herbert Jasper. Little, Brown, Boston, 1954. 896 pp. Illus. + plates. $16.00.

This magnificent volume brings together into one integrated account much of the recent work dealing with brain structure and function, particularly as they are revealed in the various forms of epilepsy. The authors are outstanding experts in their fields—Dr. Penfield as neurosurgeon and Dr. Jasper as neurophysiologist. In a unique manner, they have woven together the contributions of their two disciplines, so that they illuminate the basic physiology of the brain as they describe, in intimate detail, the manifestations of epilepsy, its clinical management, and its operative alleviation or cure. The argument is supported by more than 200 case reports, more than 300 illustrations, and a bibliography of 700 citations.

The first five chapters are largely given over to neurophysiological descriptions. A wealth of clinical material has made possible the electric stimulation of the exposed cortex and of many deeper structures in conscious human subjects. Notable features of this discussion are

1) The preparation of maps of the "supplementary motor areas" that lie on the medial surface of each cerebral hemisphere, just anterior to the upper end of the sensorimotor strip. Four centers for vocalization were described, two in the classical sensorimotor areas, two in the supplementary motor areas.

2) The mapping of the second somatic sensory areas which lie on the upper bank of the Sylvian fissure, below the primary sensorimotor complex. The heightened activity characteristic of epilepsy may originate in these second sensory areas as well as in the primary areas.

3) Failure to demonstrate the existence of the so-called "suppressor strips" on the lateral surface of the hemispheres. "One must conclude, therefore, that there is inadequate evidence for the existence of specific inhibitory areas in the cerebral cortex. Motor inhibition which is occasionally observed is obtained from areas of cortex in which the elaboration of its coordinate function may require an element of inhibition, but no area seems to have its function restricted to that of inhibition" (p. 234).

4) Evidence that the temporal lobes may be specialized areas for memory.

The authors develop a new conception of the seat of consciousness in the human brain. According to their view, consciousness does not reside primarily in the frontal lobes, as Hughlings Jackson taught. They locate consciousness in the "centrencephalic system," an area in the upper brain stem which includes thalamus, hypothalamus, and adjacent structures. It is conceived as being "highest level" in the functional, if not in the anatomic, sense. The centrencephalic system "has a symmetrical functional relationship with the cortex of the two cerebral hemispheres," its thalamic nuclei being connected by a diffuse projection system containing both corticopetal and corticofugal fibers. Posteriorly, this system is intimately connected with the reticular formation of the brain stem, forming with it a central core of nervous tissue with both motor and sensory components. This system must be distinguished from the longer and better-known specific projection systems, but one of its functions is the coordination of the activities of these specific projections.

The concept of the primacy of the centrencephalic system in the production of consciousness runs like a silver thread of continuity through many chapters. The view is thoroughly developed in Chapter XII. Its departure from orthodox thinking is portrayed in the following sentences (p. 43):

> In a sense, it might be said that experimentalists have left clinicians and psychologists stranded upon the vast shores of the cerebral cortex with no chart or compass to guide them. The initial assumption of experimentalist and clinician alike was that within the cerebral cortex alone lay the mechanisms of thought and voluntary action. But study of the epilepsies and of the experiments wrought by disease and injury upon the brain of man is gradually demonstrating the fact that the *highest level of neuronal integration* must be sought in the diencephalon and midbrain.

The types of epilepsy known as *petit mal* and *grand*

*mal* are disorders of this highest level. Their symptoms develop with complete bilateral symmetry, in both cerebral cortices, showing that hyperactivity in some central subcortical mechanism is responsible for the disorders. The loss of consciousness characteristic of both states is an indication that consciousness is normally focalized subcortically in the centrencephalic system. However (on pp. 481 and 482):

> It is obvious that the higher mental functions which distinguish man from lower animals, such as speech, the capacity for higher mathematics, and other abstract thought processes, are not possible without the cortex. . . . The vast interconnected network of cells and fibers in the cortical matrix must, therefore, constitute an essential part of the machinery of the mind. But without the constant selective activating influences of the reticular network of the higher brain stem, the cortical mantle lies dormant. . . . Highest level functions cannot be strictly localized, but result from a dynamic interaction between centrencephalic mechanisms and those areas of cortex the function of which is momentarily being employed at a given time.

Moving from these discussions of highest level functioning, the authors include chapters on diagnosis and treatment, particularly with drugs, on the technique and interpretation of electroencephalograms and electrocorticograms and on cranial roentgenography. Final chapters deal with the technique of surgical excision of epileptogenic foci and the history of patients after operation.

This is really an extraordinary book, distinguished by its broad sweep of interest and effort, which no reviewer can adequately describe. It will mean much to the growing company of experts in many fields who are seeking better to understand the functioning of the human brain. In its pages, the neurophysiologist, the neurosurgeon, and the neurologist, the psychologist, the psychiatrist, and even the philosopher will find enrichment for thought and practice.

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*Advances in Genetics,* Vol. V. M. Demerec, Ed. Academic Press, New York, 1953. 331 pp. Illus. $8.50.

This new volume of *Advances in Genetics* will prove a very useful and interesting addition to the geneticist's library, since it contains much important material that previously had been incompletely and insufficiently known. This is particularly true for two articles by H. Kikkawa and by T. Tanaka. These, for the first time, review for the Western reader the large amount of work done in silkworm genetics largely by Japanese authors. It appears clearly from these reviews that the silkworm is one of the best analyzed and most favorable materials from a genetic point of view. The number of mutants known is considerable, and linkage data are available for 15 out of 28 chromosomes. The organism seems to be particularly valuable for the study of biochemical genetics. There exists a wealth of material concerning the development and biochemistry of genetically controlled pigment characters. The genetic control of amylase in the silkworm belongs to the best substantiated cases of gene-enzyme relationships. Furthermore, in *Bombyx* has been described the only case known to the reviewer in which genes affect the selective permeability of cells. The wealth of material contained in these two articles will make them a highly stimulating contribution to the genetic literature.

Two articles deal with microbial genetics. Pontecorvo's paper on the genetics of *Aspergillus nidulans* differs from most of the reviews published in *Advances* in that it contains a large amount of previously unpublished material obtained by the author and his collaborators over a number of years. It presents a complete survey of the life cycle, the methods of study, the formal and biochemical genetics of this first homothallic organism ever investigated genetically. A number of highly important findings, such as the occurrence of at least two series of pseudoalleles and the discovery of the new phenomenon of "relative heterothallism" are described. The author puts particular stress on the comparison of the genic action between organisms carrying the same genes in heterozygous and heterocaryotic conditions. The possibility of artificially inducing diploid nuclei has made possible a thorough analysis of mitotic crossing over and of vegetative segregation. The paper is full of important new information and will make stimulating reading for every geneticist. The monographic treatment chosen by the author to publish these results provides pleasant reading and presents a more coherent picture of the different problems attacked and solved than could be achieved by a series of short communications. It appears that a thorough treatment of a series of interrelated investigations may be preferable to the usual manner in which each single problem is published in an isolated paper.

Hershey presents a review of the genetics of bacteriophage. The review is short, concise, and complete, covering the whole material in the field critically and with admirable clarity. Because it is clear and easy to read, this paper will aid in acquainting workers active in other fields of genetics with the fundamental importance of the facts of bacteriophage genetics.

The two remaining papers deal with different phases of population genetics. E. B. Ford presents a review of Genetics of Polymorphism in the Lepidoptera. The work and the views of the author on balanced and transient polymorphism may be presumed to be well known to all geneticists and have been repeatedly reviewed. In the present article, the author adds more recent results obtained from his own studies and from those of other authors and integrates them with his theory. A review by W. Frank Blair on Population Dynamics of Rodents and Other Small Mammals contains a compilation of data and observations on phenomena such as home range, dispersal, and reproductive behavior of different species of mammals, mostly rodents. The paper does not deal