groups. Prince calls such activity "cocoon work," building on the metamorphosis metaphor.

4) Edward J. Moody extends this metaphor in a most interesting way in his two-year investigation of Satanism. Although his account here is anecdotal only, Moody nevertheless argues persuasively that worship of Satan has the effect of normalizing abnormal people. Thus, to "keep secret" from ordinary people their satanic power and existence such persons are urged to behave as straight as possible. The effect, of course, is more effective social relations—the goal for which Satan's name has been invoked in the first place!

By selecting only four, the reviewer does an injustice to the other essays. Each has merit, depending upon one's interests. Leo Pfeffer, for example, is clearly a giant in the church-state issue; his essay here is a first-rate addition to that literature. It is joined by that of John Richard Burkholder, who artfully combines a close legal scholarship and a sensitivity to social science to offer a new interpretation to the legal difficulty in defining religious freedom. The essays on Mormonism, by Dolgin and Leone, are others that can only bring insightful additions to the literature on their subject. And so it goes. Provided one does not expect a comprehensive "theory of cults," this book can be recommended to all those who are interested in social movements. Religion, after all, is intimately intertwined with cultic activities; it is entirely appropriate that we should have this addition to the body of literature.

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## Chemical Plant Ecology

**Allelopathy.** ELROY L. RICE. Academic Press, New York, 1974. xii, 354 pp., illus. $25. Physiological Ecology.

A book on the biochemical interactions of plants has long been needed, but it is probably advantageous that it has been delayed long enough to include the mass of recent work in the various related disciplines. Rice has brought together data and descriptions of experimental ploys from a wide variety of sources. The resulting book is of great value to all who wish to understand the mechanisms and roles of phytotoxins in vegetation, and it is mandatory reading for those who work in the subject. The heavy emphasis on agriculture is largely a reflection of the longer history of interest and work in this discipline on the part of agricultural scientists. It seems, however, that a corresponding emphasis on academic plant ecology and the evolution of vegetation might have been gleaned from the literature with no greater effort.

Of particular value is the comparative treatment of phytotoxic relations involving the several life forms of plants (and animals—though these relations are scantily described). The involvement of similar and even identical toxic compounds in the several life form interrelations strongly suggests the possibility of a general biochemical habitat variable, but this concept is not treated. The adoption in chapter 1 of a special terminology for phytotoxins that is based on origin and victim seems superfluous, especially since the terminology is employed again only in chapter 12, and there briefly. The latter chapter, which gives structural characteristics and sources of a wide variety of phytotoxins, is particularly valuable. The emphasis on soil microorganisms should convince readers of the importance of microbial ecology and particularly of the lacunae in our understanding of the role of microorganisms in the ecology of higher plants.

Rice has covered admirably the literature from late in the 19th century to the present, especially valuable being his coverage of the rapidly growing Russian literature that Grodzinsky fosters with his annual symposiums. There are, however, some important omissions, such as Martin's able review "Chemical Aspects of Ecology in Agriculture" (Canada Department of Agriculture, 1957) and the startling forest tree studies in South Carolina by Hook and Stubbs and by DeBell, these last being virtually unique in their broad ecological implications.

Since no history of research is complete without a history of the ideas involved, it is disturbing to find that the chapter on the history of allelopathy research begins with de Candolle in 1832. Omitted is de Candolle's clear reference to Humboldt's *Aphorismen*, in which Brugmann's precociously modern research on *Lolium* is described at length and reference is made to Pliny as the source of the idea of weed-crop interaction. Pliny is now widely known as a copyist (plagiarist, since he cited no sources), and one can find most of the weed-crop and other antagonisms cited by Pliny, Humboldt, and de Candolle mentioned in Theophrastus's *Enquiry into Plants.*

The book is disturbingly repetitive, and the writing style makes for difficult reading and for a few ambiguities. One is surprised to find the California studies combined in a chapter entitled "Role of allelopathy in fire cycle in California annual grasslands." Annual grasslands have no fire cycle; chaparral does.

The strengths of this book far exceed its shortcomings, even to the extent of making it worth its rather steep price.

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## The Hypothalamus

**Integrative Hypothalamic Activity.** Proceedings of a summer school, Amsterdam. D. F. SWAAB and J. P. SCHADÉ, Eds. Elsevier, New York, 1974. xii, 516 pp., illus. $65.40. Progress in Brain Research, vol. 41.

This book is the proceedings of a 1973 conference the aim of which was to develop ideas relating to the properties of the hypothalamus as an integrative center of the brain. In spite of the organizers' efforts, the book has turned out to be a diverse assemblage of chapters most of which are far removed from the theme of integration. If one is looking for a book to "tie it all together," present trenchant overviews and develop broad concepts, or define special properties of the hypothalamus, this one is an expensive disappointment. It consists of some fine reviews of specific topics mixed with chapters that are perfunctory research reports that should properly be short communications in journals. Actually very little in the book is "integrative" and a good deal is not even "hypothalamic."

The opening chapter, dealing with "breakthroughs" in hypothalamic and pituitary research, is really a "who's who" in hypothalamic-pituitary physiology and morphology and, though interesting, commits sins both of omission and commission. For example, there is no serious discussion of the work of J. A. F. Stevenson, B. Andersson, A. Hetherington, J. Broback, or B. Anand, and I am not sure all the limbic system workers discussed here deserve such prominence in a work on the hypo-

thalamus. Moreover, the chapter is chronologically garbled and the account of the disentwinement of hypothalamic from pituitary functions is difficult to follow.

The chapter on hypothalamic anatomy by Lammers and Lohman is authoritative and sound as far as it goes, but it does not go far enough. Intrinsic connectivities (internuclear relations) of the hypothalamus are discussed in a most fragmentary manner and chemical neuroanatomy is left to be picked up, mainly in fragments, in some of the later endocrine chapters. Discussion of the monoaminergic pathways in the hypothalamus would have served as a basis for interpreting the chapters on aminergic systems in relation to feeding behavior and some of the endocrine chapters. Perhaps most important, the morphology chapter enumerates connections instead of elucidating principles of organization, such as the basic patterns of connectivity between the limbic system and the hypothalamus. The chapter by Pilgrim on the histochemical differentiation of the hypothalamus includes excellent sections on the hypothalamo-neurohypophysial and tubero-infundibular systems. It also includes brief notes on the ontogenesis of acetylcholinesterase in the ventromedial-arcuate area, but there is no discussion of the "cholinergic" circuits that pass through the lateral hypothalamic area and also provide potential "cholinergic" pathways to the endocrine nuclei of the hypothalamus.

In the physiology section, the chapters by Guillemin, Dyer, and Ariëns Kappers *et al.* deserve comment. Guillemin's covers the hypothalamic-pituitary axis thoroughly and in detail, and one comes away with a broad view of the nature of the hypothalamic-endocrine linkages, especially in regard to releasing and inhibitory factors. Dyer's chapter on electrophysiology of the hypothalamus and its endocrinological implications is excellent, but not for this particular book. Perhaps because of the paucity of data available, the chapter simply pinpoints some of the technical problems encountered in electrophysiological analysis of the hypothalamus at the single cell level, gives examples of what electrophysiology can contribute to the understanding of neuroendocrine mechanisms, and outlines some strategy for further experiments. The lengthy chapter by Ariëns Kappers *et al.* argues that pineal "hormones" activate hypothalamic magno- and parvocellular neurosecretory systems, thereby influencing endocrine activity. The conclusion that the pineal organ may be "a regulator of regulators and center for general homeostasis *probably* exerting its effects primarily on the hypothalamus" seems considerably ahead of the evidence at this time. However, this chapter constitutes about as thorough and up-to-date a discussion of pineal "hormones" as one can get.

The eight chapters dealing with growth and parturition and sexual mechanisms stay almost strictly at an endocrine level without any substantive discussion of brain-hormone interactions.

Some of the behavioral chapters do by far the best job of enlarging on the theme of the conference. Wayner's chapter on the hypothalamus and adjunctive behavior is one of them. The finding that the lateral hypothalamus is involved in the control of spinal reflex and motor activity is significant and has not heretofore been given much attention. Slangen's chapter on the role of hypothalamic noradrenergic neurons in regulation of food intake is a well-balanced review of an important topic of active research. Slangen also summarizes evidence relating damage of the nigrostriatal tract to the phenomena of adipsia and aphagia and makes a refined fractionation of the lateral hypothalamic area which indicates, as has other work in the past, that there is no single lateral hypothalamic "syndrome," but rather a gradient of effects growing more drastic as the lesion extends more laterally. Slangen observes that lateralmost hypothalamic lesions destroy part of a system that is located *only* in the far-lateral hypothalamic area. When only a part of this system is damaged some degree of functional "recovery" may take place. This chapter emphasizes the nigrostriatal system, and it should be pointed out that traveling in parallel with this system are strionigral pathways and that both of these bundles are destroyed by far-lateral hypothalamic lesions. Jürgen's chapter dealing with the hypothalamus and behavioral patterns is well organized and integrates well with chapters on hypothalamic physiology. Jürgen concludes that the hypothalamus serves to modulate stimulus-response relationships by changing the probability of occurrence of specific behavioral patterns, in other words by changing the "motivation." This conclusion is speculative and is not supported by direct evidence. Introducing the concept of motivation only befouls already muddy waters. The final chapter, by deRuiter *et al.*, is a heroic attempt to build an adequate physiological model of behavior with emphasis on the central neural feeding mechanisms. The ethology is tried and true, but the chapter becomes deeply mired in motivation theory as an explanation of mechanism. As deRuiter *et al.* finally admit, no general theory of the behavioral functions of the hypothalamus can yet be constructed. Overall, however, the chapter is thought-provoking even though it pushes neuronal modeling to its extreme limits and even beyond.

In short, despite the title of the volume neither the special properties of the hypothalamus nor its function as one of the most important *integrative* centers of the brain receives adequate coverage either in formal presentations or in the appended discussions. We still await a volume that provides an adequate synthesis of integrative hypothalamic activity.

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## Molecular Genetics

**Mechanisms of Genetic Recombination.** V. V. KUSHEV. Translated from the Russian edition (Leningrad, 1971) by Basil Haigh. Consultants Bureau (Plenum), New York, 1974. xii, 254 pp., illus. $25. Studies in Soviet Science.

The knowledge that genic material is DNA almost everywhere provides the hope that the processes of recombination will be similar in all creatures. Certain features of recombination are so widespread that they can be labeled "fundamental." Crossing-over occurs when DNA duplexes are broken and rejoined. Rejoining involves formation of a "splice." When the two participating chromosomes differ in the region of the splice, a "heteroduplex" results. Heteroduplexes can also arise by the replacement of a single-strand stretch of polynucleotide on one chromosome by the homologous stretch donated by the other in a process which does not result in crossing-over. Enzymes sometimes recognize heteroduplex base mismatches and act upon them to restore proper Watson-Crick structure. This mismatch correction is a source of gene conversion. Chromosomes contain nucleotide sequences which promote the events leading to gene conversion (localized