Biological Program's *Project Aqua,* was the only known locality of several species of plants, crustaceans, insects, and fish. I follow P. J. Darlington, Lars Brundin, and the editor of this volume in noting that the time left for the exploration of these antipodean biotas is short. Williams and his collaborators are to be commended for bringing the importance of the Tasmanian biota to the attention of the scientific community. Perhaps as the public learns more of its significance its conservation will be given higher priority.

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Aftermaths of Brain Lesions

Plasticity and Recovery of Function in the Central Nervous System. Proceedings of a conference, Worcester, Mass., Sept. 1973. DONALD G. STEIN, JEFFREY J. ROSEN, and NELSON BUTTERS, Eds. Academic Press, New York, 1974. xii, 516 pp., illus. $19.50.

The study of recovery of function following brain lesions is an old endeavor, dating back at least to the last century. The field has been plagued by the problem of defining exactly what it is that is recovering: is the brain correcting for damage done to its various parts and their dependents, or does the animal simply learn new ways to do old tricks? While the arguments continue, this problem has yet to be satisfactorily resolved, in part because the larger question of how behavioral functions are localized in the brain goes unanswered. If, as some suggest, the brain should be viewed as an incredible network with little discrete parcellation of function, the idea that lost tissue is replaced by adjustments elsewhere in the system becomes tenable. This view of brain organization has failed to gain many adherents, however. Most scientists believe that brain regions are unique and specialized, and most tend to see recovery phenomena as examples of the ability of the organism to operate without the contributions of the damaged area.

Possibly because these basic issues continue unresolved, recovery of function has remained more of concern to the clinician than to the laboratory worker. Recent developments in neurobiology, however, have revitalized interest in the subject. Specifically, substantial evidence has been reported indicating that lesions cause exotic anatomical and chemical changes, some of which seem to be excellent candidates for a mechanism to explain at least some aspects of the recovery phenomenon. The book under review is the result of a conference at which a group of workers studying recovery were brought together with researchers investigating the brain's capacities for reorganization, that is, "brain plasticity."

As would be expected, much of the book is taken up with reports from the laboratory and clinic on recovery following damage to the mature central nervous system. By reading this section a reader can quickly come to an understanding of the experimental approaches and principal neurobehavioral findings of workers in this area. This useful collection is highlighted by a superb paper by Goldberger describing work in which he used lesions in the different subdivisions of the brain's motor systems to test various descriptive hypotheses about the nature of the recovery process. The advantages gained by using lesions in anatomically defined systems and studying their effects on relatively simple behaviors are so well demonstrated by this review that one wonders why the practice is not more widely followed.

In striking contrast to the extended list of behavioral papers on the recovery process, there is very little in the book on the neuroanatomical and biochemical changes initiated by the lesions. This is all the more surprising in view of the frequent reference made in the behavioral chapters to studies of such phenomena as axon sprouting and denervation supersensitivity as possible or even likely mechanisms to account for recovery. R. Y. Moore does give us a level-headed appraisal of post-lesion growth by the catecholamine system, but the remainder of the work that has been done on lesions and brain plasticity is not reviewed anywhere in the book. In short, the book is unbalanced and in a sense fails to live up to its title.

The volume also contains three interesting papers on the behavioral and anatomical consequences of lesions in the immature nervous system. Schneider and Jhaveri's account is particularly fascinating because they have attempted with some success to correlate their descriptions of axon sprouting, or perhaps altered growth in developing fiber systems, with behavioral changes. As in the chapter by Goldberger, the advantages of selecting an anatomical system appropriate for the question being asked are well illustrated by Schneider and Jhaveri's review. The chapter by Brunner and Altman and that by Goldman not only describe some interesting findings but also provide useful discussions of the experimental and theoretical issues attendant on work with neonatal animals.

There are also two papers (Meyer and Sperry; Jacobson) on the development of the retinotectal connections in fish and amphibians. What relationship these bear to the theme of the book is left for the reader to decide, but the papers stand by themselves as sharply analytical reviews.

The book is opened by an informative and entertaining history by Rosner of the study of recovery and localization of function. This chapter should be read by anyone venturing into either of these areas.

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Membrane Methods

Evolving Strategies and Tactics in Membrane Research. DONALD F. H. WALLACH and RICHARD J. WINZLER. Springer-Verlag, New York, 1974. x, 382 pp., illus. $29.80.

This book deals with two basic problems of contemporary membrane research. The first two chapters describe membrane isolation techniques and methods for separating and identifying membrane components, and the remainder of the book deals with spectroscopic techniques that are being used to study natural membranes and artificial lipid bilayers. The book is very readable. Rather than presenting a series of highly detailed accounts of membrane techniques, the authors outline the strategy and the theoretical basis of each technique and describe it briefly, providing references for actual bench work. The first two chapters alone are probably worth the price of the book, especially to the neophyte in membrane research.

In chapter 1 the hazards of extrapolating data obtained from isolated membrane fragments to the in situ situation in the whole cell are well expounded. It is refreshing to read an integrated discussion of centrifugation techniques, membrane enzyme markers, covalent

labeling methods, and other techniques that have been used on certain membranes and that probably can be applied to membranes in general. The discussion of specific approaches to plasma membrane fractionation includes erythrocytes, bile fronts, and specialized membrane surfaces such as brush border. Cytoplasmic membranes are considered separately.

Chapter 2 emphasizes methods for separating and identifying membrane proteins on the basis of charge and size. The sodium dodecyl sulfate polyacrylamide gel system is discussed in detail, along with artifacts that may develop. The single most important feature of integral membrane proteins is their insolubility in water. As a result of this feature, the researcher is often, as the authors point out, led to "almost desperate maneuvers and unwitting pitfalls" in purification and identification. A comprehensive volume detailing specific membrane methods would be useful as a laboratory reference manual. It is not premature to be thinking in this way. Such a manual might in fact promote the development of methods for handling membrane proteins that would be as powerful and versatile as ion exchange chromatography was in the purification of water-soluble proteins.

Of the remaining chapters, only those on nuclear magnetic resonance, fluorescent probes, and spin-label probes deal with tactics useful for examining properties of the lipid bilayer and the proteins in it. These are the only spectroscopic techniques that have added unequivocally to our knowledge of lipid-lipid and lipid-protein interactions. Infrared spectroscopy, circular dichroism, and optical rotatory dispersion, the other techniques discussed, have occupied the time and energies of excellent people but have not yet been developed to their capacity for answering questions related to the membrane. The initial excitement engendered by the use of circular dichroism and optical rotatory dispersion, for example, for investigating the conformations of membrane proteins has long since abated. The authors resolutely call for "major developments in optical activity outside the membrane field." Yet the chapters on these less productive techniques have value. The authors present the basic theory underlying them in an understandable way and relate the history of their use in membrane work in several laboratories.

The discussion of spin-label probes is well done. The authors introduce the basic theory once again in a concise fashion, describe selected nitroxide spin labels, evaluate their use in various artificial and naturally occurring membranes, and present examples of conclusions concerning membrane structure reached with their aid.

In the final chapter the authors present their views on membrane architecture, repeating and redefining old terms such as "unit membrane" and including a considerable historical discussion of myelin as the prototype membrane. Brief descriptions, with literature references and diagrammatic representations, of specialized amino acid sequences in integral (or "core") membrane proteins, protein-carbohydrate complexes, and specific protein-lipid interactions in some membranes are the most useful parts of the chapter.

It is disappointing that there is no description of electron microscopic techniques using electron dense markers for visualizing the disposition and asymmetries of specific membrane components (for example, ferritin antibody techniques). The preoccupation of the authors is with structure. How these various techniques have been used or might be used for studying the manner in which specific proteins or protein-lipid complexes function in the cell surface might well be considered as a subject for future volumes in this field.

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Potentially Hazardous Nuclides

Radioecology. V. M. KLECHKOVSKII, G. G. POLIKARPOV, and R. M. ALEKSAKHIN, Eds. Translated from the Russian edition (Moscow, 1971) by N. Kaner and H. Mills. D. Greenberg, Transl. Ed. Halsted (Wiley), New York, and Israel Program for Scientific Translations, Jerusalem, 1973. xii, 372 pp., illus. $35.

Since the Russian text of this book began to be circulated here, individuals have attempted to translate parts of it for their own use. This complete translation should be eagerly received.

The book is a collection of papers organized around four topical themes: radionuclide movement in terrestrial ecosystems, effects of ionizing radiation on terrestrial ecosystems, general radioecological aspects of terrestrial ecosystems, and the radioecology of aquatic ecosystems. One of the highlights is a mapping of the geographic distribution of natural radionuclides in soils. In landscape geochemistry and pedology the Russians clearly establish their credentials. Sophisticated analyses of distribution/diffusion coefficients and thermodynamics of radionuclide-soil bonds take into account the influence of natural complexing agents on environmental mobility. Ecology in the strict sense of the word is dealt with rather superficially. Fallout predominates among the sources of environmental radionuclides discussed. The discussion of radiological hygiene (health physics) emphasizes the critical pathway concept for estimating dose to man, although biogeochemical cycles are recognized as important in chronic, low-level uptake. Principles of radiation genetics and dosimetry and ecological effects are adeptly reviewed, but agricultural systems and alpha and neutron radiations are not discussed. A special chapter on radioecology of landscapes of the far north is a comprehensive case study. In aquatic radioecology the proficiency of Russian researchers is again apparent. The extensive data presented here on the ecology and chemistry of marine and freshwater environments provide excellent background for interpreting food chain transport and bioaccumulation of potentially hazardous radionuclides.

A wealth of technical information is summarized in graphs and tables. Inconsistencies in style and objectives—some papers describe analytical methodology, others attempt conceptual synthesis—do not detract from the value of the book. There is an annoying delay in the assimilation of technical literature, and Western literature citations seem to have been editorially appended to various bibliographies. The book is not definitive, but it will serve as an invaluable summary of and guide to a literature heretofore difficult of access. For companion volumes, readers are referred to G. G. Polikarpov's *Radioecology of Aquatic Organisms* (Reinhold, 1966), and B. N. Annekov, I. K. Dibobes, and R. M. Aleksakhin's *The Radiobiology and Radioecology of Farm Animals* (AEC-tr-7523, National Technical Information Service, 1973).

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