but only, as Stebbins correctly emphasizes, when a great deal more is known about the biosynthetic pathways involved. Mycorrhizae doubtless control the distributions of many plants, and should continue to be investigated in detail. A new synthetic theory of plant population biology which is now being constructed by ecologists, geneticists, biochemists, and mathematicians will one day help further to illuminate these traditional questions.

By focusing on the adaptive nature of important evolutionary shifts in plants, Stebbins has given us a series of stimulating and well-presented hypotheses, comparable to those which have proved so fruitful in zoology, for study and evaluation. Many students of angiosperm phylogeny have dwelt at such length on the relationships among extant groups and their possible bearing on questions of mid-Cretaceous evolutionary shifts that we have often been unable to see the forest for the trees. In the present volume, a master of evolutionary theory has outlined some of the concepts that may help to free us from some of the more deeply rooted typological concepts of the past and allow us to begin charting with increasing accuracy the actual outlines of the forest.

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## A Southern Continental Island

**Biogeography and Ecology in Tasmania.** W. D. WILLIAMS, Ed. Junk, The Hague, 1974. x, 498 pp., illus. + loose map. Dfl. 140. Monographiae Biologicae, vol. 25.

The importance of the rich biota of the mountainous, well-watered island of Tasmania remains generally unappreciated by both biologists and Tasmanians. Only in the past decade have Australian biologists begun to study the area intensively. This valuable reference volume, which surveys much of the recent work, should help to bring Tasmania into the mainstream of thought on the biology of islands.

The flora of this large continental island comprises over 1250 species of seed plants, including the notorious "horizontal scrub," the only redwoods in the Southern Hemisphere, and the tallest (98 meters) hardwoods in the world. The fauna, with which this volume is largely concerned, includes evolutionary relics like the syncarid crustacean *Anaspides* and geographic relicts like the marsupial "wolf" or thylacine, which is now "very rare or extinct." Some elements of the fauna (marsupials, leptodactyloid frogs, galaxiid fish, and certain arthropods) show strong "Gondwanaland" affinities; other elements (reptiles, earthworms) do not. Endemism and diversity are relatively high. The presence of 48 endemic earthworm species constitutes a species density rarely equaled elsewhere in the world, although it is paralleled on the adjacent mainland, where the world's largest (3.4 meters) worms may still be heard.

This volume contains contributions by 16 workers. It opens with a brief account of the Tasmanian environment and a review of Pleistocene glaciation and subsequent geomorphic history. There are three chapters of primarily ecological interest (on limnology, population ecology of introduced fish, and geographical ecology of the avifauna) and nine detailed accounts of various groups of oligochaetes, crustaceans, and vertebrates. The systematics, distribution, ecology, behavior, and evolution of these groups are treated authoritatively and much new information is presented. Most of the contributors consider the fauna of the adjacent mainland together with that of the island. In his account of the Australian earthworms B. G. M. Jamieson provides a concise review of world oligochaete systematics and a critical analysis of the roles of continental drift and migration in establishing present distribution patterns. There are also reviews of marine littoral biogeography, aborigines, and conservation. A useful companion to this well-produced volume is the separate topographic map. The volume is less comprehensive than some of its predecessors in this respected series. The lack of comparable accounts of other organisms is lamentable (such an account is not yet feasible, according to the editor). More unfortunate for the general reader is the absence of a synthesis or overview of the importance of the biota.

Aside from the intrinsic interest of its biota there are several reasons why Tasmania merits global attention. First, as Williams shows in his discussion of the crustaceans, the island is of signal importance in solving the type of phylogenetic and biogeographic problems posed by groups of organisms restricted to the southern end of the world. In this connection, it is worth noting the difficulties faced by systematists working on these widely disjunct biotas; their important work could be greatly speeded up if there were more opportunities for scientific exchange between the various nations involved. Second, as this volume demonstrates, this area has great potential as a natural laboratory for ecologists, evolutionary biologists, and those interested in extending biogeographic theory to continental areas.

As evolutionary biogeographers begin to tackle the problems of continents the study of their fringing islands becomes increasingly important. Unlike oceanic islands, which are colonized across water gaps, continental islands like Tasmania were repeatedly connected with the adjacent mainland when glacioeustatic fluctuations lowered sea levels during the late Cenozoic. (In the case of Tasmania a broad Bassian Isthmus emerged whenever sea levels fell 65 meters.) The elegant theory developed to account for the biotas of oceanic islands is not directly applicable to continents or continental islands, where the roles of geographic history and coevolutionary interactions cannot be ignored. These variables are more tractable in the case of continental islands, as the contributions of vertebrate zoologists to this volume indicate. Their discussions of geographic speciation, divergence in isolation, species diversity, invasibility, and niche shifts will interest many readers and demonstrate the potential of this area for further studies.

The final chapter of this volume concerns biological conservation. "The Tasmanians have an evil record at this sort of thing," wrote the great Australian zoologist A. J. Marshall in *The Great Extermination* (Heinemann, 1966, p. 216). The record includes the genocide of the Tasmanian aborigines and the eradication of the thylacine. In 1950 a quarter of a major national park was alienated for logging; forest destruction continues today as large tracts are converted into wood-chips for export to Japan. We can only guess what fine Australian expletive Jock Marshall would have used had he lived to see the destruction of Lake Pedder by the Tasmanian government's Hydro-Electric Commission in 1972. Situated in its own national park in the remote southwest, this unique lake, conservation of which was recommended by the International

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