



Diseases and Plant Population Biology by Jeremy J. Burdon

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areas of multivariate analysis (methods of statistical hypothesis testing, such as multivariate analysis of variance), that may be important in studies of ecological communities.

The first chapter describes types and forms of ecological data, standardizations, transformations, and different ways of constructing association data from other types of data sets. The next chapter is about methods of inspecting data sets before any analysis is made. These are methods of graphical representation that make visual assessment of complex data sets easier. Similar graphical methods are also used for displaying results of multivariate analyses in later chapters.

Chapters 3 through 5 discuss two main types of multivariate analysis: ordination and classification. Chapter 3 describes ordination methods such as gradient, principal components, correspondence, canonical variate, canonical correlation and principal coordinates analyses, and non-metric ordination. Chapter 4 describes Procrustes analysis, used for comparing different ordinations (e.g., obtained from analyses based on different variables) of the same set of units. Chapter 5 describes hierarchical and non-hierarchical methods of classification. The former is further divided into agglomerative (i.e., cluster analysis) and divisive hierarchical methods. This chapter also includes a short section on methods for comparing classifications.

Chapter 6 discusses methods for analysing matrices of asymmetric associations, case studies being from animal behavior (e.g., pecking relationships among a flock of hens), plant species succession, and competitive interactions between pairs of plant species. The book ends with a chapter on computational aspects of multivariate analysis (emphasizing the use of the Genstat statistical package), and an appendix on basic concepts and operations in matrix algebra.

Although certain parts of the book would have benefitted from longer explanations (e.g., about the selection of a particular method for a particular question), in general it is a good, concise textbook, introducing a large number of methods and giving several examples in a relatively small volume. Its wide coverage of multivariate methods, especially those with which most ecologists are not familiar (analysis of asymmetry and comparing ordinations), will make it a very useful book for community ecologists.

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THE FISHERMAN'S PROBLEM. *Ecology and Law in the California Fisheries, 1850-1980. Studies in Environment and History.*

By Arthur F. McEvoy; Series Editors: Donald Worster

and Alfred Crosby. Cambridge University Press, Cambridge and New York. \$39.50. xvii + 368 p.; ill.; index. ISBN: 0-521-32427-0. 1986.

This is a remarkable work, concerning much more than its title suggests. As the blurb on the dust jacket states, "the book represents a significant new departure in the study of ecology and change in human society." The thesis is succinctly stated in the final paragraph (p. 257): "The history of California's fisheries, a laboratory example of the fisherman's problem in all its complexity, suggests that the interdependence between ecologic, economic, and social processes — between environment and society — is inexorable. . . . Forsaking domination over nature for solidarity with it need not entail the exchange by humanity of reason for animism or industrialization for a hunting-gathering economy. It only means learning to care for other living things, which is at once the special talent and the special responsibility of the species."

The author arrives at this conclusion after a detailed study of aboriginal relationships with natural resources, especially the salmon-based economy of the Indians of the lower Klamath river, and the history of the sardine fishery and the CalCOFI (California Cooperative Oceanic Fisheries Investigations), the greatest coordinated fisheries study, both in extent and duration, in history. The tangled tale of the sardine fishery, with its political and bureaucratic ramifications is told without mentioning Cannery Row, an indication of the relative insignificance of the phenomenon, whatever its literary or philosophical overtones may be. The book is stuffed with interesting details, especially about the fishery biologists involved. It is nevertheless written without rancor or special pleading. For example, McEvoy refers to the governor who wrecked the Fish and Game Commission in the middle of the sardine controversy, and by that act cut the ground from under the state's excellent fisheries staff, only by date of assuming office. The present controversy over water diversion and its effects on San Francisco Bay is not considered; that would have to be another book, but the moral is applicable.

The book is buttressed with detailed notes and a fantastic barrage of references and sources that is a gold mine "for further reading." Every fishery biologist, environmental activist and lawyer should read it. It is a labor of love, written for all of us.

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DISEASES AND PLANT POPULATION BIOLOGY. *Cambridge Studies in Ecology.*

By Jeremy J. Burdon; Series Editors: R. S. K. Barnes et al. Cambridge University Press, Cambridge and New

York. \$49.50 (hardcover); \$19.95 (paper). viii + 208 p.; ill.; index. ISBN: 0-521-30283-8 (hc); 0-521-31615-4 (pb). 1987.

The stated purpose of Burdon's brief volume is to provoke the interest of plant population biologists, including ecologists and geneticists, modellers and empirical scientists, in the interactions of pathogens with nonagricultural plant populations. He restricts his attention to viruses, bacteria, and fungi as pathogens, and presents ideas from the field of plant pathology along with examples from nonagricultural systems. His thesis is that plant pathogens are an underestimated factor influencing the density, distribution, and genetics of plant populations, and that pathogens, by extension, probably affect plant communities much more than has been appreciated. Although he emphasizes the potential significance of pathogens at the community and evolutionary levels, the book deals primarily with individual plant populations and short-term interactions. This is necessitated by the dearth of available data.

The book begins with brief reviews of growth and development of plants, plant populations, and disease epidemics. The later chapters of the book concentrate on the numerical and genetic effects of pathogens on host populations and on their potential feedback effects. As ecologists, we found the chapters on the effects of pathogens on host populations size, on host genetics, and on environmental modification of host-pathogen interactions particularly interesting. Burdon attempts to interrelate these ideas within the separate chapters and emphasizes the need for more sophisticated experiments and models if we are to understand the interrelations of environment, genetics, and demography.

Both the writing and the production are of high quality. We found very few typographical errors. The book contains a brief glossary, which is helpful, particularly for the terminology of resistance, which is used in an inconsistent and confusing way in the literature. The 20-page bibliography is current and includes a healthy mix of literature from plant pathology, ecology, and the theory of host-parasite interactions.

Burdon's book should provoke the interest of ecologists in the role of pathogens in plant population ecology. The data and ideas presented are interesting and intriguing, although in no case definitive. An understanding of the ecological and evolutionary significance of plant-pathogen interactions is in its infancy. Burdon's book makes this clear, while offering much intriguing data. The book is interesting reading and should stimulate further integrated research.

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NEURAL SCIENCES

SELECTIVE NEURONAL DEATH. Proceedings of a symposium held April 15-17, 1986, at the Ciba Foundation, London. Ciba Foundation Symposium, Volume 126. A Wiley-Interscience Publication.

Edited by Gregory Bock and Maeve O'Connor. Published for the Ciba Foundation by John Wiley & Sons, Chichester and New York. \$47.00. ix + 271 p.; ill.; contributors and subject indexes. ISBN: 0-471-91092-9. 1987.

Selective neuronal death is a widespread phenomenon during development. It is also known to be correlated with, and thought to be causally related to a number of neurological disorders. In both situations, an obvious issue is, why do certain neurons die? This is the basic question addressed by the authors whose 14 chapters are included in this Ciba Symposium volume. Seven of the chapters are clinically oriented and seven deal with experimental animal models of neuron death.

As is often the case of symposium volumes, the quality of the contributed chapters is uneven. In general, the most successful chapters are those in which the authors address conceptual issues or review a circumscribed area of research with sufficient depth and clarity to provide the reader a synthesis of some restricted aspect of neuronal cell death. The volume begins with an excellent chapter by Agid and Blin summarizing neuro-degenerative disorders and neuron loss from a neurologist's point of view. Other well-written chapters include those by Fahrback and Truman and by Konishi and Akutagawa on hormonal control of cell death in the tobacco hornworm and song finch, respectively, and one on muscle activity and motor neuron death in the spinal cord of the chick embryo, by Oppenheim. The chapter by Doering and Aguayo, on cytoskeletal abnormalities in long-term embryonic CNS transplants grown within peripheral nerve, provides information about a novel experimental approach to phenomena described by neuropathologists. Several additional chapters provide succinct reviews of the various ways chemicals can have cytotoxic effects on defined neuronal populations. A relatively long chapter by O'Leary on remodelling of early axonal projections through the selective elimination of neurons and long axon collaterals is also noteworthy. The less successful chapters serve as little more than annotated bibliographies which an interested reader would have to take to a library in order to learn anything of interest. While still useful as a starting point for access to the relevant literature,