of the subject in a text of this sort. Similarly, Brown devotes a chapter to social parasitism. Whereas Wilson apparently considers the biology of altruism to be crucial to sociobiology theory, Alcock gives it only cursory attention. Certainly, altruism and the breakthroughs associated with its evolutionary analysis were central to the renaissance of sociobiology, evolutionary ethology, or whatever one prefers to call the discipline. Whether altruism really warrants a continuing central position is uncertain at present, but it would have been nice if Alcock had indicated the basis for his de-emphasis.

Alcock's two concluding chapters deal with human behavior, persuasively arguing for consideration of possible genetic predispositions, and forthrightly facing the possible moral dilemmas. By contrast, Brown avoids the issue of *Homo sapiens*—a legitimate decision perhaps, but one that would be more palatable if accompanied by a justification. Insofar as evolutionary approaches continue to yield profitable insights into animal behavior, we can expect the issue of human sociobiology to gain momentum, cogency, and adherents in the near future. Most ethologists are committed to the proposition that a stickleback fish is worth knowing in its own right. But we are only human and cannot be blamed for wanting to test our just-forged tools against that ultimate dilemma, ourselves. Psychologists and sociologists particularly may find this new approach confusing and distasteful. However, there will be some hope for mutual understanding and beneficial exchange if the critics recognize that behavior is not claimed to be somehow encapsulated within genes, waiting to spring fully armed like Athena from the head of Zeus. Rather, genes code for a variable range of potential phenotypes, within which specific outcomes are influenced by the individual's experiences and the proximate mechanisms available.

Ethology is certainly astir these days, and anyone seeking introduction to the evolutionary approach now has two excellent, well-illustrated books from which to choose. Indeed, a field once lacking textbooks now boasts a goodly number of competent ones, each with its own approach: the classic European viewpoint (Eibl-Eibesfeldt), a substantial synthesis of ethology and comparative psychology (Hinde), a somewhat dated but still powerful exposition of proximate mechanisms (Marler and Hamilton), a historical view (Klopfer), an advanced treatment of the evolutionary biology of social behavior (Wilson), and now these two introductions to the functionalist approach, incorporating social behavior but conspicuously not limited to it. Perhaps it is time for one of the "structuralists" to enter the fray with their pitch. In any case, ethology instructors are increasingly hard put to indulge that familiar complaint of academicians, the forlorn claim that no good textbooks are available.

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Environment and Politics

The Florida Experience. Land and Water Policy in a Growth State. LUTHER J. CARTER. Published for Resources for the Future by Johns Hopkins University Press, Baltimore, 1975. xviii, 356 pp., illus. $15.

Historians of matters of environmental concern can sympathize with Gibbon's sentiment that "history is indeed little more than the register of the crimes, follies, and misfortunes of mankind." Much of *The Florida Experience* supports such a view. Florida was the first of the United States to be discovered and colonized by Europeans, but it presented more obstacles to early conquest and dominion than any other. For three centuries following Ponce de Leon's 1513 voyage, the European physical impact on the territory was negligible. In south Florida, Indians hostile to Europeans and an environment hostile to any who did not understand it and would not adapt their life style to its demands destroyed or excluded most outsiders until late in the 19th century. Indian wars were still being fought in the area long after they had become distant memories throughout the rest of the eastern half of the continent.

Florida was clearly a different frontier, and it was one that inspired considerable hyperbole. Some early writers described it as a wasteland fit only for reptiles while others wrote reverently of an awesome and mysterious earthly paradise. Lack of understanding of what Florida was had great influence on its development.

Florida contains many uniquely sensitive delicate environments, and a substantial fraction of the state's land is either submerged or periodically inundated. As confidence in man's engineering ability grew, vast drainage schemes were envisioned and undertaken. These "reclamation" projects resulted in perhaps the most significant changes in the Florida landscape, but were just another in a series of exploitative perturbations that grew at a rate that more than compensated for the centuries of intimidation.

As is often the case when poorly understood complex systems are manipulated, drainage created at least as many problems as it solved. In reviewing the development of water policies in south Florida, Carter does a remarkable job of describing the natural systems, tracing and evaluating the forces behind the drainage schemes, and analyzing the diverse aggregation of resulting diseconomies. He chronicles the years of political activity that resulted in the creation of Everglades National Park, a relict area that now encompasses a mere 7 percent of the original area of the biome it represents.

The Everglades story and that of south Florida drainage are only two of the scenarios that Carter uses to highlight the development of the state's conflicts between growth and preservation. His case studies of the ill-conceived Florida Jetport, the growth of Dade County, the preservation of the Big Cypress Swamp, and the conflict over the Cross-Florida Barge Canal are masterpieces of measured reportage and analysis.

Despite the sadness one feels for what so recently has been lost, a sense of inexorability, the essence of tragedy, does not dominate Carter's style. He is at his best in analyzing the political forces that have evolved in modern Florida, and here one senses optimism. He reviews the revitalization of an anachronistic governmental structure and the curious homeostasis that a change in beliefs and values is bringing about. Environmental destruction may have created an environment in which newcomers who further perturb natural systems can comfortably live, but it is these very newcomers who are most vocal in support of preserving what is left of primeval Florida. They have become a potent political force.

Carter's evaluation of the recent innovative environmental legislation that has become law in Florida is a perceptive analysis of how governments deal with environmental matters and what political and constitutional problems they face. He identifies the strengths and shortcomings of new land and water laws in terms of both the bureaucratic framework in which they have to operate and the individuals upon whom their administration depends.

What Carter has done, in essence, is artfully weave together history, natural history, and politics into a work that gives the reader a feel not only for what Florida was, what it is, and what it might become, but for what he thinks it should become, and why. The readability of the book and its careful separation of fact and opinion argue well for the encouragement of such research and writing projects by able journalists. The book is thus also a credit to Resources for the Future, the organization that supported Carter's research, whose

emphasis on arcane economics keeps much of its work from decision-makers and the general public.

"One of the happy incidents of the Federal system," Justice Louis Brandeis once wrote, "is that a single state may, if its citizens choose, serve as a laboratory; and try novel social and economic experiments without risk to the rest of the country." Carter's book is a valuable documentation of one such set of experiments. His insights and conclusions should be of value to those facing similar growth-related problems in other states.

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Species Abundance Patterns

Ecological Diversity. E. C. PIELOU. Wiley-Interscience, New York, 1975. x, 166 pp., illus. $14.95.

How many species can live together in a given place, and what are their relative abundances likely to be? Pielou's monograph (not to be confused with her textbook *Population and Community Ecology*, also just published) aims at a succinct review and synthesis of mathematical aspects of these questions.

The book opens with a survey of the often muddled literature that seeks some single number, or "index," to describe the diversity or evenness of a community. Various species-abundance distributions (lognormal, logseries, and so on) are then discussed in detail, with attention given to the relationship between the different ways in which these distributions are conventionally displayed by ecologists (for example, as rank-abundance plots). With the mathematical foundations laid, Pielou turns to statistical methods for testing hypotheses about species' abundances, and to the relations between spatial patterns and species diversity.

In discussing *local* factors that help determine diversity, Pielou gives an incisive summary of the models of Skellam and of Horn and MacArthur, which show how a competitively inferior species can persist by virtue of superior vagility if the environment is spatially heterogeneous. She also develops a suggestive new model for two-species competition, in which time delays in the growth equations and a monotonic environmental gradient can combine to produce a cyclic mosaic: zones dominated by species A alternate with zones dominated by species B, and these zones migrate up and down the gradient in cyclic fashion.

The discussion of *global* factors that bear upon species diversity includes a very crisp exposition of current notions about the relation between "stability" and "complexity," namely that a predictable or stable environment may permit the evolution of a complex community (itself usually a dynamically fragile thing). The book concludes with speculations about changes in diversity over geological time. This is a fascinating topic. How recent developments in theoretical ecology can shed light on aspects of the fossil record is illustrated by many papers in the new journal *Paleobiology* or (for a more general audience) by some of Gould's monthly essays in *Natural History*.

The emphasis in this book is primarily on lucid and rigorous mathematics, and secondarily on methods for testing hypotheses against relevant data. It is a "feet-on-the-ground" book, with a healthy distrust of grand and general theories. Pielou has wise things to say about what might be called the philosophy of model building, or even the philosophy of applied mathematics. Noting the tendency for theoretical ecology to bifurcate into mathematical ecology and statistical ecology, she cautions that "mathematicians run the risk of constructing interesting models divorced from reality; and the statisticians of providing clear answers to ecologically uninteresting questions." At times these digressions border on the epigrammatic: "models reveal possibilities but not impossibilities."

From the areas mapped out in this book, paths lead off in many directions. For example, it is frequently noted that in streams and lakes the effect of pollution is to change the patterns of species relative abundance from the relatively even lognormal distribution characteristic of the equilibrium community into a distribution where a few species are exceptionally common. It is tempting to seek some simple diversity index that reflects such changes, and to use this index in environmental impact studies. But as Patrick, Williamson, and others have observed, for polluted waters any such single number will be dominated by the handful of common species, whereas the time scale for recovery of the pristine ecosystem (and, indeed, whether it can ever recover) depends on the presence of a variety of species which are uncommon in the polluted community, and whose presence will not show up in any overall diversity index. This is one of many relevant but unresolved questions. Pielou's book stands as a signpost toward this sort of practical application.

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Secretory Mechanism

Salt Glands in Birds and Reptiles. M. PEAKER and J. L. LINZELL. Cambridge University Press, New York, 1975. x, 308 pp., illus., + plates. $27.50. Monographs of the Physiological Society, No. 32.

There has been no other comprehensive treatment of avian and reptilian salt glands, and the appearance of this volume is most welcome. These glands, which provide an extrarenal mechanism for salt secretion, are of interest from viewpoints ranging from the molecular to the ecological. Thus, publications on salt glands have appeared in a wide variety of journals, and much of this information has not previously been brought together—much less synthesized. This is what Peaker and Linzell have attempted, rather successfully, in their monograph.

The section on avian salt glands makes up over 80 percent of the text. Following an overview of the morphology of the gland, this section proceeds into chapters focusing on the various physiological and biochemical mechanisms involved in salt gland function (for example nervous control, blood flow, secretory mechanisms, role of hormones, adaptation) and ends with two chapters dealing with salt glands in the perspective of the whole animal and its environment. The chapter topics are highly interdependent, yet the authors have tried to make the chapters comprehensible as units to enable readers "to find what they require without having to plough through the whole work!" Extensive cross-referencing is employed to this end, but those plowing through still encounter considerable repetition. The section on reptiles is divided taxonomically and treats sea turtles, terrapins, sea snakes, the Galápagos marine iguana, and terrestrial lizards. Insofar as is possible, matters of morphology, control mechanisms, adaptation, and so on are dealt with for each group, with frequent comparison with the avian glands.

This book provides a complete and detailed accounting of research on salt glands such as is not possible in review articles. Reference is made in the text to virtually every publication on salt glands appearing prior to 1973, and to many that appeared in that year. An addendum lists more recent publications relevant to each chapter. Liberal use of tables and figures from primary sources also enhances the reference value of the book. Although the authors occasionally become bogged down in attempts to reconcile conflicting data, they usually manage to emerge with testable hypotheses. In addition, they provide thoughtful criticism of the methods employed in studies of salt glands.