The papers in this volume are largely self-contained and can be read independently. In general they are thoroughly referenced. The book contains detailed author and subject indexes. It will be of obvious value to the materials scientist or physiologist working in biomechanics, and it can be read profitably by many molecular, cell, developmental, and evolutionary biologists, as well as by physicians, anatomists, and ecologists.

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Patterns of Predation

Predation and Freshwater Communities. THOMAS M. ZARET. Yale University Press, New Haven, Conn., 1980. xiv, 188 pp., illus. $15.

As an alternative to the *post hoc ergo propter hoc* syndrome typified by ecological studies of competition, the author of this book tries "a different approach . . . From inductive reasoning, community models [of predation] are developed. . . . predictions are generated and tested with field data." Zaret has been a leading researcher on size-selective fish feeding, effects of prey visibility on rates of predation, and vertical migration as an antipredator tactic in both temperate and tropical lake ecosystems. He thus writes with authority on the effects these and other aspects of predation have on freshwater communities. The result will certainly be of interest to ecologists seeking readable descriptions of the various processes by which predation molds the structure of natural communities and to freshwater biologists desirous of a well-referenced review of research on interactions among pelagic animals in lakes.

However, the book does not provide concise, quantitative models of predation that would serve as a basis for significant advancement in lake ecosystem studies. The models presented in chapter 6 are simple summaries of community patterns presented in earlier chapters along with descriptions of the species interactions (also presented earlier) that generate them. We learn that, when predation by planktivorous fish is moderate in lakes of northeastern United States, predation by invertebrates tends to be intense. This leads to the predominance of prey species 0.8 to 1.8 millimeters long that have reduced visible body size (to avoid vertebrate predators) and enlarged helmets and tail spines (to foil the invertebrate predators). The models provide interesting and perceptive accounts of predation mechanisms that lead to community patterns routinely observed in lakes, although, curiously, the commonly observed coexistence of *Bosmina* and *Epischura* is not predicted. Too qualitative and descriptive to provide any but the most generalized predictions, these models also come dangerously close to being truisms. Field tests of the models presented in chapter 7 are based on two data sets (Galbraith's on Michigan lakes and Brooks and Dodson's on Connecticut lakes) that have already been cited in the development of the models. A third test data set (Nilsson and Pejler's on Swedish lakes) necessitates the development of a new submodel to account for the observed patterns.

Zaret considers the polarization in lake studies that has developed between "predationists" and "competitionists" to be counterproductive. He sensibly recommends that studies seeking to elucidate the ecological conditions under which each process is dominant will be the most profitable. Agreed; however, I think an important but little-discussed difference between the two processes deserves emphasis. Zooplankton communities in which competition predominates are inherently more efficient at transferring energy from algae to fish than are those in which the extra trophic link of predation is present. Thus for studies of lake productivity the distinction between competition and predation is important, whereas for explanations of why a small cladoceran disappears following removal of fish planktivores it is of little value. In fact, throughout the book Zaret gives little consideration to energy flow and ecological efficiency in lakes, emphasizing instead factors determining the densities of predators and their prey. Granted he makes no claim to address these problems, but some report of the considerable quantity of data on effects of prey size on fish growth efficiency and relations between production efficiency and body size in lakes would have been useful. Zaret's decision not to deal with algal grazing by zooplankton will be a disappointment to algologists who consider this to be a legitimate case of predation.

In his appended "further considerations" Zaret lists some interesting problems yet to be resolved. How do prey patches affect planktivore feeding? Why do tactile feeding copepods and filter-feeding cladocerans need eyes? Are toxic prey rare in lakes because, at the low light levels in which fish planktivores feed, aposematic coloration is ineffective? Does *Leptodora*'s strong oxygen dependency affect its ability to compete with other invertebrate predators? These and other questions are useful, but the list could become quickly dated because of the rapid progress of zooplankton ecology. Since the publication of the book it has already been shown, for instance, that cyclomorphosis in some *Daphnia* species (which Zaret correctly interprets as an antipredator tactic) can be induced by chemicals from notonectid and chaoborid predators. Because the book was a long time in preparation (since 1974) much recent work is not adequately incorporated, particularly that presented in the large volume published after the Dartmouth zooplankton symposium (*The Ecology and Evolution of Zooplankton Communities*, W. C. Kerfoot, Ed., University Press of New England, 1980).

Although this book is clearly a labor of love, it does not make a major contribution to the study of predation in freshwater communities and thus cannot be highly recommended.

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Books Received

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