Book Reviews

Community Ecology

Insects on Plants. Community Patterns and Mechanisms. D. R. STRONG, J. H. LAWTON, and RICHARD SOUTHWOOD. Harvard University Press, Cambridge, Mass., 1984. vi, 313 pp., illus. $35; paper, $18.95.

Community ecology is in a ferment, agitated by a rancorous debate about the degree of orderliness and the importance of competition in natural systems. Some of the disagreement is undoubtedly due to the disparate experiences of researchers working with different taxa. In this debate, studies of insects have stimulated many of the challenges to what some perceive to be a competition-biased, equilibrium-obsessed theory. Among insects, equilibria often are difficult to see and species interactions appear to be little affected by competition. These themes, and the additional question of the contribution of coevolution to plant-insect systems, are the focus of this provocative monograph. The authors are quick to point out that their concern with the community ecology of phytophagous insects is no esoteric hobby—after all, plants and their insect herbivores together represent one-half of all living species.

This is a wonderfully written, engaging book, with a very personal choice of examples. By emphasizing systems with which they themselves have worked (for example, *Spartina, Heliconia*, bracken fern, and British trees), the authors offer the insight that comes from a total of 65 years of studying plant-insect associations. *Insects on Plants* is also distinguished by an overriding conviction that populations are the basis of communities and that therefore an understanding of communities must proceed from an understanding of population ecology. Thus, to evaluate the relative importance of competition and predation, much attention is given to life table studies, *K*-factor analyses, and specific population responses to species manipulations. Little mention is made of community-wide, species-packing, or niche-partitioning patterns.

The authors fearlessly take stands on most of the major questions in community ecology as they apply to insect herbivores. They conclude that interspecific competition is feeble and sporadic in its effects but that natural enemies and interactions acting vertically in the food chain are important. The variable and unpredictable character of plant-insect associations is stridently documented and is assigned responsibility for what Strong has labeled "density-vague" population dynamics. We learn, however, that in spite of dramatic fluctuations in absolute densities the structure of the insect community on bracken fern has remained remarkably constant during an 11-year study by Lawton. (I would not expect this to hold up as a general result for insect communities.) Evidence for tight coevolution in plant-insect systems is found lacking—the authors argue that the scarcity of such evidence reflects the rareness of "the sustained, reciprocal and intense interactions that are necessary for coevolution" (p. 218). Additional topics include the evolution of insect diversity through geological time, the number of insect species that feed on particular host plants, consequences of plant defenses, and three-trophic-level interactions. These are all matters on which the authors have made major contributions in their own research.

My only complaint is that I think the authors are sometimes a bit uncritical in using the literature to support their arguments. For example, I do not think that Anderson and May's mathematical models show that natural cycles in the gray larch moth are "most likely" (table 5.2, p. 122) due to infectious disease; Anderson and May actually claim only that their models show that the cycles "may be" due to infectious diseases. Furthermore, the alluring qualitative verbal summaries of the effects of natural enemies and of plant defenses provided by the authors are not enough to satisfy me; I will tend to remain suspicious of our understanding until I see a mechanistic model that generates apt quantitative predictions about plant-herbivore-predator dynamics. Such quantitative theory is still in its infancy when it comes to plant-insect systems. But this quibbling is a little unfair, especially since the authors shun simplistic or dogmatic answers and themselves point out the limitations of our understanding regarding insect herbivores.

Insects on Plants is a first step toward a community ecology for herbivorous insects. Although there is much to disagree with in the book (indeed I am sure the authors intended it that way), it should be widely read. Entomologists could profit by using the book to extend their typical emphasis on autecology. Meanwhile, ecologists (especially American community ecologists) would do well to adopt some of Strong, Lawton, and Southwood's population-level orientation toward testing and developing community theory. It might even turn out that the taxon-prescribed approach represented by *Insects on Plants* is a way of escaping the divisive and ill-posed debates now plaguing community ecology.

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Neo-Darwinism in Disfavor

Beyond Neo-Darwinism. An Introduction to the New Evolutionary Paradigm. MAE-WAN HO and PETER T. SAUNDERS, Eds. Academic Press, Orlando, Fla., 1984. xiv, 376 pp., illus. $40.

Neo-Darwinism began with Weissman's rejection of Lamarckian inheritance and matured in the "modern synthesis," from the 1930's to the early 1950's. A simplistic, false, but remarkably widespread view of this synthetic theory is that it was a simple union of Darwin's theory of natural selection with the mechanistic theory of Mendelian genetics. In this conception, neo-Darwinism is equated with "natural selection of random variations," as the editors of this volume phrase it. Much of the current, less incisive evolutionary literature might indeed lead one to this equation, for the "adaptationist program," under which all traits are adaptive and nearly ideally so, has a firm grip in some quarters. But both the Panglossian adaptationists and the critics of neo-Darwinism fail to appreciate the richness, the plurality, of evolutionary mechanisms inherent in the synthetic theory.

To be sure, natural selection and random mutations were a dominant focus of the modern synthesis. The synthesis came about, after all, largely as a reaction against various neo-Lamarckian,