

## Natural enemies

Natural enemies. The population biology of predators, parasites and diseases. M. J. Crawley, ed. Blackwell Scientific Publications, Oxford, 1992, 576 pp. ISBN 0-632-02698-7.

The book edited by M. J. Crawley consists of 21 chapters written by 30 authors. The chapters are arranged in three sections. The first one ("Background") is aimed at presenting the theoretical background of evolution, morphology, behaviour, and population dynamics of predators and prey. The second section ("Population Biology of Natural Enemies") deals with different taxonomic groups of animals. Biology of various predators (large carnivores, insectivorous mammals, raptors, marine mammals, and invertebrates), parasitoids and parasites (bloodsucking arthropods, insects, worms, viruses, and bacteria) and their interactions with prey/host populations are described. The aim of chapters included into the third section ("Synthesis") is to provide a synthesis of the material given in the preceding sections, but they also present several new problems such as biological control or evolution of prey coloration.

The main questions about the role of natural enemies in the population dynamics and evolution of prey/host can be found in each chapter. This gives a reader the possibility to understand similarities and differences between the role of antagonistic interactions in different taxonomic groups. Attempts to answer other, more specific, questions are also found through this book.

Much of the emphasis is put on the theory of predation, especially concerning population dynamics of predators and prey. Chapters written by M. J. Crawley ("Population dynamics of natural enemies and their prey"), and R. M. May and C. H. Watts ("The dynamics of predator-prey and resource-harvester systems") explore a wide range of theoretical hypotheses and possibilities of predator-prey interactions and their consequences for population dynamics. The theory is usually explained in a simple and understandable manner. The authors explained many terms that are often confused or poorly understood. For instance, the explanation of and distinction between the neutrally stable cycles (a result of Lotka-Volterra model) and the stable limit cycles are presented, and the conditions, under which prey and predator populations should be stable or cyclic, are well described. Review of the foraging theory is presented in a chapter by M. J. Crawley and J. R. Krebs.

Unfortunately, very often it is not clear how a given theory applies to what we really observe in nature. Some chapters give impression as if the mathematical models were developed in a separation from the results of empirical studies. It especially concerns the problems of vertebrate predators and their prey. Generally, the book is more comprehensive in the chapters dealing with invertebrates than in those about vertebrate predators and prey. Some important results of empirical studies on the role of predation in vertebrates are not mentioned (e.g. extensive research projects on predators and voles in California, Pearson 1966; and in western Poland, Ryszkowski *et al.* 1973; Goszczyński 1977). Typically for western books, the whole Russian-language literature on vertebrate predator-prey systems is ignored, obviously because of the linguistic barrier.

More detailed information on biology and ecology of specific taxonomic groups is presented in the second section. T. M. Caro and C. D. Fitzgibbon described hunting techniques and prey selection by large carnivores ("Large carnivores and their prey: the quick and the dead"). Also, they present an overview of studies estimating the impact of predation on ungulates. Discussion of evolution of group living and cooperative hunting can be found in this chapter as well as in the chapter by P. H. Harvey and J. L. Gittleman.

Very interesting aspects of biology and analysis of geographic distribution of insectivorous mammals (shrews, dasyurid marsupials and bats) are presented in the chapter by I. Hanski. Several

species of shrews can coexist in the same locality, but they always exhibit strikingly regular differences in body size. Hypotheses explaining evolution of these differences are discussed. As in other parts of the book, the emphasis is put on regulatory capabilities of predation, in this chapter – by shrews.

The insect parasitoids show features in common with both predators and parasites. They acquire energy from a single host (like parasites), but they always cause the death of the host (like predators). Interesting features of their biology and dynamics of host-parasitoid interactions are presented by M. P. Hassel and H. C. J. Godfray (“The population biology of insect parasitoids”).

Bloodsucking arthropods (e.g. mosquitoes, flies, fleas, ticks) can influence host population directly, but they are also important vectors of diseases. The effects of very complicated interactions between hosts, bloodsucking parasites and diseases on population dynamics of the host are presented by C. Dye.

The infections caused by microparasites (viruses and bacteria) in human and animal populations often show regular cyclic pattern. We can learn from the chapter written by D. J. Nokes, what are the roles of immunological response of host and other factors in shaping this pattern of dynamics, and what are the factors underlying microparasite population biology.

The book gives a wide overview of both theoretical and empirical problems in predator ecology and it is an important step in our way to understanding the role of predation in animal life.

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BIAŁOWIEŻA ● ZAKŁAD BADAŃ SŚAKÓW PAN ● POLAND

Nakład 750 + 50 egz. Obj. ark. wyd. 10,0 Obj. ark. druk. 7,00  
 Podpisano do druku w marcu 1995. Druk ukończono w marcu 1995.

Skład, łamanie, diapozytywy: Zakład Badań Ssaków PAN, Białowieża  
 Druk: Białostockie Zakłady Graficzne w Białymstoku.