KOSMOS
PROBLEMY NAUK BIOLOGICZNYCH
Tom 48, 1999
Numer 4 (245)
Strony 403–404
Polskie Towarzystwo Przyrodników im. Kopernika

PREDATION ECOLOGY IN AQUATIC ENVIRONMENT

INTRODUCTION

Each organism, irrespective of its taxonomical position, age or sex, during its lifespan, has to permanently satisfy its metabolic demands and to avoid being eaten. Simply speaking, the dilemma "to eat and not to be eaten" is shared by all living organisms. In evolutionary and behavioral ecology, the question arises how an individual solves these two basic problems during its ontogenesis and how these solutions are influencing the individual fitness, i. e. the survival probability and viable offspring number. In the domain of population ecology, this is the question whether the availability of food resources or the risk from potential consumers is the major factor shaping the population dynamics of a species. In the community or ecosystem ecology, this is a bottom-up *versus* top-down controversy, i. e. the problem whether the abundance (or biomass) of a trophic level is regulated by its food resources (i.e. from the bottom of the food chain), or by its consumers (from the top of the food chain). Answers to these questions constitute the foundations of biomanipulation approach, i.e. attempts to shape the trophic structure of a community aimed, e.g., at the improvement of water quality in reservoirs, *via* the reduction of algal biomass. This can be achieved by promoting the development of predatory fish that keep in check planktivorous fish, which eventually enables the herbivorous invertebrates to exert an efficient control over the unwanted algal biomass.

The research undertaken at the Department of Hydrobiology, University of Warsaw is, to a large extent, focused on these questions. We are trying to answer them at the individual, population and community levels, using the model of aquatic animals, mostly plankton organisms and fish in the open waters, but also invertebrate prey and predators in the littoral zone.

This issue of KOSMOS is a synopsis of our long experimental and field research and the conceptual approach initiated nearly 10 years ago by a paper by DAWIDOWICZ, PIJANOWSKA and CIECHOMSKI (1990)[1], one of the very first which demonstrated the possibility of induction of defensive reactions *via* the chemicals released by a predator into the environment. The presence of the predator itself, which would eventually decimate the prey, appeared to be unnecessary to induce the defensive response. Since then, many other prey responses were examined under different conditions, and were proved to be inducible.

The content of this volume reflects our past and present research interests: from defensive mechanisms in planktonic animals such as the diel vertical migration behaviour (P. DAWIDOWICZ), morphological variability (E. RUTKOWSKA and J. PIJANOWSKA) and diapause (M. ŚLUSARCZYK), through various defensive mechanisms in fish (A. JACHNER) and diel migrations of young fish (J. SŁOŃ), to the self defense of invertebrates in the littoral zone (D. RUTKOWSKI) and rivers (A. KOŁODZIEJCZYK). Beside a presentation of the state-of-the-art on the chemistry involved in the prey-predator relationships, there is an overview of new concepts on hydrodynamics of these interactions (G. ABRUSÁN). The presentation of ontogenetic responses to predation is supplemented with the description of mothers influence on the future biographies of her offspring, i.e. the so called maternal effect (A. MIKULSKI). The review of defensive mechanisms is preceded by a classification of hunting strategies employed by freshwater predators (P. KOPERSKI), and the description of circumstances favouring the evolution of phenotypic plasticity in the anti-predator defense (J. PIJANOWSKA). The whole content is tightly linked by the concept of trade-off in evolutionary ecology, more precisely to the trade-off between the simultaneous necessity of satisfying the nutritional demands and the necessity to avoid the risk of predation (M. GLIWICZ).

Many of our achievements related to this topic would not have been possible without the access to the laboratories and library in Max-Planck Institute of Limnology in Plön, headed by Professor Winfried Lampert, whose friends-

hip and support of us all acknowledge with gratitude.

Myself as well as at least two other referees from the group to taking twelve KOSMOS authors, have reviewed each article. Each of us benefited from criticism by our colleagues. We are also thankful to Professor Andrzej Prejs who kindly agreed to comment a few papers, and to Ewa Rutkowska for her assistance in editorial work and graphics. Without the strong encouragement from Professor Maciej Gliwicz, to whom all of us owe lots of inspiration and intellectual stimulation at various stages of our work, this volume would have never appeared. We are also grateful to those of our colleagues at the Department of Hydrobiology who, even without participating in this enterprise, created a helpful climate of interest and support.

Joanna Pijanowska

[1]DAWIDOWICZ P., PIJANOWSKA J., CIECHOMSKI K.,1990. *Vertical migration of Chaoborus larvae is induced by the presence of fish.* Limnol. Oceanogr. 35, 1631–1635.