

**TOP-DOWN REGULATION IN CTENOPHORES-ZOOPLANKTON COMMUNITY  
IN COASTAL WATERS OF THE BLACK SEA (SEVASTOPOL BAY)**

**G. FINENKO<sup>1</sup>, Z. ROMANOVA<sup>1</sup>, G. ABOLMASOVA<sup>1</sup>, L. BAT<sup>2</sup>, and A. E. KIDEYS<sup>3</sup>**

<sup>1</sup> Institute of Biology of the Southern Seas, National Academy of Sciences, Sevastopol, UKRAINE

<sup>2</sup> University of Ondokuz Mayıs, Sinop Fisheries Faculty, Sinop, TURKEY

<sup>3</sup> Institute of Marine Sciences, Middle East Technical University, Erdemli, TURKEY  
E-mails: gfinenko@ibss.iuf.net; leventbat@hotmail.com; kideys@ims.metu.edu.tr

**ABSTRACT**

The invasion of *Mnemiopsis* (Agassiz) in the Black Sea in the late of 80's is the demonstration of the global phenomenon of invasive alien species spread that may constitute a threat to biodiversity and have irreversible and unpredictable economic and environmental impacts for ecosystems.

The Black Sea is an impressive model of damaging impact of invasive species on the ecosystem in a whole and on the planktonic community in particular. The introduction and subsequent explosion of the ctenophore *M.leidy* along with eutrophication resulted in dramatic decrease not only the abundance of some species but also temporary missing in biodiversity of zooplankton community. *M.leidy* competition with planktonic fish for zooplankton as a food brought to remarkable decline in the fish stock registered those years and economic losses about 240 millions of US dollars in a year for all riparian countries.

In August-September 1999 a new alien ctenophore *Beroe ovata*, predator feeding on *M. leidy*, was found in large number in different regions of the Black Sea. Its introduction has caused the new changes in structure and functioning of the Black Sea plankton community. The quantification of the top-down control mechanism exerted by *B. ovata* is important to understand these changes.

Our research aimed at:

- studying annual dynamics of abundance, biomass and population structure of *M. leidy* when *B.ovata* was absent (1995-1996) and both *M.leidy* and *B.ovata* in the presence of the latter (1999-2001) in Sevastopol Bay and adjacent water regions
- measuring ingestion and growth rates of both ctenophore species and the effects of food concentration and body weight on these parameters quantify the *B.ovata* and *M.leidy* predatory impact on plankton community.

In order to understand the mesozooplankton-prey-predator interactions of invasive ctenophores, the population dynamics, abundance and biomass of the ctenophore *M.leidy* was studied in Sevastopol Bay during 2 years from January 1995 to March 1996 when *B. ovata* was absent and from September 1999 to May 2001 after *B. ovata* arrival to evaluate the impact of the latter in the last a few years. The period of high levels of *Mnemiopsis* inhabit in plankton was about 4-5 months in the years before *Beroe* introduction. The abundance of the *M. leidy* increased by 4-5 orders of magnitude in 1.5-2 weeks during the breeding season due to the high fecundity and short-term development from egg to sex maturity as well as high growth rate. *M leidy* population abundance and biomass were high (maximum abundance 3000 ind m<sup>-2</sup> in July and maximum biomass 600 g m<sup>-2</sup> in August) in 1995. During the year the ctenophores grazed daily from 1 to 35% of zooplankton biomass. In winter ctenophore biomass was low and the rations as well as daily predatory values were also low. In summer and early autumn zooplankton biomass increased by a factor of 5-10; this time the maximum development of the ctenophore population occurred. The daily ingestion rate by *M. leidy* increased up to 9 and 21% of zooplankton biomass. Daily minimum food requirements of ctenophore population were substantial, amounting up to 40% of zooplankton biomass. Under such high predatory pressure zooplankton biomass would decrease dramatically, as it was observed these years.