ZOOPLANKTON COMMUNITY STATE IN THE ADJACENT REGIONS OF THE BLACK AND MARMARA SEAS

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Abstract
During 2005 -2008 species composition and abundance of mesozooplankton collected in the Bosphorus regions of the Black and Marmara Seas were studied taking into account the number of live and dead individuals. In the direction of the Marmara Sea from the Black Sea through the Bosphorus, the abundance of the Black Sea originated species reduced and the proportion of carcasses increased. On the contrary, the abundance of the Mediterranean species diminished toward the Black Sea. High number of their carcasses was found in the Black Sea near the Bosphorus.
Keywords: Zooplankton , Mortality, Black Sea, Marmara Sea

The Black and Marmara Seas are connected with the narrow Bosphorus Strait (31 km). Due to positive water balance in the Black Sea, its water masses are transferred into the Marmara Sea through the Bosphorus forming a brackish surface layer (15-20 m) with a salinity of 18-24 ‰ and temperature ranging from 20-24 ^{0}C in summer to 8-9 ^{0}C in winter. Below this brackish layer lies more densely saline (about 39 ‰) Mediterranean Sea water with a constant temperature of about 15 ^{0}C throughout the year. These dense and warm water masses enter from the Bosphorus with deep countercurrent and mix with overlying cold (6-8^{0}C) intermediate layer of the Black Sea. The aim of the study was to analyze spatial and vertical distribution of alive and dead components of mesozooplankton community in view of spatial and vertical structure of the water masses in the adjacent regions of the Black and Marmara Seas.

Zooplankton samples were collected with a closing Nansen net seasonally during 2005 – 2008 at the permanent stations in the Marmara Sea near the Prince Islands and Bosphorus, in the northernmost part of the Bosphorus Strait and in the Black Sea near the Bosphorus. The samples were preserved with 4% borax-buffered formaldehyde. In the laboratory species composition and numbers of individuals being alive before sampling and their carcasses with destructive changes in muscles and internal organs were determined under a dissecting microscope.

During all periods of the study the tendency to diminish from the Black Sea toward the Marmara Sea for abundance and biomass of the Black Sea originated zooplankton species was found. This trend was due to decrease in total abundance and biomass of mass Black Sea copepod. The mean annual biomass of the Black Sea copepods decreased from 3696.9±2008 mg.m^{-2} in the Black Sea to 832.8±453.9 mg.m^{-2} in the northern Bosphorus area and 329.8±265.7 mg.m^{-2} near the Prince Islands in the Marmara Sea. The abundance of dead organisms of the Black Sea origin increased toward the Marmara Sea. Maximum mortality of the Black Sea copepods was observed in the Bosphorus region of the Marmara Sea. In this area mean values of non-consumption mortality for the Black Sea copepods varied in limits of 8 – 60% increasing dramatically up to 80% in *Acartia clausi*. On the contrary, the mortality of Cladocera was low near the Bosphorus and reached 35% near the Prince Islands. In the Marmara Sea, the Black Sea species aggregate mainly in upper brackish or mixed layers whilst the Mediterranean organisms inhabit deep strata with high salinity. Usually the mortality in the Black Sea species increases with depth. In the northernmost part of the Bosphorus only 6 species of the Mediterranean origin were found. The main part of population of dominative *O. minuta* was attributed to the lower-layer flow where the mortality did not exceed 8 %, whereas in the upper layers the mortality of this species reached 42 %.

According to [1] and [2], mass mortality of copepods penetrating into the Marmara Sea from the Black Sea is connected with low tolerance to sharp salinity increase in the intermediate layer of the Marmara Sea. High mortality of warm-water Mediterranean species transferred to the Black Sea with the Bosphorus deep countercurrent may be due to both low salinity and temperature of their new environment.

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