

## Problems with invaders in the Black Sea

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Accidental introduction of alien species into the Black Sea are documented since the early 19<sup>th</sup> century. Most of the invader species are small species, barnacles, hydromedusa, gastropods, mussels and small crustaceans, which spread all over the Black Sea area and did not harm the resident fauna. Only four species had an overall impact to the Black Sea ecosystem. This species are the gastropod *Rapana thomasi* (introduced 1947; origin: Sea of Japan), the bivalves *Mya arenaria* (introduced 1967; origin: North Sea), *Cunearca cornea* (introduced 1984; origin: Philippines) and the combjelly fish *Mnemiopsis leidyi* (introduced 1982; origin: North America).

While the first 3 species did not harm the ecosystem to a major extent, the occurrence of *Mnemiopsis leidyi* coincided with the dramatical changes of the Black Sea ecosystem during end of the 1980's, beginning of the 1990's. The collapse of the anchovy fishery, and the harsh decline of the total zooplankton biomass combined with the dramatically changes of the zooplankton community during the same period were often related directly to the outburst of *M. leidyi*.

Other analysis displayed, that beside *Mnemiopsis*, the combination of several man made impacts played a role by the decrease of the anchovy and zooplankton stock: Pollution (especially in coastal areas), eutrophication, overfishing. Beside these impacts, the effect of physical and meteorological changes during the same period seems to have an effect to the Black Sea ecosystem as well. Comparison with long-term series of other regions of the world as Atlantic, North Sea, Baltic Sea, waters off California and fresh water lakes as Lake Windermere and the Bodensee showed similar fluctuation patterns of the zooplankton as in the Black Sea. Comparison of the anchovy catches in different upwelling systems of the world showed, that the anchovy stock of South Africa and California collapsed as well in the same period as the anchovy stock of the Black Sea during end of the eighties. It could be possible, that changes in the weather regime during the 1980s could have triggered the changes in the phyto- and mesozooplankton communities of the Black Sea, which caused the conditions for the outburst of *M. leidyi* and the decline of the mesozooplankton- and anchovy stock.

During 1999 a new Ctenophore species immigrated into the Black Sea, *Beore cucumis* (or *B. ovata*). The exact species name is not clear yet, but due to the absence of anastomosing the species looks more like *B. cucumis* than to *B. ovata*. *Beore* spread over the Black Sea in few month and was observed by scientists in coastal and open waters in Turkish, Romanian, (BULGARIAN?) Ukrainian and Russian territories. *Beore* originates the epipelagial of the Mediterranean and the Sea of Marmara. Before 1999 *Beore* was never observed in high densities in the Black Sea.

According observations in Turkish waters the numbers of *Mnemiopsis leidyi* were very low in areas of the Black Sea, where *Beore* was abundant. Especially the Bosphorous was dominated by *Beore*, while *Mnemiopsis* was hard to find. The reason for this is, that *Beore*, known as a predator on other ctenophore species, feed on *Mnemiopsis leidyi*. Stomach analysis of 10 individuals indicated no copepod like food, but observations in aquariums on board displayed, that *Beore* was feeding on *Mnemiopsis*. *Beore* swallowed *Mnemiopsis* in one piece. The digestion period was about 3 hours.

It seems, that about 10 years after its intrusion, *M. leidyi* attracted its predator *Beore cucumis*, which seemed to control the *Mnemiopsis* stock in Black Sea during 1999. Similar invertebrate predator control patterns in ctenophore species and its effects to the mesozooplankton are well known from other marine ecosystems (Greve, 1981). First rough analysis of the mesozooplankton in the Turkish area of the Black Sea indicated, that the mesozooplankton abundance increased during 1999 in comparison to previous years.

It could be assumed, that *Beore* immigrated the Black Sea via the Channel of Bosphorous, maybe by a passive drift via the under current of the Bosphorous, or by the ballast water of big ships. Many vessels take up ballast water before entering the Bosphorous and deballasting in the Black Sea (pers. communication: Ostürk). It is not clear yet, why *Beore* immigrated to the Black Sea during 1999 and not before, because the food condition, the *M. leidyi*- stock, was during the previous years in the same range or even bigger, than during 1999. If *Beore*

gave only a guest performance in the Black Sea during 1999 or becomes an other permanent member of the Black Sea ecosystem remains to be seen.

**Literature:**

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