

8. ABSTRACT

Polar ecosystems, both the Arctic and Antarctic, are characterized by extreme environmental conditions. Seasonal changes in ice cover and the intensity of light result in a strong annual fluctuations in primary production. Similarities in both abiotic and biotic characteristics makes marine flora and fauna in polar areas develop in similar ways, despite geographic isolation.

The Southern Ocean is one of the biggest, most homogenous, oldest Ecosystems on Earth and is inhabited by the large number of endemic species. Geographically, the Arctic is the opposite of Antarctic, it is relatively young ecosystem, and most of inhabiting it organisms are relatively recent immigrants from the latitudinal regions. Extreme environment conditions are surely the most important trait, which characterizes Polar Regions, together with its distinct seasonal changes in the ice cap, intensity of solar radiation and in consequence primeval production.

There are many research concerning zooplankton from both Polar Regions. Unfortunately majority of them focus crustaceans, mainly copepods and commercially valuable krill which are considered the main factions of this ecological formation. Larvaceans are however, commonly completely ignored or treated very superficially. Especially in Polar Regions, data on biology and ecology of these organisms are very rare and fragmentary.

Appendicularians are pelagic tunicates vileyly prevalent in all oceans and are considered one of the most abundant zooplankton groups in marine ecosystems. These suspension feeders use a secreted mucous house, with build in set of complex filters and are able to feed on wide size range of food particles from colloidal organic matter through pico- and nanoplankton to even large diatoms. They also possess ability to very quickly increase their abundance when conditions become more favorable. Larvaceans are preyed upon by numerous species of invertebrates and fish, both larval and juvenile. Appendicularians also pay an important role in transport of organic matter from the euphotic zone to deeper water layers by producing large numbers of discarded houses and fecal pellets.

To this time most studies of relationships between the temporal and vertical distributions of appendicularians and environmental variables have been conducted primarily in European and Japanese coastal waters. Additional studies from other regions are necessary to assess their ecological impact and gain a more global perspective on their

distribution in relation to environmental variation. The Polar Regions. Are ideal ground for analysis of environment fluctuations connected with processes of global climate.

The fundamental direction of this study were to determine the role and function of appendicularians in polar ecosystems in relation to environmental conditions. To achieve this goal carried out research included:

- investigation of spatiotemporal distribution of appendicularians in Polar Regions,
- calculation of biomass and developmental stage of most abundant species in Drake Passage on base of biomorpometric measurements.

Investigated regions included: Drake Passage, Admiralty Bay (Southern Shetland Island) and region of West Spitsbergen Current.

Zooplankton samples came from 20 stations from Drake Passage, 1 from Admiralty Bay and 13 station from the region of West Spitsbergen Current, in total 234 samples were examined. Zooplankton sampling nets of different types and mesh sizes were used for material collection: Copenhagen 50 and 100 μm , WP2 100, 180 and 200 μm . Conducted in the Admiralty Bay research are the first so detailed qualitative analysis of temporal variability of these animals carried out in this region.

During the investigations twelve species of appendicularians were found, eight in Drake Passage: *Fritillaria borealis*, *Fritillaria antarctica*, *Fritillaria fraudax*, *Fritillaria pellucida*, *Oikopleura fusiformis*, *Oikopleura gaussica*, *Oikopleura parva*, five of those: *F. antarctica*, *F. borealis*, *O. fusiformis*, *O. gaussica*, *O. parva* were also found in Admiralty Bay as well as *Fritillaria aberrans*. Les species – only four, were found in West Spitsbergen current region: *F. borealis*, *Oikopleura dioica*, *Oikopleura labradoriensis* and *Oikopleura vanhoeffeni*.

Results of the research showed that species composition of larvaceans in Drake Passage was dependent on the presence of specific water masses. Domination of specific taxa changed from *F. borealis* in Antarctic part of the profile to *O. fusiformis* in American continental zone. *F. borealis* was also the most abundant specie whilst *O. fusiformis* had the highest biomass.

During the research in Admiralty Bay *F. borealis* was a dominating species for whole investigated period, with highest abundance observed in late summer. Research showed some hints of species succession with the increase of role of *O. gaussica* in early winter.

Similarly, to Drake Passage results from West Spitsbergen Current region showed connection of species composition and hydrological characteristics of water masses. *F. borealis* was the most abundant species in this region, although it was observed only on few stations located in shelf waters and species from genus *Oikopleura* dominated in the rest of the investigated region.

In Conclusion, results from investigated regions show a strong link between taxonomic structure and abundance of appendicularians and hydrological conditions, especially temperature. In addition observed in those regions climate changes may have a significant impact on range of distribution of those animals. This mainly concerns species like *Oikopleura fusiformis* penetrating regions south from Antarctic polar front, and *Oikopleura dioica*, which may spread further north with Atlantic waters of West Spitsbergen Current.