

Scyphozoan medusae: the seasonal and spatial distribution along transects through the Baltic Sea

Elena Karasiova, Igor Karpushevski and Alexander Zezera

*Atlantic Research Institute of Marine Fisheries and Oceanography (AtlantNIRO), Russia
236022, Kaliningrad: [e-mail: karasiova@rambler.ru]*

Summary

Only two species of scyphozoan medusae occurred in the Baltic Sea influencing the pelagic ecosystem as consumers of zooplankton on adult life stages: *Aurelia aurita* and *Cyanea capillata*. Data on abundance and distribution were received by vertical hauls of ichthyoplankton nets on three transects along the Baltic Sea in autumn 2005 and spring and summer 2006. The significant difference was revealed in temporal and spatial distribution of the respective species. The peak abundance of *A. aurita* was observed in October, simultaneously with the largest spatial expansion: from the Bornholm Basin to the western Gulf of Finland. During spring minimum numbers were recorded. Lacking link between that species distribution and abiotic bottom conditions evidenced a preference of a surface habitat. Seasonal dynamics were defined apparently by beginning of spring heating and zooplankton producing. Peak and minimum abundances of *C. capillata* were in spring and summer correspondingly. The distributional range enclosed only deep Bornholm Basin under high bottom salinity. The biotope of that species in saline deep water could depend on salt water inflows. On average, numbers of *A. aurita* exceeded that of *C. capillata* by factor 10. The specific trait of *A. aurita* was the formation of high abundance patches, probably linked to hydrodynamics water structures.

Introduction

In the Baltic Sea scyphozoan medusae are presented by two species : *Aurelia aurita* and *Cyanea capillata*, which potentially can cause a significant predatory effect on plankton community. Literature data are known mainly for the western and central Baltic - Kiel Bight, Bornholm Basin (Möller, 1980; Barz, Hirche, 2005). The aim of that study is to reveal the seasonal dynamics and abundance levels of those species on the spatial scale from Bornholm Basin to Gulf of Finland.

Materials and Methods

Materials on abundance and distribution of scyphozoan medusae were collected along three transects through the Baltic Sea from Bornholm Basin to Gulf of Finland in October 2005, April-May and July-August 2006. Sampling was carried out by vertical hauls of IKS-80 ichthyoplankton net with a filtered cone made of 335 µm capron net and mouth opening area of 0.50m². In all 96 samples were collected. After collection medusae were measured and identified by species and life cycle stages.

The abundance was calculated in sp. /100m³ and also in sp. /m² due to a significant difference in depths of investigated areas (from 30 to 192m). The mean values were estimated for four deep-sea areas (Bornholm Basin, Gotland Basin, Northern Baltic Basin, Gulf of Finland) and shallow Middle Bank. The investigations were accompanied by oceanographic observations on the each station included water temperature, salinity and oxygen content measurements with a standard CTD probe.

Results

Adult species of *A. aurita* occurred in Bornholm and eastern Basins during three seasons (spring, summer, autumn), in Gulf of Finland during autumn only, and in autumn and summer in Middle Bank. The abundance increased from the spring minimum to autumn peak in all areas, including Bornholm and Gotland Basins (Figure 1). The maximum concentration (138 sp. /m²) was revealed in western part of Gulf of Finland under the mean number 22 sp. /m². Ephyrae of *A. aurita* were observed in Bornholm Basin (spring) and the Gotland area (spring, summer). The ephyrae diameter enlarged

from 0.2-0.4mm in spring to 0.6-1.0mm in summer. *C. capillata* was found in Bornholm Basin only. At the average its abundance was a factor 10 less than that of *A. aurita*.

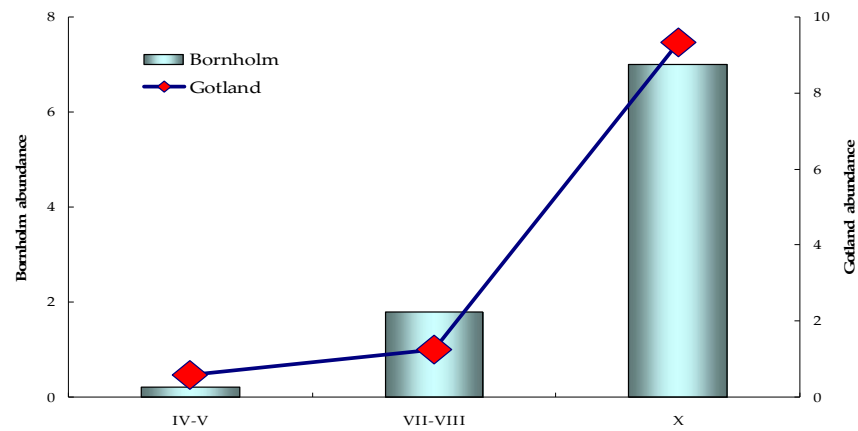


Figure 1. The seasonal dynamics of *A. aurita* abundance (sp. /m²) in Bornholm and Gotland Basins.

The comparison of medusae numbers (sp. /100 m³) in Bornholm Basin with literature data (Bars, Hirche, 2005) was presented in Table 1. It demonstrated: 1) the seasonal variability of abundance was an inherent trait of the distribution; 2) there was an inter-annual quantitative changeability.

Table 1. Scyphomedusa abundance (sp. /100m³) in Bornholm Basin in 2005-2006 vs. 2002 (Barz, Hirche, 2005)

Year	Month	<i>A. aurita</i>		<i>C. capillata</i>
		adult	ephyrae	adult
2005	X	14.77	0.00	0.41
2006	IV-V	0.26	1.71	0.64
2006	VIII	1.58	0.00	0.28
2002	VII	0.25	0.00	1.00
2002	VIII	2.30	0.00	0.05

Discussion

Spatial distribution traits of these species were condition upon differences in their biotopes. *A. aurita* inhabited a surface freshening layer above thermocline. In spring 2006 its low abundance was defined by the later surface water heating after a cold winter of that year. The absence of *A. aurita* in spring and summer in Gulf of Finland with the subsequent autumn outburst in its western part could be a result of a spatial shift in terms of seasonal plankton peak due to the lateness in production processes in northern areas. Apart from, hydrodynamics water structures could be cause of formation of high abundance patches. Availability of ephyrae of in Bornholm and Gotland Basins evidences a possible reproduction of *A. aurita* in those areas. Based on seasonal changes in ephyrae sizes and abundance of in Gotland Basin in 2006 it could be supposed a mass appearance of larvae stages between May and July. A study of distribution combined with circulation models should help in identifying the origin of *A. aurita* in the central Baltic (Bars, Hirche, 2005). Distribution of *C. capillata* was linked with saline bottom waters and restricted by Bornholm Basin where it could depend on salt water inflows.

References

- Barz K., Hirche H. J. 2005. Seasonal development of scyphozoan medusae and the predatory impact of *Aurelia aurita* on the zooplankton community in the Bornholm Basin (Central Baltic Sea). *Marine Biology*, 147: 465-476.
- Möller H. 1980. Population dynamics of *Aurelia aurita* medusae in Kiel Bight. *Marine biology*. 60: 123-128.