

Hydrobiological characteristic of the (Mixo) oligohaline zone
on the example of the zooplankton of the Firth of Vistula

by

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The percentage of salt in the Firth of Vistula is very low. In its extreme north-eastern part (Station F) it very seldom exceeds 5‰, while in the south-western part the water is almost fresh (Station A). The Firth lies therefore, in the (Mixo) oligohaline zone (according to the Venice System).

The Zooplankton of the Firth of Vistula consists of Protozoa, Rotatoria, Cladocera and Copepoda. The majority of its population belong to these groups, but in some periods larvae of benthonic animals can also be found.

Rotatoria are the most numerous group, in number and in kind, which is characteristic for reservoirs of low salinity. About 40 species were found in the material examined but only some of them appeared in mass or were numerous. They were mostly the euryhaline fresh water species. In summer Keratella cochlearis (Gosse) and Filinia longisetata (Ehrb.) predominated, while in winter Synchaeta sp. were most plentiful.

Among Copepoda the Calanoida group with its brackish water species, Eurytemora affinis (Poppe) and Acartia tonsa (Dana) were largest in number.

Cladocera were the least representative group of the zooplankton. Before discussing the hydrobiology of the Firth of Vistula it should be mentioned that the delincation of the border line between the (Mixo) oligohaline zones α and β , that runs through the water containing about 3‰ of salt, was based on the average salinity for the whole research period. This border line of salinity had been marked out by Stations B and C. The main aim of this research was to find out whether biological phenomena correspond with theoretical hydrological reasoning.

The zooplankton of the Firth of Vistula consists of euryhaline fresh water species, brackish water species and strong euryhaline marine species. In the most fresh part of the Firth freshwater stenohaline species were also found.

Graph No. 2 shows the correlation between these elements of the zooplankton and the number of species found at each station. The salinity is the average for the whole period.

A very characteristic drop in the number of euryhaline freshwater species at the salinity of about 3‰ can be seen on the graph No. 2. It is the outside reach of the 1st degree euryhaline freshwater species (as Romane, 1958, describes them). These species are living in waters where the concentration of salt does not exceed 3‰, they therefore belong to the inhabitants of the β -oligohaline zone. Consequently, it can be stated that two zones with different zooplankton exist in the Firth of Vistula and that the stretch of water where salinity amounts to about 3‰ forms the border line between them.

The circumstance that euryhaline marine forms were noted only in the α -oligohaline zone, confirms as well the fact that the water of the Firth should be divided into two α - and β -oligohaline zones. The species which were never found beyond these zones are the following: Podon polyphemoides (Leuckart), larval forms of Balanus improvisus (Darw.) and brackish water form of Keratella cruciformis var. (Eichwaldi Thompson). Species such as Acartia bifilosa (Giesbrecht), A. longiremis (Lilljemborg) and copepodites Temora longicornis (P. Muller) which appear sporadically, were also found in the α -oligohaline zone only.

The border line between the zones α - and β -(Mixo) oligohaline is subject to variations within a year. Early in spring when salinity is at its lowest the decrease in the number of the 1st degree euryhaline freshwater species can be seen up to the point D (Graph No. 1). During this period no euryhaline marine species were noted.

The reach of the Cyclopoida group varies with the shifting of the border line between the α - and β -(Mixo) oligohaline zones. When salinity is at its lowest Cyclopoida are found up to the Station E. As salinity increases their reach recedes and when the border line between α - and β -oligohaline zones is already fixed, they can only be found in the latter.

When analysing the above observations it can be stated that the biological characteristics existing in the Firth give reasons to divide it into two zones α - and β -(Mixo) oligohaline. Zone β is populated mainly by the 1st degree euryhaline freshwater species. Their number exceeds several times the number of brackish water species. The predominance of Rotatoria is especially noticeable. Also the percentage of Cladocera is higher here than in the α -(Mixo) oligohaline zone. In the stretch of water that forms the border line between the two zones a rapid decrease in the number of the 1st degree euryhaline freshwater species can be seen. There are found in the α - euryhaline zone freshwater species under salinity that exceeds 3‰. Their number is here only a little higher than the number of brackish water species. The appearance of highly euryhaline marine species is characteristic for this zone.

The above data produce one more proof that the partition of the Baltic region into two (Mixo) oligohaline zones α and β , as proposed by the Venice System, is correct.

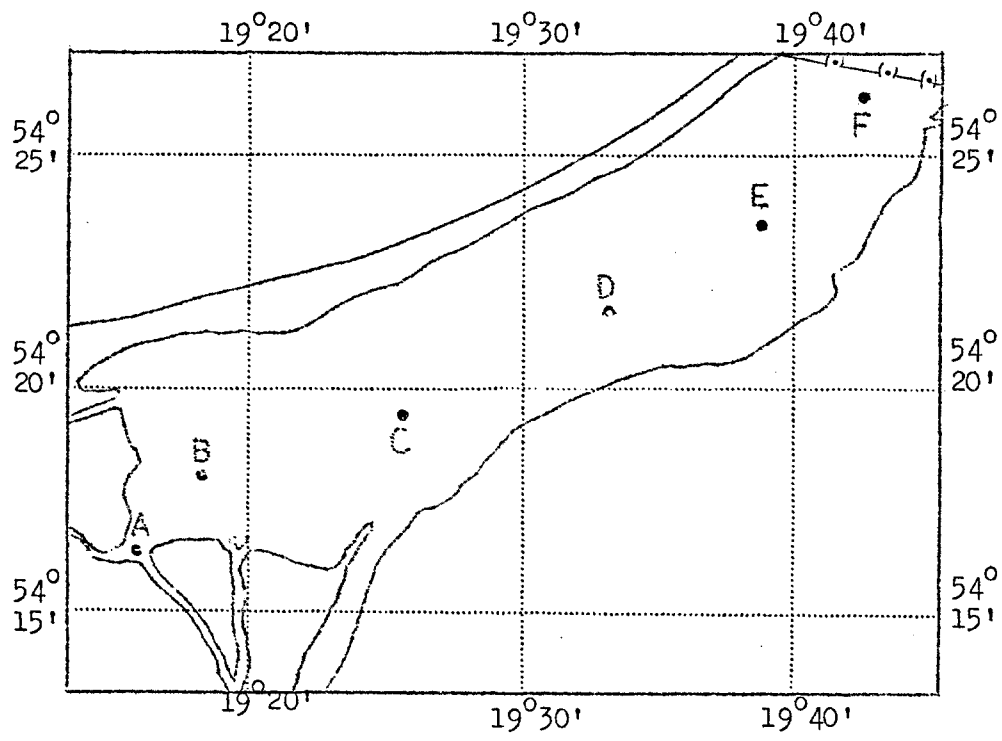


Fig. 1. Distribution of selected stations on Firth of Vistula

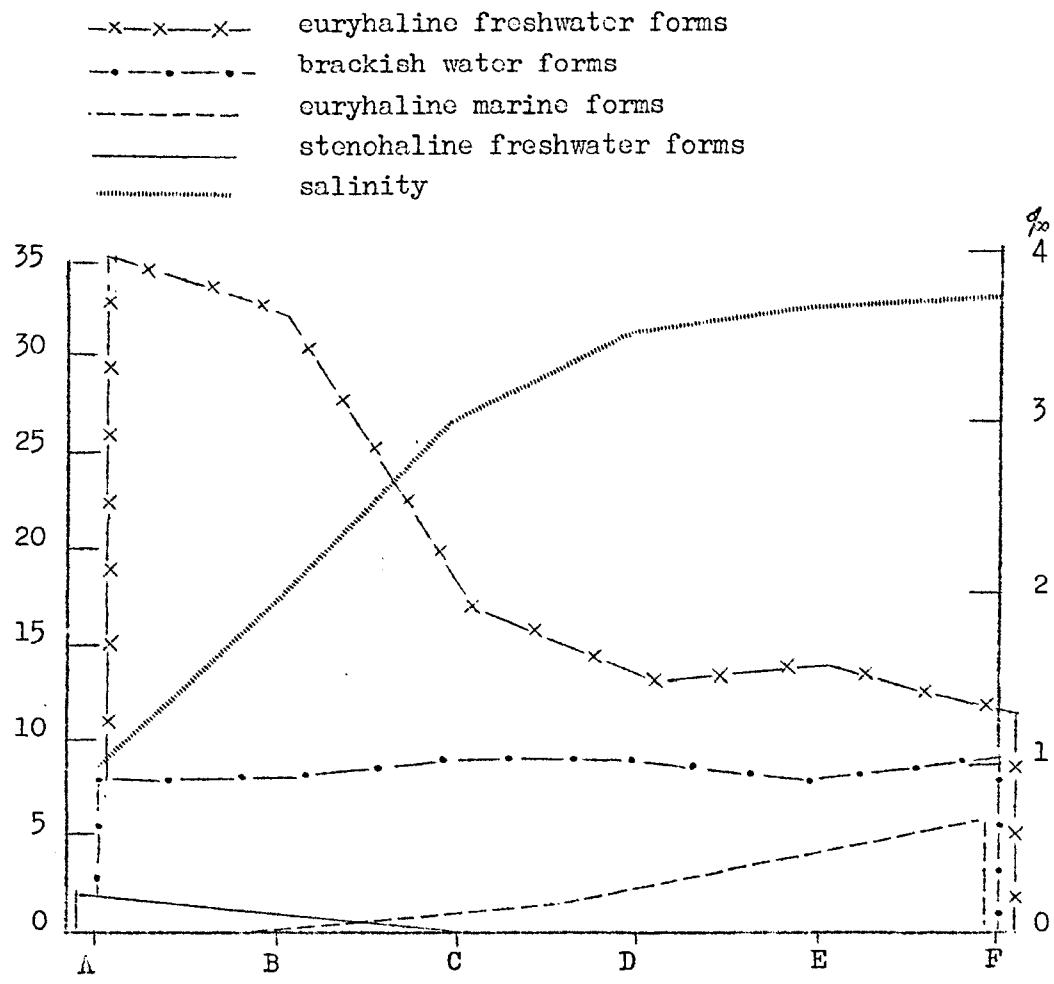


Fig. 2. The composition of zooplankton on Firth of Vistula.