

The distribution of *Cerastoderma glaucum* (Poiret), *Macoma balthica* (Linnaeus), *Mya arenaria* (Linnaeus) and *Mytilus edulis* (Linnaeus), in Holocene bottom sediments of the southern Baltic Sea

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Investigations were carried out at the State Geological Institute (Marine Geology Branch, Sopot, Poland) on the base of 2500 samples collected by means of a van Veen grab during research cruises in 1973-1990. For a macroscopic description of four species of Mollusca present in the bottom sediment samples, i.e. *Cerastoderma glaucum* (Poiret), *Macoma balthica* (Linnaeus), *Mya arenaria* (Linnaeus), and *Mytilus edulis* (Linnaeus), both living and dead specimens have been taken into account. A biofacial distribution map for these four species is presented. It is concluded that the type of sediment and the sea depth are the most important factors influencing the distribution of the species.

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Introduction

Since twenty years the southern Baltic, which constitutes a large part of the Baltic Sea, is geologically investigated by the Marine Geology Branch of the State Geological Institute in Sopot, Poland. This large area (92 795 km²) has several basins, deeps, troughs, bays, and lagoons (Łomniewski et al., 1975). Starting in the west, the following characteristic units are present within this area: the Pomeranian Bay, the Odra Bank, the Bornholm Basin, the Stupsk Bank, the Southern Central Bank, the Osetnik Bank, the southern part of the Gotland Basin, the Gdańsk Basin, and the Bay of Gdańsk (Fig. 1).

The surface sediments of this area consist mainly of sand, gravel, stones and mud. Sand predominates in the shallow water coastal zones. The thickness of these sediments varies from a few cm on the slopes of the basins, up to a few m on the banks. The other sediments occur at different places, often mixed with sand.

The Baltic Sea water body consists mainly of two layers separated by the halo-

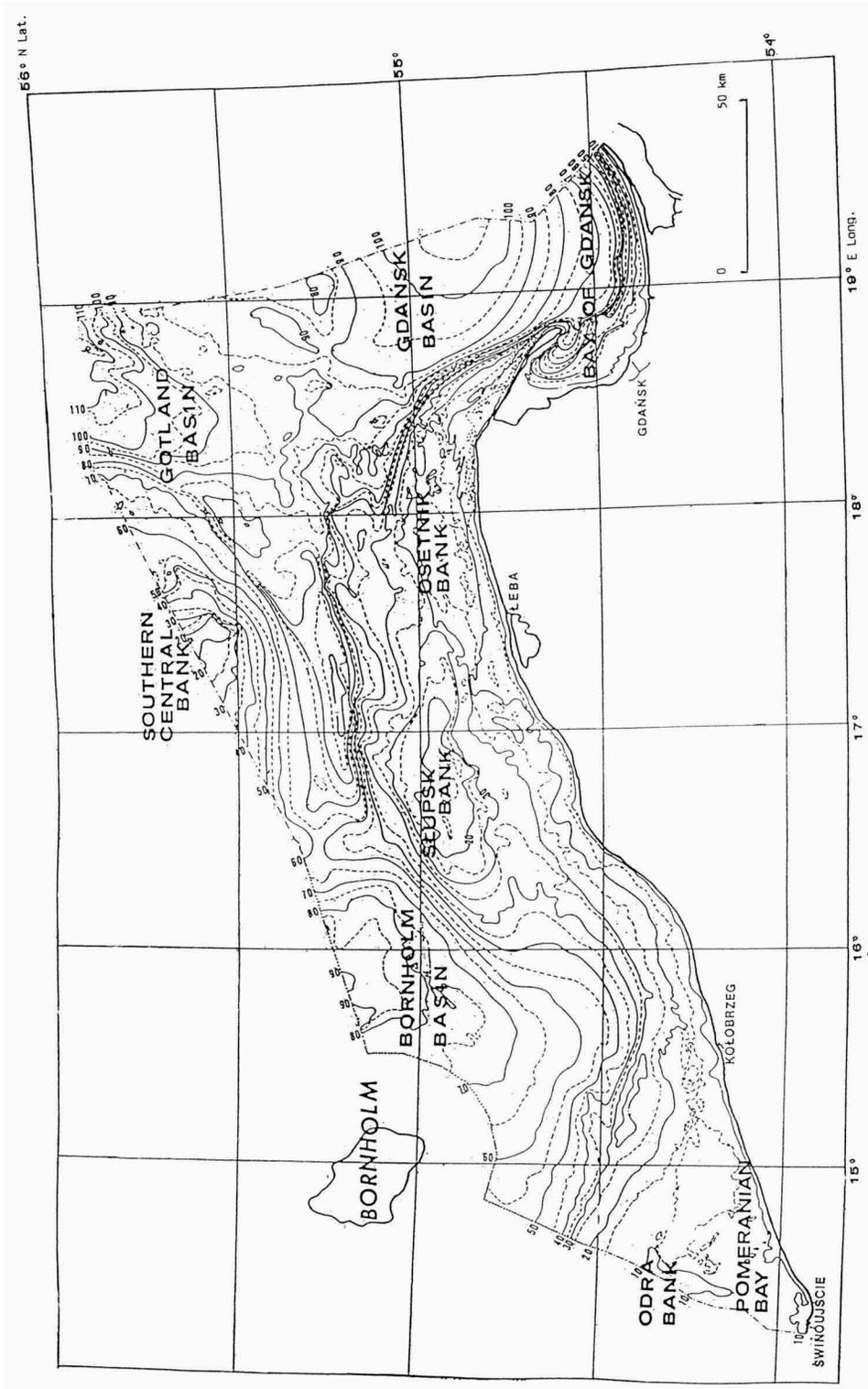


Fig. 1. Bathymetry of the southern Baltic Sea.

cline. The upper layer (0-60 m) is influenced by seasonal changes of air temperature and supplied by river water. The average salinity of this layer is c. 8 ppt. In the vicinity of rivers the salinity is much lower (0-2 ppt). In those areas where the lower water layer (60-80 m) is present (Fig. 1) the salinity of the water increases to 14-16 ppt near the sea bottom. Simultaneously, the water temperature increases from 3-5° C to 6-7° C in the near-bottom layer (Łomniewski et al., 1975).

Methods

Samples, used for preparing the map of the distribution of *Bivalvia* in sediments, were taken between 1973 and 1990, during research cruises organised by the Institute. More than 8000 samples were taken with a van Veen grab and described; c. 2500 of these samples contained *Bivalvia*. The presence of both living and dead specimens were taken into account during macroscopic description. The biofacial map was made on the basis of these descriptions. This map represents the occurrences of: *Cerastoderma glaucum* (Poiret), *Macoma balthica* (Linnaeus), *Mya arenaria* (Linnaeus), and *Mytilus edulis* (Linnaeus) in the bottom surface sediments of the Southern Baltic (Fig. 2).

Holocene sediments have been formed in the Baltic during the last 7500 years. The thickness of these sediments varies from 0.01-0.02 m to 5-6 m (Kramarska et al., in press). The uppermost layer of the sediments is influenced by hydrodynamical and hydrochemical changes of the marine environment. The sediments were investigated at the Institute at the same time as the *Bivalvia*. As a result of those investigations a lithologic map was obtained (Kramarska et al., in press). The biofacial map was compared with the sedimentological results in order to obtain a correlation between the occurrence of the *Bivalvia* and the type of sediment.

Results

It was found that the distribution of the discussed species is correlated both with the type of sediment and with the depth of the sea.

Salinity and temperature are also very important factors influencing the distribution of bivalves (Wołowicz, 1991). Detailed studies concerning these factors will be the subject of further investigations.

Based on the first two factors, the range of occurrence of each species may be characterised as follows:

Cerastoderma glaucum (Poiret, 1789)

This species occurs in sandy sediments. Its range is limited by the 30-35 m isobath. The largest bottom areas where this species occurs are found in the Pomeranian Bay. Furthermore it is present along the Polish coast to the Bay of Gdańsk, and also in the shallow-water part of the Southern Central Bank.

Macoma balthica (Linnaeus, 1758)

This is the dominating species in the whole Southern Baltic area. It lives in sandy

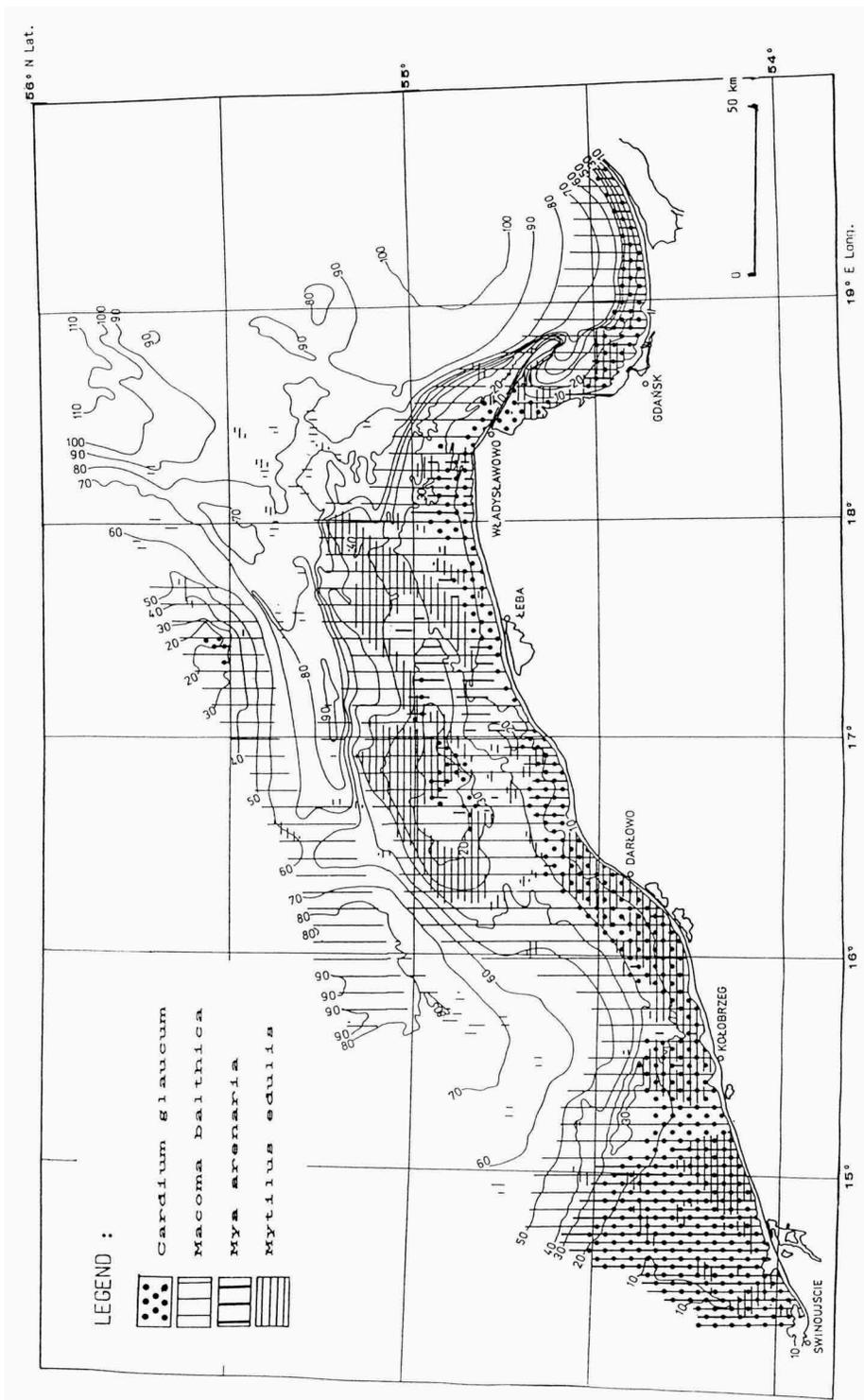


Fig. 2. Distribution of Bivalvia in the Holocene sediments.

and muddy sediments. The area of its occurrence along the Polish coast, as well as on the Southern Central Bank, is restricted by the 60 m isobath. In the southern part of the Bornholm Basin it occurs in depths reaching 90 m, and in the Bay of Gdańsk 80 m. This species was not found in the deepest parts of the Bornholm, Gotland and Gdańsk deeps, probably because of oxygen deficit and periodical occurrence of H₂S.

Areas of co-appearance of this species with *Cerastoderma glaucum*, *Mya arenaria* and *Mytilus edulis* were found along the whole discussed area to a depth of 30 m and on the Southern Central Bank to a depth of 20 m.

Mya arenaria (Linnaeus, 1758)

This species lives in sandy sediments. As in the case of *Cerastoderma glaucum* its distribution is restricted by the 30-35 m isobath.

The largest concentrations of *Mya arenaria* were observed in the Pomeranian Bay, along the whole coast inclusive of the Bay of Gdansk and at the Southern Central Bank.

Mytilus edulis (Linnaeus, 1758)

This species occurs in the entire shallow water zone, and at some places at a depth of 40-50 m, where a gravel bottom is present. The largest concentrations were found on the Slupsk Bank.

From these observations it appears that *Macoma balthica*, *Mya arenaria* and *Cerastoderma glaucum* occur mainly in the near-shore zone, down to a depth of 30-35 m, in sandy sediments. *Mytilus edulis* is found only at those places where a gravel bottom is present, down to a sea depth of 40-50 m.

At larger depths, only single specimens of *Macoma balthica* were found in muddy sediments, in well oxygenated places.

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