



BIVALVES IN SURFACE DEPOSITS OF THE SOUTHERN BALTIC

JARMILA KRZYMIŃSKA

Department of Marine Geology, Polish Geological Institute, Kościarska 5, 80-328 Gdańsk, Poland
(e-mail: jkrzyminska@pgi.gda.pl)

ABSTRACT: Maximum depth of occurrence and preferred substrata have been determined, and distribution maps prepared for four bivalve species of the S Baltic: *Cerastoderma glaucum* (Poiret) (30–35 m, sandy bottom), *Macoma balthica* (L.) (55–80 m, muddy bottom), *Mya arenaria* L. (30–35 m, sandy bottom) and *Mytilus edulis* L. (40–50 m, stony bottom); four bivalve communities have been distinguished and mapped.

KEY WORDS: Southern Baltic, Bivalvia, distribution, substratum preference, depth range

INTRODUCTION

Studies on the bottom fauna of the Southern Baltic were initiated by DEMEL (1935) who described mainly qualitative composition of zoocenoses. Benthological research in that area became intensified after World War II. In the late 40s and in the 50s the bottom fauna was studied by DEMEL & MULICKI (1954) and DEMEL (1957), later by ŻMUDZIŃSKI (1967, 1974, 1977, 1978, 1982), FALNIOWSKI et al. (1977), WIKTOR & WENNE (1982), HERRA & WIKTOR (1985), WARZOCHA (1988) and OSOWIECKI (1996).

The result of their work was a general characteristics of the zoobenthos, distinguishing main zoocenoses and recognition of distribution ranges of some of their component species. Relationships between faunistic sequences and changes in ecological, hydrological and climatic conditions were also investigated.

The bottom fauna of the Southern Baltic is to a large degree composed of species which can survive

considerable fluctuations of water salinity. The shallow part of the Southern Baltic has a low salinity (7.5–8 PSU) and is inhabited only by rather few species of marine origin. Typically marine foraminifers, sponges, sea anemones, echinoderms, crabs, tunicates, as well as many molluscs, whose distribution ranges never exceed 10 PSU isoline, are completely absent, whereas a few bivalve species are among the main components of the zoobenthos; their proportion in the total biomass may locally exceed 90%. This pertains also to surface deposits of the Southern Baltic which are inhabited by four bivalve species: *Cerastoderma glaucum* (Poiret, 1789), *Macoma balthica* (Linnaeus, 1758), *Mya arenaria* Linnaeus, 1758 and *Mytilus edulis* Linnaeus, 1758. In this paper distribution maps of the bivalves are presented, depending on the depth and kind of deposit. Besides, bivalve communities inhabiting various parts of the Southern Baltic have been distinguished and mapped.

METHODS

The study included all the Polish EEZ of the Baltic, i.e. the shallow part of the Southern Baltic, especially the shoals Odra Bank, Southern Middle Bank, Słupsk

Bank, the Gulf of Gdańsk, Puck Bay and the Hel Peninsula (Fig. 1). In these areas, in 1973–1990, during a cartographic survey preparatory to the Geological

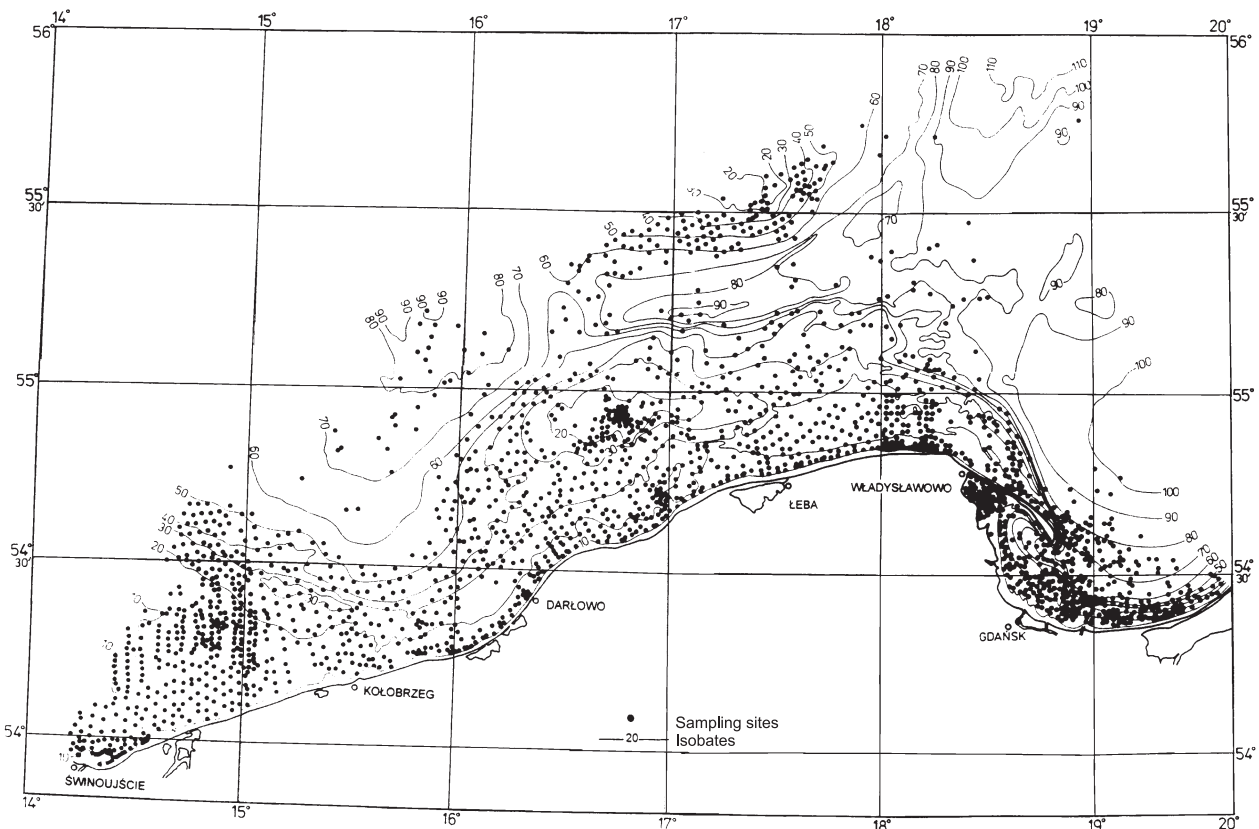


Fig. 1. Distribution of sampling sites in the Southern Baltic

Map of the Baltic Bottom, 1:200,000 (MOJSKI 1989–1995), samples of surface deposits were taken with VAN VEEN's sampler. The total number of samples was 2,148.

Detailed distribution maps of each species were prepared based on a locality map (1:500,000) with the depth indicated. These were superimposed

on the lithological map of surface deposits of the Southern Baltic (1:500,000, KRAMARSKA et al. 1995, KRZYMIŃSKA 1995), in order to recognise substratum preferences of each species. Superimposing all the species distribution maps made it possible to obtain a map of bivalve communities inhabiting the Southern Baltic.

RESULTS AND DISCUSSION

Distribution maps of each species are presented in Figures 2–5. They indicate the following regularities in the distribution of the bivalves.

C. glaucum occurs in sandy deposits, down to the isobate of 30–35 m. It inhabits the largest bottom areas in the Gulf of Pomerania, along the coastal zone from Ustka to the Gulf of Gdańsk, and especially in the Puck Bay as well as in the region of the shoal Southern Middle Bank (Fig. 2).

M. balthica is the dominant bivalve species in the entire Southern Baltic. It lives in sandy and muddy deposits which are most often found at greater depths. The bivalve prefers this kind of deposit because of its feeding mode (WENNE 1993) – preferring detritus to phytoplankton – reaching a higher growth rate at a muddy bottom and growing to a larger size in deep

water. Its distribution in the western part of the Baltic and in the Southern Middle Bank is limited by the isobate of 55 m, while in a part of the Bornholm Basin and in the Gulf of Gdańsk it goes down to 80 m (Fig. 3).

M. arenaria inhabits sandy deposits, like *C. glaucum*, and reaches the depth of 30–35 m. The largest aggregations of *M. arenaria* are found in the Gulf of Pomerania and along the whole coast eastwards to the Gulf of Gdańsk, as well as in the region of the Southern Middle Bank (Fig. 4).

M. edulis occurs in shallow waters, in places reaching the depth of 40–50 m and inhabiting mainly stony bottom and bottom vegetation. The largest aggregations of this bivalve were observed in the region of the Słupsk Bank and north of Kołobrzeg and Darłowo. In

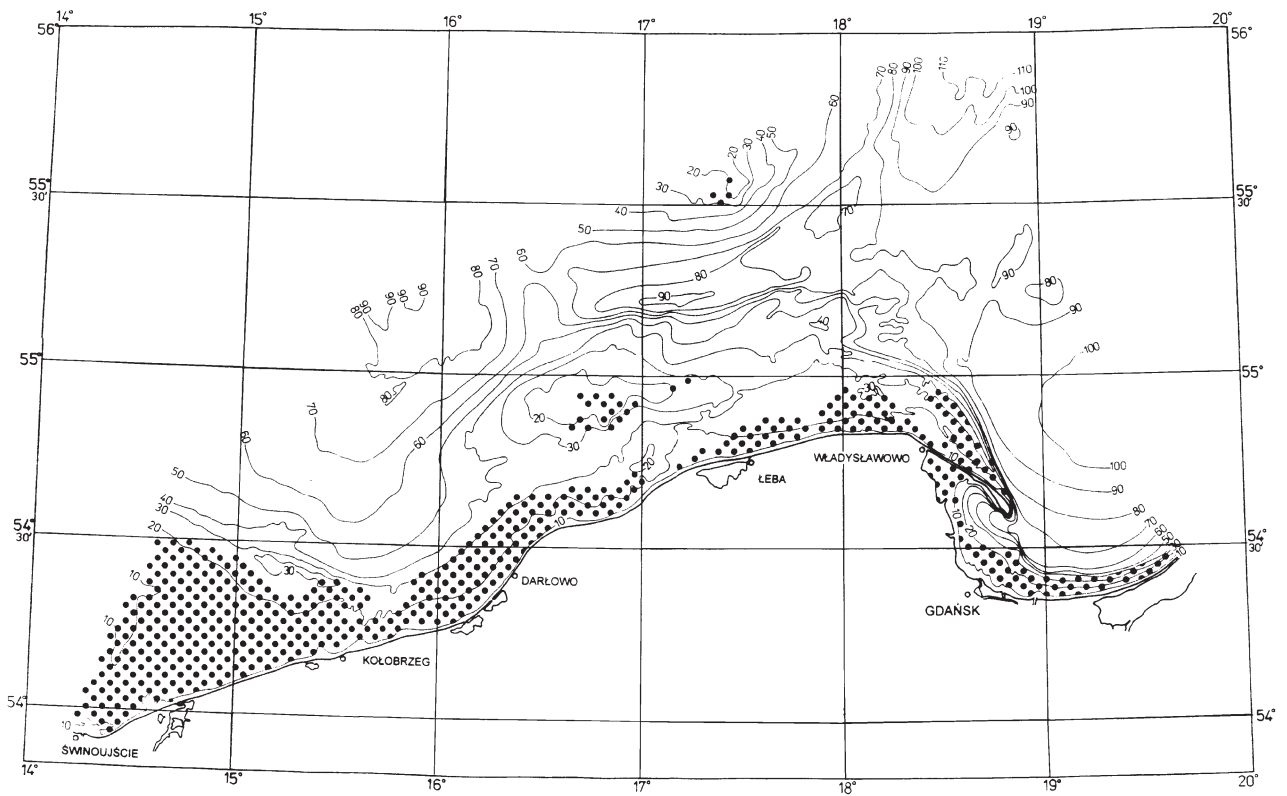


Fig. 2. Distribution of *Cerastoderma glaucum* (Poiret) in the Southern Baltic

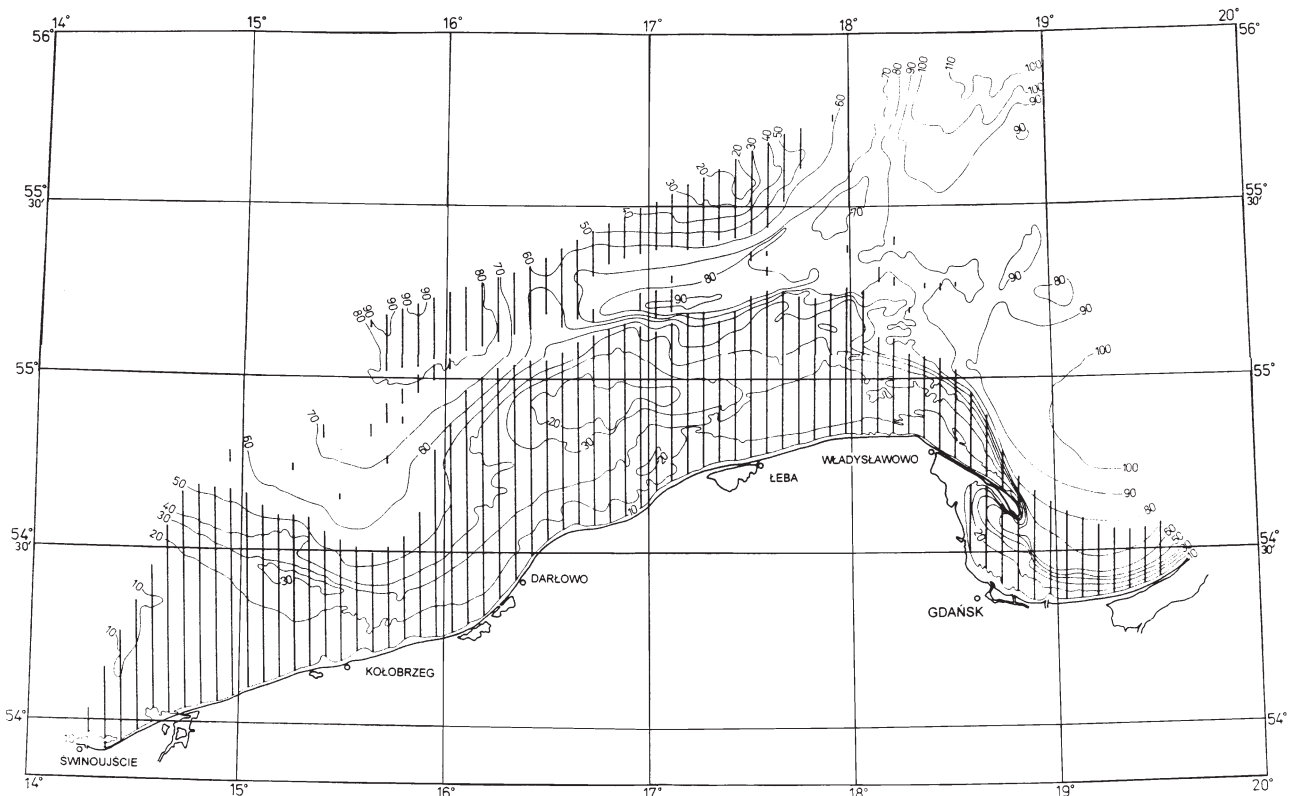


Fig. 3. Distribution of *Macoma balthica* (L.) in the Southern Baltic

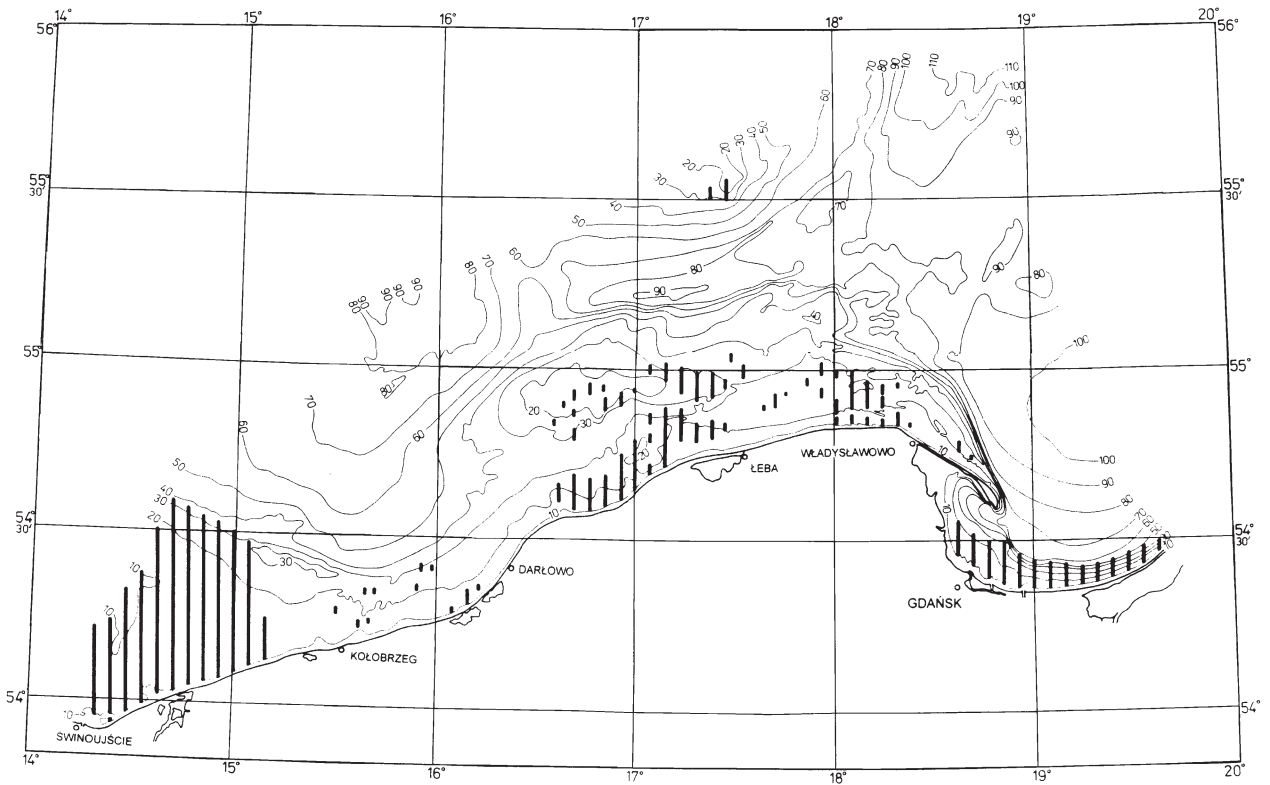


Fig. 4. Distribution of *Mya arenaria* L. in the Southern Baltic

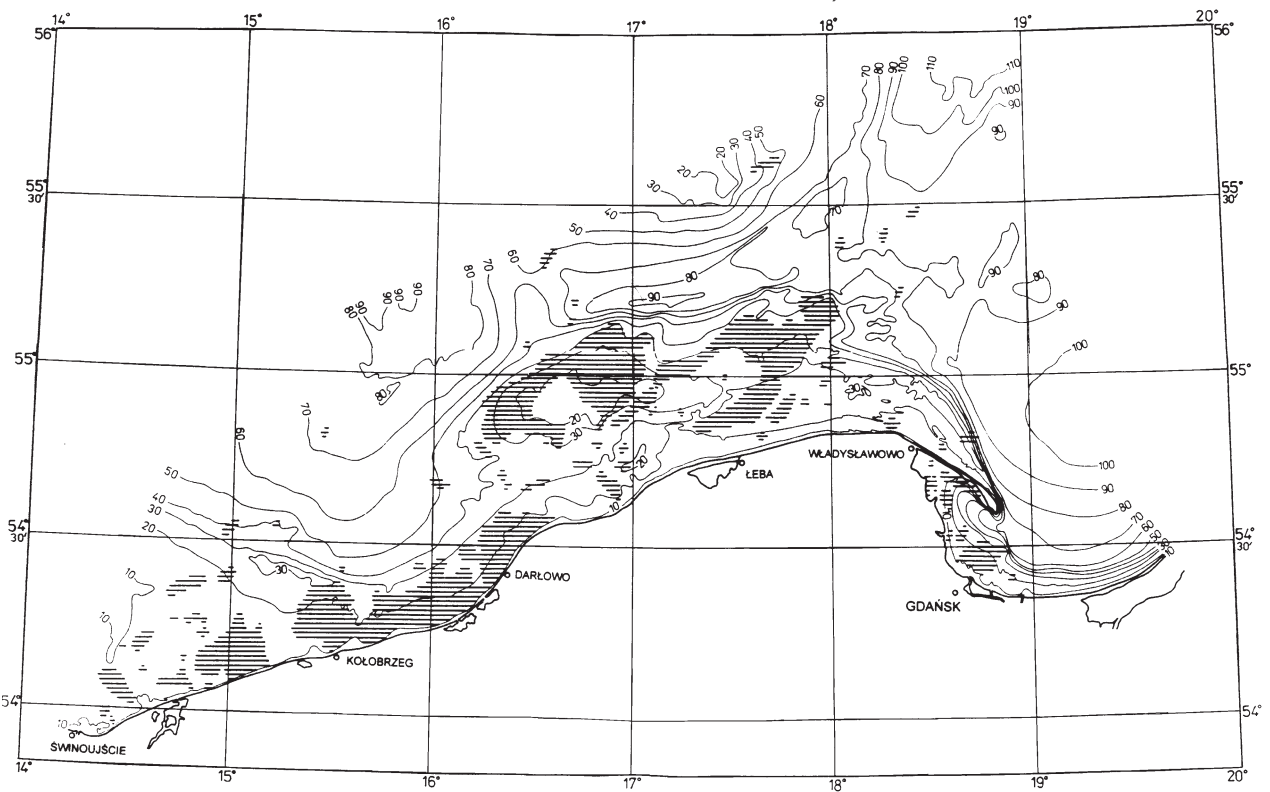


Fig. 5. Distribution of *Mytilus edulis* L. in the Southern Baltic

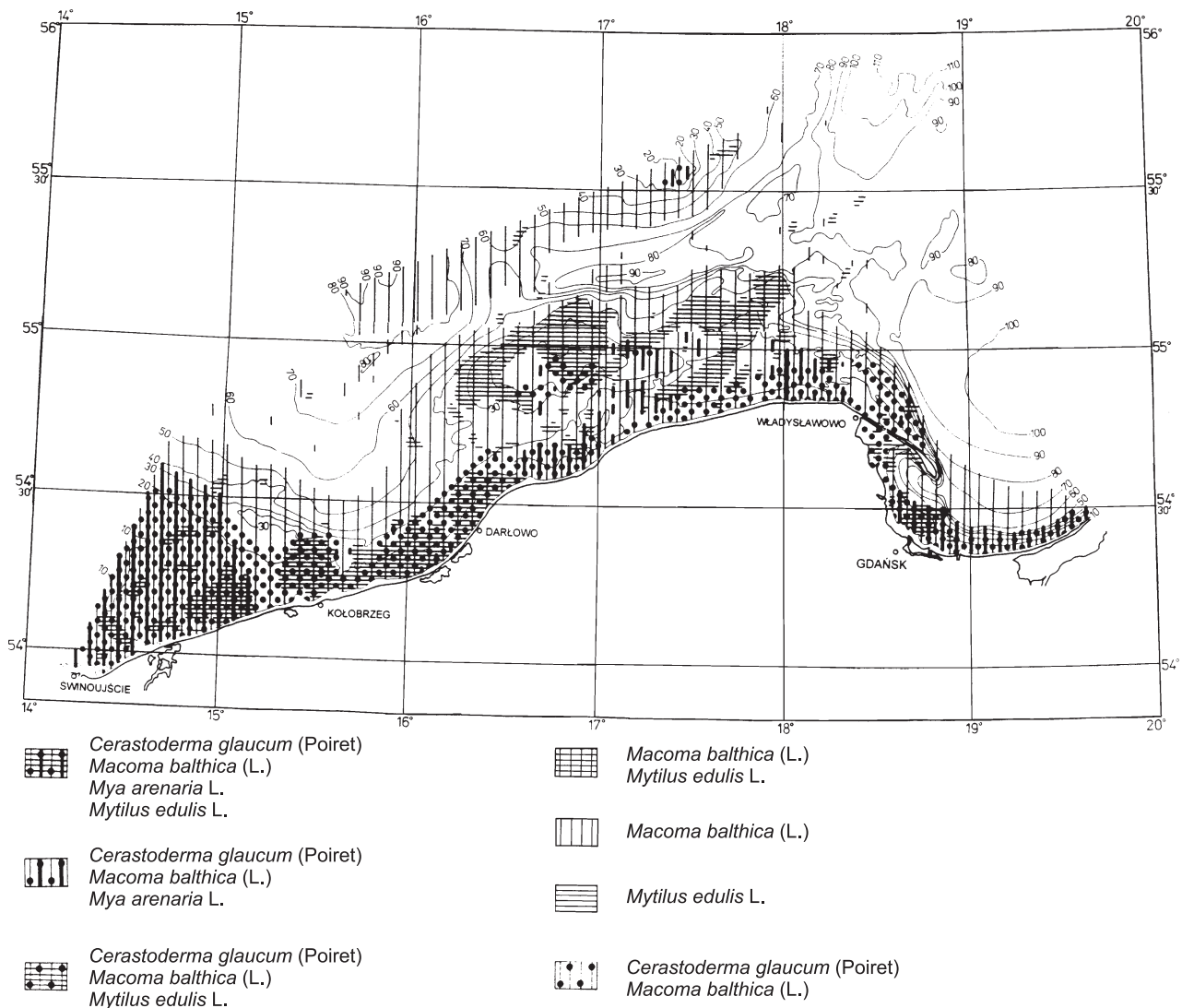


Fig. 6. Distribution of bivalve communities in the Southern Baltic

the Gulf of Pomerania and the Puck Bay *M. edulis* occupies only small areas (Fig. 5).

The distribution pattern of these species, depending on the depth and kind of substratum, makes it possible to distinguish the following bivalve communities (Figs 6, 7):

1. *C. glaucum*, *M. balthica*, *M. arenaria* and *M. edulis* in the region of the Gulf of Pomerania, along the section extending from Darłowo to Władysławowo, and in the region of the Słupsk Bank and the Gulf of Gdańsk.
2. *C. glaucum*, *M. balthica* and *M. arenaria* in the region of Łeba, the Southern Middle Bank and the Puck Bay.
3. *C. glaucum*, *M. balthica* and *M. edulis* north of Kołobrzeg and Darłowo, and in the Puck Bay.

4. *M. balthica* and *M. edulis* at the depth of 35–50 m north of the Odra Bank, in the region of the deep Słupsk Trough and on the ridges separating deep water basins.

The first three communities occupy the largest areas of the Polish coastal zone. In the open sea *M. balthica* dominates as the only species, but it is also a component of bivalve communities in shallow areas i.e. the shoals Słupsk Bank and Southern Middle Bank. The map in Figure 6 reveals the poverty of malacofauna in the Słupsk Trough which separates both these shoals. Besides the large depths, this is probably associated with a considerable water dynamics in that area.

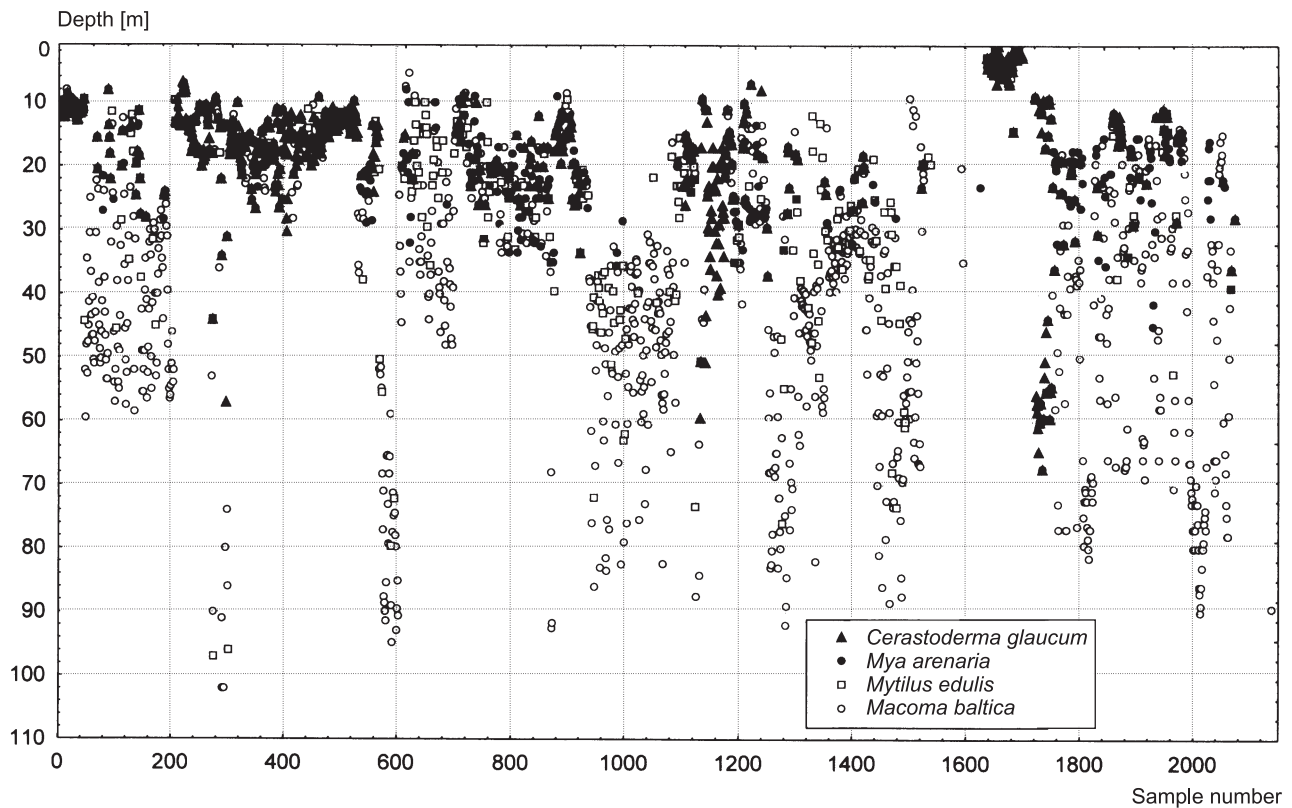


Fig. 7. Depth range of the four bivalve species in the Southern Baltic

REFERENCES

- DEMEL K. 1935. Studia na faunę denną i jej rozszedleniem w polskich wodach Bałtyku. Arch. Hydrobiol. Ryb. 9: 3–4.
- DEMEL K. 1957. Życie morza. Wydawnictwo Morskie, Gdańsk.
- DEMEL K., MULICKI Z. 1954. Studia ilościowe nad wydajnością dna południowego Bałtyku. Prace MIR 7: 75–126.
- FALNIOWSKI A., DYDUCH A., SMAGOWICZ K. 1977. Mięczaki Zatoki Puckiej. Materiały Międzynarodowego Sympozjum Oceanograficznego, Szczecin; UJ Kraków: 210.
- HERRA T., WIKTOR K. 1985. Fauna denną w strefie przybrzeżnej Zatoki Gdańskiej właściwej. Stud. i Mater. Oceanol. Nr 46. Biol. Morza 7: 115–142.
- KRAMARSKA R., UŚCINOWICZ SZ., ZACHOWICZ J. 1995. Czwartorzęd. In: Atlas geologiczny południowego Bałtyku (MOJSKI J. E., ed.), pp. 22–30, PIG, Warszawa.
- KRZYWIŃSKA J. 1995. Fauna denną. In: Atlas geologiczny południowego Bałtyku (MOJSKI J. E., ed.), pp. 37–38, PIG Warszawa.
- MOJSKI J. E. (ed.). 1989–1995. Mapa geologiczna dna Bałtyku 1:200.000. PIG, Warszawa.
- OSOWIECKI A. 1996. Makrozoobentos. In: Warunki środowiskowe polskiej strefy południowego Bałtyku w 1995 roku (CYBERSKA B., LAUER Z., TRZOSIŃSKA A., eds), pp. 168–172, Mater. Oddziału Morskiego IMGW, Gdańsk.
- WARZOCHA J. 1988. Struktura zespołów makrozoobentosu w południowym Bałtyku. Kwartalnik Geol. 1: 248.
- WENNE R. 1993. Zróżnicowanie przestrzenne i ewolucja wybranych gatunków małży morskich. Wydawnictwo UG, Gdańsk.
- WIKTOR K., WENNE R. 1982. Fauna przybrzeżnych wód Zatoki Gdańskiej. Studia i Mater. Oceanol. Nr 39, Biol. Morza 6: 137–171.
- ŻMUDZIŃSKI L. 1967. Zoobentos Zatoki Gdańskiej. Prace MIR 14A: 47–80.
- ŻMUDZIŃSKI L. 1974. Świat zwierzęcy Bałtyku. Wydawnictwa Szkoły Pedagogicznej, Warszawa.
- ŻMUDZIŃSKI L. 1977. The Baltic deserts. Ann. Biol. 32: 50–51.
- ŻMUDZIŃSKI L. 1978. Zmienność składu gatunkowego i biomasy zoobentosu Bałtyku południowego. In: Produkcyjność ekosystemu Morza Bałtyckiego (MAŃKOWSKI W., ed.), pp. 143–159, Kom. Bad. Morza Bałtyckiego.
- ŻMUDZIŃSKI L. 1982. Zoobentos płytkowodny Bałtyku. In: Zoobentos lat sześćdziesiątych (MAŃKOWSKI W., ed.), pp. 39–78, Wydawnictwa Wyższej Szkoły Pedagogicznej, Słupsk.

received: October 15th, 1999
accepted: February 20th, 2000

