GEOECOLOGICAL ANALYSIS OF THE NW BLACK SEA SHELF BASED ON THE STUDY OF OSTRACODS

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Introduction

When undertaking geoecological monitoring, one of the important aspects is the choice of a sensitive bioindicator system, which responds to the conditions of accumulation of toxic substances in bottom sediments (Kravchuk and Kravchuk 2000). Biological components comprising the ecological biotopes of the shelf region are controlled by the physico-chemical parameters and the concentration of a substance within sediments. The assessment of the situation and the general knowledge of the active processes can be obtained by investigating the changes in species content of various groups of living organisms. The pollution of marine environments by organic byproducts causes noticeable influence on the ostracod communities (Kravtsov *et al.* 2007).

Methodology

Ostracod analysis was performed based on samples obtained during the 1998-1999 cruises of the *R/V Argon and R/V Sprut* (Fig. 1).

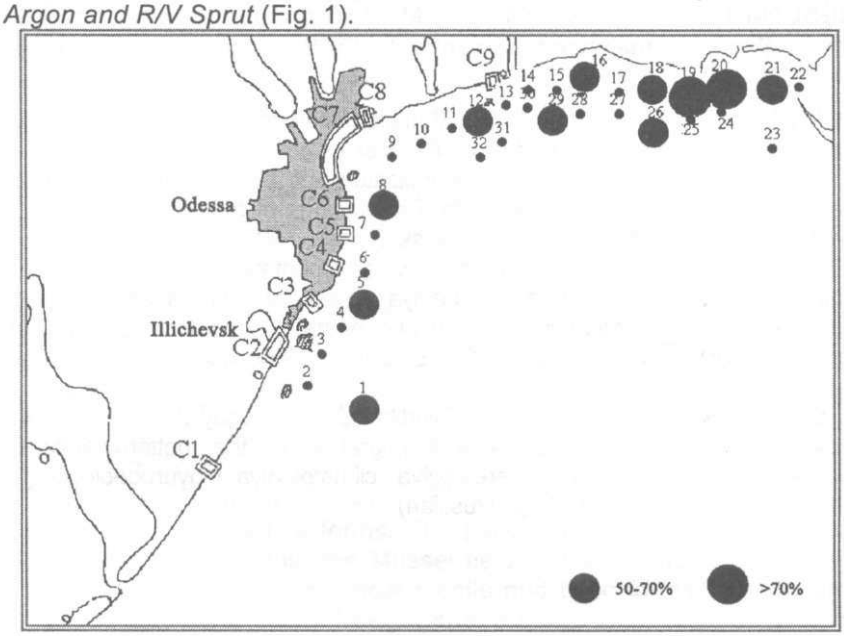

Figure 1. Studied area. The numbers represent the stations; the black circles represent the concentrations of sulphidized shells of ostracoda.

Comprehensive microfaunal studies of bottom sediments and the water column were performed for 59 stations from the Danube River delta region to Dnieper-Bug liman. The background distribution of ostracods was characterized based on materials from the collections of Paleontological Museum at the Odessa National University. Taxonomic identification was carried out based on morphological analyses. The details of test

morphology were studied by specialized investigation on an electron microscope (JEOL JSM-840A).

Results

In the immediate vicinity of the pollution sources, the more serious situation is characterized by abiotic zones or regions with sharp decline in ostracod occurrence, which is confirmed by investigation of ecologically stressed parts of the Black Sea shelf (monitoring regions near the Danube River delta, mouth of the Dniester River, Odessa Bay, and Dnieper-Bug liman). At some distance from the pollution sources, hypertrophic zones may be traced based on their sharp increase compared to background level. Areas of pollution are distinguished by a decrease in ostracod species diversity and community modification compared to non- polluted regions.

The methodology of environmental bioindication on the basis of ostracod analysis reflects the overlap of pollution areas with interruption in species diversity, population density, and community structure. Negative influence of the polluting substances on benthic organisms is tightly linked with the existence of biomineralogical mechanism for concentration of toxic compounds in the carbonate fraction of bottom sediments. Morphological changes in the tests and the development of sulphidization play an important role as bioindicators (Yanko *et al.* 1998).

In the northern part of the shelf, the sulphidization is more intense and is characterized by patchy distribution, often localized near the outflows of industrial and agricultural sewage (Fig. 1). Critical sulphidization levels have been observed at the stations of Cape Ajiyask, suggesting a deceleration of longshore transport of pollutants from the Dnieper-Bug liman. The fact that river-mouth areas act as main sources of shelf pollution plays a prominent role in the formation of sulphidization regions.

Conclusions

According to the results of the investigation, the methodology of biotesting and bioindication based on ostracods ensures early detection of irregularities, from initial changes in the state of living organisms to distant consequences and disappearance of various species from the study area. The priority of a geological approach to a comprehensive investigation of bioindicator properties of ostracods is defined by the application of micropaleontological, mineralogical, and biogeochemical methods to the analysis of changes in ecologically stressed parts of marine basins. On this basis, it is possible to organize the system for operative control of recent/past marine environments.

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