



## **Ecological state of North -Western Black Sea macrobenthos on offshore bottoms deeper than 50 m**

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In the last 10-15 years researches concerning benthos in the north-western Black Sea were focused mainly on inshore bottoms, usually less than 50 m deep, where important ecological changes occurred. The offshore bottoms, deeper than 50 m, and especially the periazotic level at the edge of the continental shelf have been less known, the information being scarce.

The present study gathers the results of the researches carried out in the past 12 years on the *Modiolus phaseolinus* community, including the periazotic level, and allows a comparison to be drawn with the situation of the so-called “ecological stability” period at the beginning of the 1960s, before the ecosystemic disturbances began in the Black Sea.

In 1995-2007, a number of 133 quantitative macro-benthos samples were collected at depths of 50 – 213 m by means of the van Veen-type grab and box corer; these samples were taken during several cruises (R/V “Prof.Vodyanitskyi” EROS 1995, 1997, R/V „Akademik” 2003, R/V „Parshin” 2005, R/V „Akademik” 2006 R/V „Mare Nigrum” 2006 and 2007), the researches aiming at the assessment of the benthic ecosystem state.

The analyses of the 133 samples helped identify 191 taxa (Vermes - 88, Mollusca – 24, Crustacea - 32 and Varia - 47), approximately 60% of the total number of species recorded in the north-western Black Sea during the period of “ecological prosperity”. The mean abundance of the benthic populations was 4,836.2 indivs.m<sup>-2</sup> for density and 189.9 g.m<sup>-2</sup> for biomass.

Most macrobenthic taxa occurred in the samples accidentally; out of the 191 taxa recorded, 60 taxa had a frequency of 1-2%, 37 taxa 2-5%, 28 taxa 5-10%, 32 taxa 10-20%, 26 taxa 20-50% and only eight species had a frequency over 50% (*Modiolus phaseolinus*, *Terebelides stroemi*, *Capitella capitata*, *Nephtys hombergi*, *Amphiura stepanovi*, *Sphaerosyllis bulbosa*, *Apeudes ostroumovi* and *Phyllodoce lineata*).

Numerical abundances were dominated by worms (2,606.9 indivs.m<sup>-2</sup>) and molluscs (1,398.7 indivs.m<sup>-2</sup>) populations representing 82% of the total mean density of benthos. As weight, the molluscs only (*Modiolus*, *Mytilus*) represented more than 85% of the total mean biomass.

The most spectacular development of benthos populations was registered, however, by the polychaeta worms *Capitella capitata* and *Polydora* sp.(*antennata?* *quadrilobata?*). They are opportunistic species, widely distributed on the NW Black Sea bottoms, with different types of substrata (both soft and hard). Frequently, these species are the dominant forms, particularly in the zones with high organic loading of sediments or in heavy polluted zones. In the mud community dominated by *Modiolus phaseolinus*, *Polydora* population had in its belt-like enclave of sand an average density of 12,000 indivs.m<sup>-2</sup> and maxima of 23,000 indivs.m<sup>-2</sup>.

The results of the comparative analysis along the depth gradient showed that the specific diversity decreases with depth. Thus, out of 191 taxa recorded in the zone under study, 186 taxa (approximately 90%) were identified in the depth interval between 50-100 m, 86 taxa identified between 100-150 m and only one species was found below 150 m. The quantitative values decreased gradually with depth. The numerical abundance decreased approximately twice in the interval 100-150 m as compared to the interval 50-100 m (from 5,600 indivs.m<sup>-2</sup> to 2,600 indivs.m<sup>-2</sup>), and the biomass decreased approximately seven times (from 230 g.m<sup>-2</sup> to 32 gm<sup>-2</sup>).

The dominant species in the depth interval of 50-100 m, with abundances over 45% of the total density were *Modiolus phaseolinus*, *Polydora antennata(?)* and *Capitella capitata* and over 85% of the total biomass - *Modiolus*

phaseolinus, *Mytilus galloprovincialis*, *Terebelides stroemi*. In the depth interval of 100-150 m the quantitative dominants by density were *Protodrilus flavocapitatus*(?), *Modiolus phaseolinus*, *Capitella capitata*, and, respectively, by biomass, *Modiolus phaseolinus*, *Ctenicella appendiculata*, *Haliclona aquaeductus*. Only one Sponge species (*Suberites carnosus*) was found below 150 m depth.

By analysing the numerical and weight structure of the major groups of macro-benthic organisms (Vermes, Mollusca, Crustacea, Varia) in the Black Sea pre- and post- ecological disturbances, we can conclude that the numerical changes occurring both in the *Modiolus phaseolinus* community and at the periazotic level ranged between expected limits during the past 50 years.