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ANTIBIOTICS AND METAL RESISTANT BACTERIA IN COASTAL WATERS OF ZMIINY ISLAND

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Currently, there is rising interest in the pollution of water with heavy metals as a selective factor in increasing resistance to antibiotics. Relationship between resistance to antibiotics and heavy metals can be explained by co-resistance in which the various determinants of resistance are presented in the same genetic elements - plasmids, integrons and conjugative transposons and cross-resistance which mechanism is the same for antibiotics and for metals (Baker-Austin, 2006).

Studying reaction of bacteria on heavy metals and antibiotics in coastal water of Zmiiny island is actual due to geological activity and anthropogenous press from the Danube river and also from intensive development of the island infrastructure.

The purpose of this work was to study the resistance of the dominant heterotrophic bacteria of Zmiiny island aquatorium to heavy metals and antibiotics.

The response of heterotrophic bacterioplankton isolated from 7 stations located in the coastal zone of Zmiiny island aquatorium on the effect of 7 heavy metals (Cu^{2+} , Ni^{2+} , Co^{2+} , Cr^{2+} , Pb^{2+} , Cd^{2+} , Hg^{2+}) and 9 of antibiotics (benzylpenicillin, cefotaxim, streptomycin, gentamycin, erythromycin, tetracyclin, chloramphenicol, nalidixic acid, rifampicin) were examined in during our research.

During 3 expeditions in summer and autumn of 2008, and also in spring of 2009, the levels of heavy metals in the studied aquatorium, mainly, did not exceed MCL, except for copper which level reached 6 MCL. It is found that in the investigated aquatorium there are bacteria capable to grow at the concentrations of heavy metals that considerably exceed their levels in marine water. In summer and autumn the seasonal dynamics of minimal inhibitory concentrations (MICs) of heavy metals was not marked. A decline of MIC of Ni, Co, Cd for the representatives of heterotrophic bacterioplankton of all studied stations was found in spring. Similar tendencies were marked for Cr and Pb, while MIC of mercury increased. MIC of Cu in different seasons did not undergo changes that could be related to a regular high level of copper in this aquatorium.

The data on the levels of resistance and the seasonal dynamics of the values of MIC of antibiotics was received for the first time in the investigated region. The maximal level of antibiotic resistance was observed in summer, and the minimal one - in spring. In summer and autumn, the highest levels of resistance to cefotaxim, chloramphenicol, tetracycline and erythromycin were found at stations that had the greatest load of tourists. In spring increased levels of resistance to most antibiotics were noted at stations g, h, k, which were characterized by a relatively high level of MIC values of chromium, lead and mercury.

Thus, changes in levels of resistance to antibiotics can be explained with a seasonal anthropogenic load of tourists and with an influence of xenobiotics, in particular of heavy metals. It is interesting to conduct further research of the genetic bases of multiresistance of water microorganisms to various toxicants.

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