



## RESISTANCE OF HETEROTROPHIC BACTERIA OF ZMIINY ISLAND COASTAL WATERS TO HEAVY METALS AND ANTIBIOTICS

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**Introduction.** Currently, there is increasing interest in the pollution of water masses of heavy metals as a selective factor in increasing resistance to antibiotics. Relationship between resistance to antibiotics and heavy metals can be explained co-resistance in which the various determinants of sustainability presented in the same genetic elements - plasmids, integrons and conjugative transposons and cross-resistant which is one mechanism for antibiotics, and for metals (for example an efflux pump) [1, 2, 3]. Studying of reaction of bacteria on action of heavy metals and antibiotics in island water area Zmiiny in communication as with geological activity, and an anthropogenous press from outside the rivers Danube, and also intensive development of an infrastructure of island is actual.

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

**Materials and methods.** In the course of the research has examined the response of heterotrophic bacterioplankton isolated at 7 stations located in the coastal zone of the water area of Zmiiny island, the effect of 7 heavy metals ( $\text{Cu}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Co}^{2+}$ ,  $\text{Cr}^{2+}$ ,  $\text{Pb}^{2+}$ ,  $\text{Cd}^{2+}$ ,  $\text{Hg}^{2+}$ ) and 9 of antibiotics (benzylpenicillin, cefotaxim, streptomycin, gentamycin, erytromycin, tetracyclin, chloramphenicol, nalidixic acid, rifampicin).

**Results.** In the period of lead through of 3 expeditionary works a summer and autumn 2008, and also by a spring 2009 maintenance of heavy metals in the studied aquatorium, mainly, did not exceed MCL, except for a copper the level of which arrived at 6 MCL. It is set that in the probed aquatorium there are bacteria, capable to grow at the concentrations of heavy metals, considerably exceedings maintenance of pollutatants in marine water. In a summer and autumn period practically a seasonal dynamics was not marked minimal inhibitory concentrations (IICs) of heavy metals. A decline is sprint exposed of IIC  $\text{Ni}^{2+}$ ,  $\text{Co}^{2+}$ ,  $\text{Cd}^{2+}$  for the representatives of heterotrophic bacterioplankton of all studied stations. Similar tendencies were marked for  $\text{Cr}^{2+}$  and  $\text{Pb}^{2+}$ , while IIC of mercury increased. IIC of  $\text{Cu}^{2+}$  in different seasons did not suffer changes that can be related to the stably high level of copper in this aquatorium. For the first time received the data on the levels of resistance and the seasonal dynamics of the values of IIC of antibiotics in the investigated region. The maximum level of antibiotic resistance was observed in summer, and the minimum - in the spring. In summer and autumn, the highest levels of resistance to cefotaxim, chloramphenicol, tetracycline and erytromycin found at stations that have the greatest load of tourists. Spring noted increased levels of resistance to most antibiotics on 3 stations, which is characterized by a relatively high level of IIC values of chromium, lead and mercury.

**Conclusion.** Changes in levels of resistance to antibiotics can be explained as a seasonal anthropogenic load of tourists, and the influence of xenobiotics, in particular heavy metals. Further research perspective to the study the genetic bases of multiresistant water microorganisms to the action of various toxicants.

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