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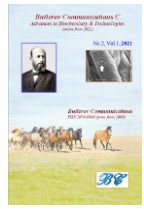

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Morphological adaptations of *Aspergillus niger* to white phosphorus

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Abstract

Biodegradation is one of the most important methods for neutralizing toxic xenobiotics, including those belonging to the highest hazard classes. Much has been previously presented on the advantages of biodegradation as against other methods of treating wastewater and contaminated soil. In current times, the fungus *Aspergillus niger*, which has a high potential for processing unnatural substances, is increasingly used for this purpose. In earlier studies, we were the first to demonstrate the biodegradation of white phosphorus by *Aspergillus niger* strains. Much focus was given to studies on the resistance of this microorganism to white phosphorus: the search for minimum inhibitory concentrations (MIC), and the comparison of the resistance of this unique microorganism with other closely or distantly related microbes. In the framework of further deepening of our research, a further important task remains the study of resistance mechanisms of *A. niger* to such a toxic substance. These mechanisms can be very diverse if we draw analogies with other microbial strains that are resistant to chemical pollutants of the environment. Two mechanisms are most likely. The cell wall of the fungus is a barrier to the penetration of white phosphorus into the cell. In such a case, an increase in cell wall thickness should be observed in response to exposure to the

toxicant. The second mechanism is associated with a general activation of metabolism, accompanied by an increase in the number of mitochondria in the cells. It was shown that white phosphorus has little effect on the ratio of living and dead cells in the colonies of fungi, i.e. resistance to it is very high.

The studies carried in the present work out with the use of transmission electron microscopy and complex statistical processing of the results have shown that both resistance mechanisms take place.

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