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THE ROLE OF AQUIDOBIONTS IN THE SELF-PURIFICATION OF RESERVOIRS

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Annotation: *Hydrobionts play a key role in the process of self-purification of water bodies. They are an important part of the food chain and are involved in various biochemical processes. Below are the main roles of aquatic organisms in the self-purification of water bodies.*

In general, aquatic organisms are key participants in the processes of self-purification of water bodies, performing a number of important functions, such as biological decomposition, filtration, biotransformation and oxygen production.

One of the most pressing environmental problems of the 21st century is the conservation of ecosystems and their biodiversity. The state of a biological system, to one degree or another, characterizes the impact of natural, anthropogenic factors and environmental conditions on it. The process of self-purification is one of the natural mechanisms for the rehabilitation of water bodies subject to various types of pollution. Almost all the biodiversity of aquatic organisms - from the first trophic level (phytoplankton and higher plants) to fish - are important elements and participants in the processes of water self-purification. Currently, scientists are paying great attention to the problems of self-purification of water bodies and the role of aquatic organisms in them.

Anthropogenic sublethal disorders, including functional disorders of physiological activity, as well as changes in behavior (in almost any group or taxon of aquatic organisms) should be considered as potentially dangerous in terms of reducing the efficiency of self-purification. The fact of the significant role of not only microorganisms, but also the macrobiotic component in the self-purification of ecosystems is noted, which makes it necessary to compare the sensitivity of different organisms to pollutants. High (sublethal) concentrations of pollutants can disrupt the activity and vital functions of other organisms participating in the functioning of the ecosystem as a bioreactor.

The role of biota in self-purification and improvement of water quality is multifunctional. Thus, the detrital material of sediments, which is of mixed origin and is formed from the tissues of dead mollusks and plants, has the ability to accumulate heavy metals, thereby contributing to the process of self-purification of the reservoir.

Aquatic hydrobionts are an integral part of the ecosystem. Their functioning influences the formation of water quality.

Aquatic ecosystems play an important role in the redistribution of radioactive isotopes. The latter, with groundwater, rain and flood flows, are transported over considerable distances and gradually accumulate in closed reservoirs, absorbed by hydrobionts, settling in bottom sediments.

Thus, the entire ecosystem of the reservoir participates in self-purification processes. The duration of these processes is determined by many factors, including the half-life of long-lived radionuclides, the number of pollutants entering the reservoir, the number of hydrobionts participating in self-purification processes, etc. As a result, self-purification processes can be delayed for a long time. The task of scientists at this stage is to speed up the self-purification processes, doing everything possible so as not to harm or destroy natural ecosystems. The search for ways to rehabilitate contaminated water bodies has not yet led to a common understanding of the mechanisms for removing radionuclides and other pollutants from them.

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Based on the previously studied features and biological mechanisms of self-purification of aquatic ecosystems, a number of authors have proposed a biotechnological method, including the use of various hydrobionts to improve the ecological condition of water bodies.

One such example is a bioplateau with the participation of higher aquatic plants (reed, reed, cattail, pondweed, susak, etc.). By absorbing a significant amount of nutrients, higher aquatic plants reduce the level of eutrophication of water bodies, assimilate and process various substances, promoting the deposition of suspended and organic substances, saturate the water with oxygen, and intensify the purification of water from heavy metals and oil products through oil-oxidizing bacteria.

Purifying contaminated water with weeds is another effective remedy proposed by Russian scientists. Specialists from the Institute dealing with cytology and genetics at the Russian Academy of Sciences have developed an innovative method of water purification, in which the main component to be eliminated is radioactive substances. The most interesting thing is that no nanotechnology is required for this. Purification is carried out by the plant Eichhornia, which is quite common in tropical latitudes, and has the excellent property of absorbing almost the entire volume of pollutants from water.

Algolization of water bodies and the introduction of herbivorous fish is also one of the effective methods of biological reclamation of water bodies. To solve the problem of "blooming" of water bodies, a biological approach is used, which consists in the structural restructuring of the phytoplankton community with a predominance of green algae (for example, Chlorella vulgaris BIN strains). Algolization of reservoirs using planktonic strains of Chlorella creates the prerequisites for normalizing the hydrobiological regime of the reservoir. The use of the Chlorella vulgaris BIN strain, with its fundamentally new capabilities for the biological rehabilitation of polluted water bodies, makes it possible to change the ecological situation and create a reliable system for improving the environment.

It has been established experimentally that it is possible to effectively purify contaminated water through the combined use of bioagents capable of active sorption of radionuclides with removal of the latter from the biological cycle, in combination with technical means of filter-adsorption purification. This possibility is provided by a combined sorbent based on a polymeric fibrous-porous melt-blown carrier impregnated with a dispersed suspension of green algae chlorella (Chlorella vulgaris). The type of carrier was chosen due to the unique combination of structural parameters and physical properties achieved in melt-blown materials. Such materials have the property of retaining particles of the dispersed phase and allowing the dispersion medium to pass through, demonstrating low hydrodynamic resistance. They are also chemically resistant to any composition of the water being treated and are easy to use. One of the known and available sorption-active substances are humic substances. Being in water bodies, they play an important role in the neutralization, accumulation and migration of pollutants. Currently, the participation of humic substances in the detoxification of pesticides, heavy metals, and radionuclides has been proven. High efficiency of radionuclide extraction is achieved using the above-mentioned combined sorbent, in which the polymer carrier is impregnated with a targeted additive of humic substances. This method of extracting radionuclides from water using a combined sorbent (polymer + bioagent) was developed at the intersection of scientific fields and demonstrates the promise of finding means of rehabilitating contaminated areas using the arsenal and methodology of related sciences.

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