
Introduction

*N*ecessity of water resources management and their redistribution in time and space has required creation of huge fund of reservoirs. Now there are 30 thousand reservoirs of volume more than 1 m³ in the globe, which cover 0,2 % of its land territory. Reservoirs became a major component of the river systems practically in all regions of the world and appreciable component of the environment. The majority of them is constructed with the purposes of water-power engineering, irrigation, water supply (technical and drinking), and also improvement of water traffic.

In Ukraine, characterized by lack of water resources, regulating of Dnieper was begun in 1931 by construction of DneproGES dam and construction of Dnieper (nowadays Zaporozhye) reservoir. In 1973 the Dnieper runoff in its upper part had been regulated by creation of the cascade of reservoirs of total square up to 7 thousand km². Also, these years in down and middle Dnieper large water-supplying and irrigation channels were constructed. They are Dnieper — Krivoy Rog, Krasnoznamensky (together with Severo-Krymsky channel, branched from it), Inguletsky and Dnieper — Donbass.

The radical change of a hydrological regime of Dnieper as a result of hydraulic engineering construction and growing pollution of water by industrial, agricultural and municipal wastewater has resulted in essential

changes in the hydrochemical, biological and sanitary regimes of the river regulated.

The economic importance of the Dnieper reservoirs for Ukraine is very high, as they store more than 70 % of water resources of the state and which used for drinking and technical water supply, irrigation, water transport, electricity producing, and fishery. Dnieper reservoirs are especially important for the water supply of the South of Ukraine where this problem was extremely sharp before creation of reservoirs and channels.

The analysis of the hydrological, hydrochemical and hydrobiological features of reservoirs shows their principal differences from the river and lacustrine types of water objects. A spatially non-uniform structure of the abiotic conditions and also a variety of the main hydrobionts communities characterize reservoirs.

The time and space regularities of these ecosystem formation and functioning require steadfast attention of many ecologists. In this connection it is necessary to note, that only long hydroecological researches integrated with microbiological ones, allow to distinguish cyclisity of the natural biological processes from the man-made changes of formation of water quality and bioefficiency of reservoirs, and also to reveal regularities of functioning of planktonic and bentic communities.

The transformation of organic substance by bacteria in reservoirs includes: its production at the expense of duplication of bacterial populations, its transition to the next trophic level owing to consumption of bacteria by water animals, and also destruction of organic compounds during bacterial oxygen consumption.

The present work is the most complete generalization concerning characteristics of bacterioplankton functioning and its role in transformation of organic matter in ecosystems of huge lowland reservoirs of intensive complex use (taking Dnieper cascade as an example). For the first time the quantitative estimations of participation of bacteria in transforma-

tion of organic matter for the 30-year's period in reservoirs of various physical-geographical zones (Polesye, Forest-Steppe, Steppe) are given; its characteristics are shown. Also, the regularities of bacterioplankton succession under the natural and antropogeneous factors are established. The reservoirs investigated are differed by their location in the Dnieper cascade: heading (Kiev), regulating (Kremenchug) and closing (Kakhovka), and also by the character and degree of antropogeneous loading.

Before our generalization there were systematic researches of bacterial processes in the mountain reservoirs. The Irkutsk and Bratsk reservoirs on Angara River were microbiologically studied for 5 years of their existence. Ust'-Kamenogorsk and Bakhturmisk ones on Irtysh River were investigated for 10 years (Кожова, Мамонтова, 1979; Гулая, 1975). Also, lowland reservoirs — Slapy and Klichava (Czechia) and Rybinsk reservoir on Volga River, were microbiologically studied for 10 (Драбкова, Страшкрабова, 1983) and 15 years (Романенко, 1972).

D.Z.Gak (1975) made for the first time microbiological generalization for one of the largest lowland rivers in Europe, Dnieper, before and after it regulating by dams of hydroelectric power stations. Thus last researches of the author are referred to 1968. Since then new reservoirs have been constructed, the scales of antropogeneous press have grown, and also Chernobyl NPP accident has occurred. All these factors could affect on functioning of the bacterial population and its role in ecosystems of Dnieper reservoirs.

The author has begun their study in the Dnieper basin since 1960 and in reservoirs of the Dnieper cascade since 1965. We tried to generalize the material obtained in organic connection with the D.Z.Gak's data.

The purpose of the work consist in an estimation of the role of bacteria in the transformation of organic matter by planktonic community, and also establishment of the basic regularities of bacterioplankton functioning under influence of change of a hydrological regime of the large rivers

under conditions of creation and infancy of the reservoirs (taking Dnieper as an example), their intensive complex use, and also toxic and radioactive pollution caused by Chernobyl NPP accident.

The plan of our researches, which were a basis for the monography offered for an attention of the readers, included the resolving of the following basic tasks.

To generalize the available literary data on the features of formation of a hydrobiological regime of large reservoirs of various physical-geographical zones in terms of bacterioplankton functioning depending on the reservoir trophicity and influence of basic abiotic and biotic factors. To analyse long-term characteristics of formation of the microbiological regime of the principal sites of Dnieper and to estimate the importance of the factors influencing saprobicity parameters of water body, including the river runoff regulating factor.

To determine a role of bacteria in plankton and seston of the Dnieper reservoirs depending on qualitative structure of algae; to study long-term dynamics of bacterioplankton production, its involvement in trophodynamics, destruction of organic matter and flow of energy through planktonic community.

To investigate features of the structural-functional characteristics of bacterioplankton under radioactive and toxic contamination.

To estimate long-term microbiological parameters of saprobicity of Dnieperreservoirs and to establish regularities of bacterioplankton succession under natural and antropogeneous factors.

The study of long-term dynamics of bacterioplankton of large lowland reservoirs (taking Dnieper cascade as an example) has shown that its structural-functional characteristics are not constant, and depend on the natural and antropogeneous factors, which are capable both to stimulate and to suppress bacterial processes.

The results of the researches carried out have already put into practice. In particular, our development on water quality forecasting for Niznednieprovsky reservoir projected are used by Ukrhyprovodkhoz of the Ministry of Water Management of Ukraine during preparation of the Feasibility Report "Probable Changes in Ecosystem of Dnieper-Bug Lagoon in Connection with Reduction of the Dnieper Runoff" (volume XII, book 3, sections 1, 3 and 2, 7, Kiev, 1979), and also VNIIVO when modeling formation of water quality of the Kremenchug reservoir (Kharkov, 1983).

The established regularities of bacterioplankton functioning depending on the natural and antropogeneous factors were a basis of the forecast for a microbiological regime of the Kremenchug reservoir in connection with its reconstruction planned («Ecological Estimation of the Measures to Increase an Actual Output of Kremenchug and Kakhovka Reservoirs» under the task given by Ukrvodproject, Kiev, 1991).

The monography is prepared on the basis of long-term researches of the microbiological regime of Dnieper and its reservoirs and is a part of complex hydrobiological works carried out by Institute of Hydrobiology of the National Academy of Sciences of Ukraine and guided by the Academician of Academy of Sciences of USSR A.V.Topachevsky (since 1961 till 1977) and Academician of NAS of Ukraine V.D.Romanenko (since 1980 and till the present time).

With feeling of deep gratitude, I shall always recollect my first scientific chief Professor Yakov Yakovlevich Tseeb (1904—1978), who was directly supervising complex researches in Dnieper in 1960—1978, and supporting microbiological work in every possible way as an integral and major component of these researches.

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Introduction

The author knows that after long discussions Blue-Green Algae were referred to bacteria world. It is formally legalized in «Bergy's Identification Key for Bacteria» (1994), where these microorganisms as cyanobacteria were included into a group of oxygene phototrophic bacteria.

But during the study period (1960—1992), according to the classification adopted at that time, this group of microorganisms belonged to Algae.