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MICROBIOTA AS A FACTOR OF SELF-CLEANING FORMER COASTAL WATER BODIES

Bakhieva Louise Aminovna
Candidate of Biological Sciences, Associate Professor, Department of General Biology and Ecology
Karakalpak State University named after Berdakh, Republic of Karakalpakstan

ANNOTATION

The article discusses the features of the microbiota as a factor in the self-purification of coastal waters. Microbiota play an exceptional role in the processes of self-purification of water bodies, since they are primarily responsible for the destruction of organic matter accumulating in lakes.

KEY WORDS: ***food, circulation, carbon, reservoir, bacterium, microflora, phosphorus, nitrogen, sulfur.***

Microorganisms, utilizing autochthonous and allochthonous organics, are "orderlies" of water bodies. Processing the flow of polluting organic substances, bacteria at the same time serve as food for a number of microbionts. The contribution of microorganisms to the process of self-purification of water bodies has been evaluated by a number of researchers (Drabkova, 1983, Kuznetsov, 1970). Thus, microflora is an important lever in the ecosystem of water bodies (Kuznetsov, 1970).

Bacteria carry out a complex set of changes and transformations of substances. By mineralizing organic residues, they return carbon, sulfur, nitrogen, phosphorus, and also trace elements necessary for algae and other hydrobionts into the cycle.

The biochemical activity of microorganisms is associated with the oxygen regime of reservoirs and streams, the transformation of biogenic elements. The use of microbiological research methods makes it possible to decipher the course of the destruction of organic matter in water bodies, for which it is necessary to have data on the number of microorganisms, the rate of their reproduction, the intensity of respiration, and production.

Bacteria play an exceptional role in the processes of self-purification of water bodies, since they are primarily responsible for the destruction of organic matter accumulating in lakes.

The purpose of our research was to study the regularities of the distribution of microorganisms in the reservoirs of the Muynak region, fed exclusively by the Amu Darya water.

The total number of bacteria. An important morphological characteristic that clearly reveals the relationship with the type of water bodies is the number of microorganisms. We have carried out long-term studies on the content of microorganisms and their forms in the studied objects. The average annual values of the total number (highs and lows) are presented in the figure. Interannual changes (1995-1997) of the total number of microorganisms studied in lakes and bays are insignificant. However, in 1996 the level of spread of bacteria throughout the year and at all stations was much higher than in previous years.

The intra-annual fluctuations are characterized by spring and summer-autumn peaks, with the maximum values shifting to the end of summer and the beginning of autumn. The total number of bacteria directly counted in the water of the studied lakes and bays is unevenly distributed over the stations and fluctuated over a very wide range from 1.0 to 2.3 million/ml cells, depending on the place of sampling and the season of the year. The greatest number of bacteria was in coastal zones, in old channels, intensively overgrown with reeds and water-immersed vegetation, a significantly smaller number of microorganisms was noted on open shoulders. Water

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bodies are characterized by bacterial stratification, but the maximum number of microorganisms was noted in the bottom layers.

The total number of microbes in lakes and bays fluctuated significantly by the seasons of the year: two maxima were noted - in summer and early autumn. Dimensions and biomass of microorganism cells. For each water body, we measured 50 cells of different morphological groups on colored membrane filters using an ocular micrometer; the drying coefficient of bacterial cells in the filters was not taken into account.

The volume of bacterial cells varies: rods from 0.12 to 0.80, cocci from 0.11 to 0.66 microns. Comparing with the literature data, we can say that the volume of cells in the studied area is relatively small, larger cells are characteristic of littoral stations and more productive areas, and cells are smaller in less productive areas.

The average volumes of cells in all objects in the annual cycle fluctuated within a very wide range, and no regularity was observed over the seasons. Sometimes the minimum volume of cells was observed during the freeze-up period, sometimes in spring, even in autumn. Often, an increase in the volume of microorganisms was recorded in the summer.

Characteristic of all objects is an increase in the size of cells in the bottom layers of lakes, especially in periods with well-defined stratification. This is clearly seen in Lake Shegekul, where the average volume of cells in the bottom layer is 2-3 times higher than in the surface.

A certain relationship was noted between the productivity of the reservoir and the size of bacterial cells, especially rods.

In Shegekul Lake and Muynak Bay, they are long and wider than in other water sources. For the coccal flora, it is difficult to talk about such a relationship. Sometimes in channels their volume is greater than in lakes and bays.

It should be noted that earlier in the Amu Darya there was no own microflora, and microorganisms that got from outside were at a minimum.

Simultaneously with the determination of the total number of bacteria, the number of bacteria growing on meat-peptone agar (MPA) was determined. This group also indicates the presence of biochemically active organic matter in the lake.

The study of the distribution of saprophytes in the annual cycle and along the vertical revealed a predominantly summer maximum, and it is most pronounced in the surface layer. The layer at a depth of 1m is significantly enriched with saprophytes. Larger numbers of saprophytes are recorded in the autumn months than in other seasons of the year.

In winter, the content of saprophytic bacteria ranges from 488 to 621 cells per ml, often the minimum number of saprophytic bacteria was detected in spring. A very important indicator in determining areas of pollution in lake waters can be the ratio of morphological forms of heterotrophic bacteria (rods, cocci). The predominance of rods, for example, indicates that the site is contaminated with easily oxidized organic matter.

On glass fouling (bacterial periphyton) one can get a picture of contamination of a particular area by the ratio of both gram-positive and gram-negative forms of microorganisms. It was found that gram-negative forms of bacteria prevailed in the pollution zone in lakes and bays. The increase in gram-negative forms once again allows us to speak about anthropogenic pollution of the reservoir. In areas of high content of organic matter, the morphological diversity of cells and the density of bacterial periphyton increase. As the concentrations of organic substances decrease, the microflora is less diverse, and the amount of periphyton decreases.

Bacterial respiration. According to the activity of respiration, one can judge the amount of organic matter subjected to destruction. The intensity of respiration of one bacterial cell ranges from 0.12 to 0.42×10 mg O2/l per day. The total intensity of respiration of bacterioplankton is from 47 to 90%, which gives reason to consider bacterioplankton as one of the leading links in hydrocenosis in the formation of the hydrochemical regime of water sources.

Based on the above, the following conclusions can be drawn:

- The distribution of microorganisms in the studied reservoirs is very variable and ranges from 1.0 to 2.3 million cells per milliliter;
- microflora is represented by medium-sized forms, cell sizes closely correlated with the productivity of the reservoir and even depended on the productivity of a particular area and the nature of its pollution;

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-bacterioplankton living in the studied reservoirs is very active, with a high respiration rate. The total destruction reaches 90%, which indicates a significant contribution of bacteria in the process of self-purification of water bodies.

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