Number, biomass and production of planktonic bacteria in the shallow Lake Balaton

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With 22 figures and 8 tables in the text

Abstract

A detailed temporal and spatial analysis on the heterotrophic and total bacterioplankton was carried out in the shallow Lake Balaton. Significant daily, seasonal and yearly fluctuations have been found in the number, biomass and production of the bacterioplankton. The vertical distribution is unstable except the stratification under ice. A definite differentiation have been found between the littoral zone and the open water. Depending on the self-purification capacity of lake water, the river influence was different seasonaly.

The most important trend in modern limnology is to quantify the basic energy sources and the main pathways and transfer efficiencies of energy in aquatic ecosystems. Sufficient data enable us to construct cybernetical models in order to describe the dynamic structure and function of ecosystems. Bacterial function results in the decomposition of organic matter and in the production of bacterial protein in the biosynthetic processes. This particulate bacterial protein serves as a basic food resource for the nutrition of aquatic animals.

We have only very few data on bacterial production comparing with data on primary production, especially in shallow lake ecosystems. In the shallow Hungarian lakes with an extensive water surface like Lake Balaton, which is the most important of them, there was no report concerning the number, biomass and production of the total bacterioplankton until 1969. In this paper we summarize our data obtained mostly with the membrane filter method during the years of 1966—1970 in order to describe the general quantitative aspects of the spatial and temporal changes. After obtaining sufficient data also on other parameters of the energy turnover, these summarized data are intended to serve as a basic material to construct the cybernetical model of this lake.

Planning and methods

During the first bacteriological investigations the number of heterotrophic microorganisms counted on different media was below the value of 50 cells per