Microbial oxidation of crude oil hydrocarbons in Danube water

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Abstract

Bacterial degradation of soluble hydrocarbons in water of the river Danube was studied experimentally. Total organotrophic bacteria as well as bacteria of the genera Pseudomonas, Flavobacterium and Chromobacterium survived and grew in contaminated Danube water under static conditions and with aeration. This applied to hydrocarbon concentrations of up to 500 mg/l. Growth rate of bacteria and degradation rate of soluble hydrocarbons were high during the first three days. Due to the changing composition of the bacterial community, respiratory activity of the bacterial cells increased between day 3 and 7. Bacterial cells became larger in contaminated Danube water.

The natural self-purification process passing off in surface waters is a complex of physical, chemical and biological factors. The first two of them affect the present crude oil and its products only partially. The first place in the degradation of crude oil hydrocarbons belongs especially to biological factors, microorganisms playing the main role among them. Through the activity of microorganisms, crude oil substances are transformed into simple compounds entering the carbon circulation in water. This is a basic, ecologically significant property exhibited only by some microorganisms. Along these lines we have paid attention to selected groups of bacteria that take an active share in the oxidation of crude oil hydrocarbons, their survival, physiological and degradation activity in the Danube water as well as the possibility to apply it by removal of the water contamination consequences in river Danube. The experimental results draw upon our paper published in this journal in 1987 (Tržilová & Miklošovičová, 1987).

Material and method

Bacterial strains were isolated from surface water (Danube, Str.-km 1868) on medium according to Velankar et al. (1975) and Liu (1973), and biochemically identified (Tržilová, Miklošovičová 1982).