

FATTY ACID COMPOSITION OF TOTAL LIPIDS OF SULFATE-REDUCING BACTERIA, ISOLATED FROM MAN-CAUSED ECOTOPES

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The growth of a man-caused load on the environment leads to the destruction of natural ecotopes and reveals as a stress factor for soil microbiota. In the areas of laying and exploitation of underground structures, sulfate-reducing bacteria (SRB) are widespread. Adapting to environmental changes they are capable to reverse into corrosive-relevant modes. Adaptation to stress factors is intensively studied; in particular, attention paid to study the fatty acid composition of bacterial cells.

The aim of the study was the analysis fatty acid composition of cellular lipids of SRB strains, isolated from man-caused ecotopes: from corrosion products and soils *Desulfovibrio desulfuricans* DSM642, *D. vulgaris* DSM644, obtained from the Deutch Collection (DSMZ); from reinforced concrete buildings *Desulfovibrio* sp. 10; from city heat systems *Desulfovibrio* sp. TC2, *Desulfotomaculum* sp. TC3, *Desulfomicrobium* sp. TC4 from the Ukrainian Collection of Microorganisms (UCM); and from main gas-pipeline *Desulfovibrio* sp. K1, *Desulfovibrio* sp. K2, *Desulfotomaculum* sp. K1/3 from collection of the Department of General and Soil Microbiology. The composition of bacterial fatty acids was analyzed by gas chromatography-mass spectrometry (GC/MS). Correlation analysis had performed using Pearson's method.

The 17 fatty acids, including 14 saturated and 3 unsaturated were determined. Among saturated fatty acids, the predominate ones were with the chain length C14:0, C15:0, C16:0 and C18:0, and within unsaturated fatty acids there were as C16:1 and C18:1. The membrane fluidity of the SRB was determined: the indexes of unsaturation were in the range from 0.03 to 0.35; the average lengths of the carbon chain (9.28 to 16.04) and the viscosity membrane indexes (65.84 to 110.10). It was shown that SRB characterized by high saturation degree of fatty acids, which indicated high rigidity of the cell wall. Correlation analysis of the SRB fatty acid profiles revealed that correlation index between *Desulfovibrio* sp. K1 and K2 strains, isolated from soils near gas main-pipeline, was 94% ($p < 0.05$); and between *Desulfovibrio* sp. TC2, *Desulfotomaculum* sp. TC3 and *Desulfomicrobium* sp. TC4 strains, isolated from heating systems, it was 97%-99% ($p < 0.05$).

The results indicate that adaptation of the SRB to a man-caused loading takes place. The changing of the saturation degree of cellular lipids is an important mechanism for maintaining the required level of fluidity of the cytoplasmic membrane and, accordingly, the adaptation of microorganisms to unfavorable environmental factors. The differences in the fatty acid composition of the SRB were due to decreasing the cytoplasmic membrane fluidity that is a protective adaptation reaction of bacteria to changing environment. The fatty acid composition of total lipids and cytoplasmic membrane fluidity indexes can be serving as an important indicator for assessing the degree of the SRB adaptation to the influence of man-caused loading.