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STRATIFICATION OF ENDOSPOREFORMING BACTERIA IN BOTTOM
SEDIMENTS OF BLACK SEA

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Aerobic Endospore-forming Bacteria (AEB) represent an interesting group of mesophilic bacteria for geological and environmental studies. The optimal temperature for their growth are in the range of 25-30 ° C. The main places of their habitation are soil, active sludge and bottom sediments of fresh water basins. In the marine environment they come from land with annual and rainy runoff and through the air. From the upper aerobic zone of the sea, along with organic residues, these planktonic bacteria sediment to the bottom of the sea. It can be argued that in conditions of low temperatures, complete absence of molecular oxygen, high concentrations of hydrogen sulfide and methane in the deep sea of the Black Sea, these bacteria are unable to carry out their life processes and multiply. But their endospores are resistant to the negative effects of environmental conditions, which makes them able to maintain viability in sedimentary matter for hundreds of years [1, 2]. Thus, the amount and taxonomic composition of the endosporeforming aerobic bacteria found on certain horizons in the bottom sediments can serve as a characteristic of environmental conditions (including hydrological) of a certain historical period. It is accepted that one centimeter bottom sediments accumulate over 20 years [3].

Samples of the Black Sea sediments were collected in 2011 during the international expedition on the German vessel Meteor at five points (with numbers 242, 233 on the Turkish shelf, and 258 and 269, on the shelve of the Crimean peninsula, respectively), at depths from 880 to 2000 m and were gifted to us by Professor Yu.P. Zaytsev from the Institute of Marine Research (Odessa). Kerns were

cut into sectors of 5 cm (0 corresponds to the surface of the bottom). The work was carried out using classical microbiological and statistical methods. Pasteurized and non-pasteurized sediment suspensions were inoculated on meat-peptone agar prepared from 1.8% sea salt solution and cultivated at 25 ° C for counting bacteria (as colony forming units - COO) of mesophilic lifestyle and 5 ° C for psychophilic, respectively. The research was carried out in five repeats.

The number of psychophilic AEBs, depending on the depth of the siege horizon, took values in a wide range (from 0 to 10⁶ CFU / g), which may be explained by the assumption of the existence of local ecological gradients in the process of their formation. The number of mesophilic AEB co-livated in the same range (from 0 to more than 300 × 10⁶ CFU / g), but more evenly compared to psychophytes. In general, the results of changes in the number of AEB in bottom sediments can be a reflection of climatic changes in the Black Sea region during the last 1000 years. According to the analysis of fatty acid composition and PCR analysis, the bacteria studied from the corresponding horizons are identified as: *B. cereus*, *B. pumilis*, *B. megaterium*, *B. licheniformis*, *B. subtilis*, *B. atrophaeus*, *B. mycoides*, *B. viscosus*, *B. luciferensis*, *B. oleronius*, *B. halmapalus*, *B. thuringiensis*, *B. thuringiensis israelensis*, *Paenibacillus macerans*, *Paenibacillus polymixa*, *Paenibacillus alvei*, *Paenibacillus larvae pulvifaciens*, *Brevibacillus choshinensis*, *Brevibacillus parabrevis*, *Brevibacillus reuszeri*, *Lysinibacillus sphaericus*, *Virgibacillus pantothenticus*.

The proposed microbiological approach for detection of climatic changes by the content of AEB can be applied to paleo-climatic researches and also the study of the effects of long-term anthropogenic climate change [3], but the authors consider it necessary to compare the results of microbiological studies with the results of paleogeological, physical and chemical studies.

Keywords: endospore, deepwater sediments, *Bacillus*

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