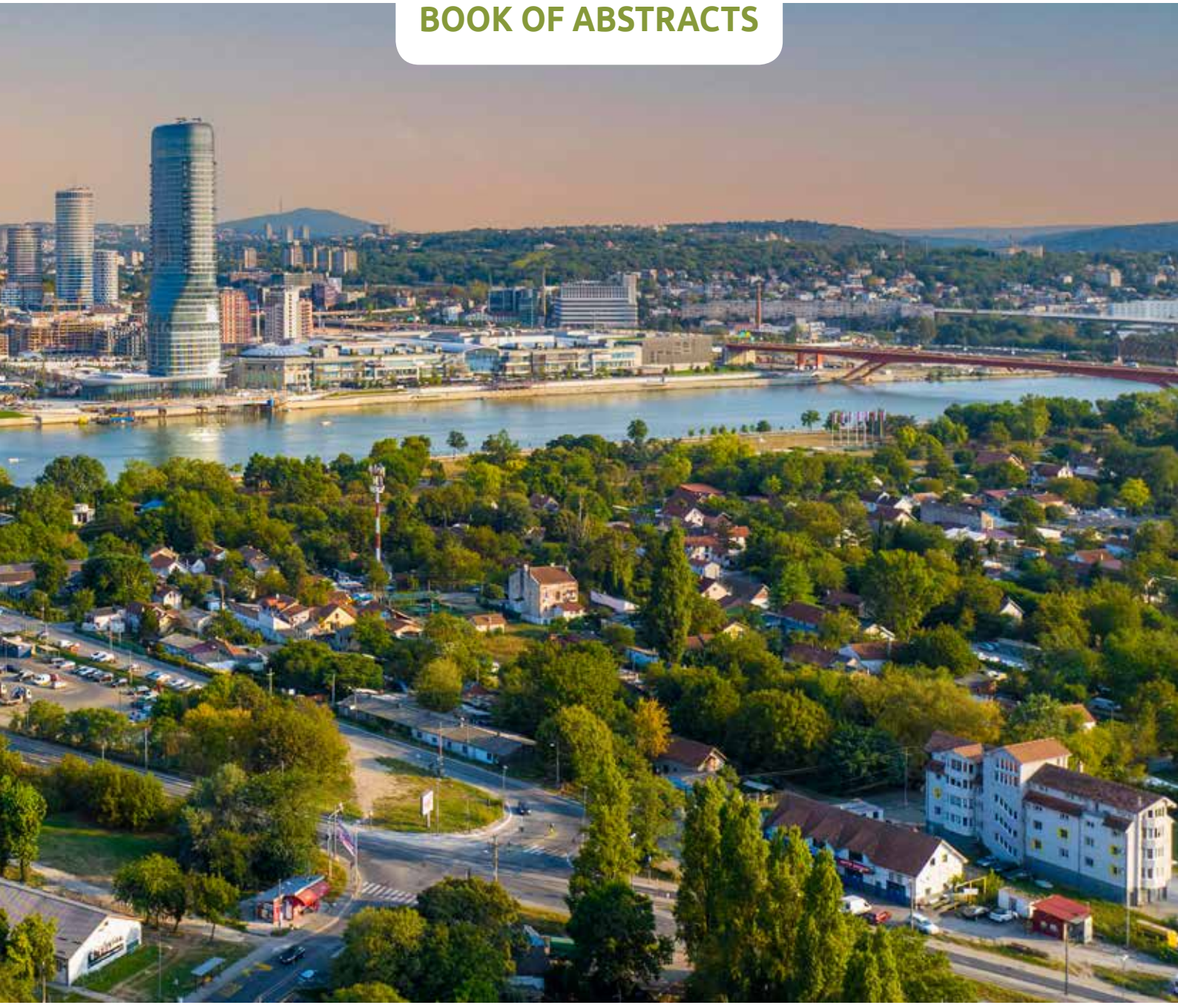
BiomeFUN 2025

From Genomic Analysis to Functional Models
in Microbiomes and Synthetic Consortia

15 - 19 September Belgrade, Serbia

BOOK OF ABSTRACTS



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Diversity of psychrophilic bacteria isolated from cold alpine lakes in High Tatras, Slovakia

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Psychrophilic bacteria are adapted to thrive at low temperatures through specialized cellular mechanisms, including the production of cold-active enzymes, antifreeze proteins and modified membrane lipids. These traits make them promising candidates for biotechnological applications in cold-chain industrial processes, biodegradation of pollutants in cold ecosystems and bioremediation of contaminated areas under low-temperature conditions. This study explores the bacterial diversity in selected glacial lakes of High Tatras, Slovakia, with a focus on the isolation and characterization of psychrophilic microorganisms with potential biotechnological applications. Water and sediment samples were collected from five alpine lakes and cultured at two temperatures 20 °C and 4 °C to differentiate. Using MALDI-TOF mass spectrometry, 107 bacterial isolates were identified. At 20 °C, the predominant genera included *Serratia, Bacillus* and *Pseudomonas*, with a notable abundance of potentially pathogenic Enterobacteriaceae in Slavkovské pleso, suggesting anthropogenic influence. In contrast, cultivation at 4 °C yielded a distinct spectrum of psychrophilic taxa, including *Pseudomonas antarctica, Exiguobacterium sibiricum* and *Janthinobacterium lividum* — species known for their ecological resilience and functional potential in cold environments. The observed microbial profiles also provide insights into how environmental and anthropogenic factors shape microbiome composition in fragile alpine ecosystems. By highlighting the functional traits of psychrophiles, this work contributes to the broader understanding of microbiome adaptation, resilience and their prospective use in sustainable biotechnology.

KEYWORDS: Psychrophiles; Anthropogenic impact; High Tatras; MALDI-TOF MS; Nioremediation

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