

Microbiological investigations of thermal baths in Budapest

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Thesis work summary

The aim of the thesis work was the microbiological investigations of thermal baths using standard and special cultivation techniques and molecular methods to study the natural bacterial communities of the well waters and examine the effect of water treatment as well as the anthropogenic influence on the microbial communities.

The wells have diverse bacterial communities - several prokaryotic taxa were described from aquatic habitats which have important roles in aquatic ecosystems due to their metabolic properties. As the wells are not exposed to external and anthropogenic disturbance, stable bacterial communities can develop there. With cultivation only a few bacterial taxa were detected, meanwhile the results of molecular studies indicate the possibility of the presence of till now undescribed bacterial taxa. With cultivation Proteobacteria, Firmicutes and Actinobacteria phyla were detected although their presence and rate were diverse in the wells. Overlap between the well waters was revealed in the case of *Brevibacillus*, *Ferrovibrio*, *Micrococcus*, *Pseudomonas*. Besides Proteobacteria members of Aquificae were also detected with NGS.

As the pool waters originate from the wells, several common taxa were detected in the water of the pools and wells by the applied methods. At the same time, the bacterial communities of the pool waters are influenced by several outside factors - bacteria from the well water flow into a new environment where the water treatment and the anthropogenic effect influence the bacterial growth.

Based on hygienic investigations the microbial quality of the wells are adequate, although in several cases (mainly the charging-unloading pool operation type) the microbial quality of the waters exceeded the standard limit values due to the Hungarian regulations. It should be noted that with molecular methods the recirculating pool operation type is much more effective in the eliminating of microbes as compared to charging-unloading systems. During our studies besides the standard hygienic parameters a few opportunistic pathogens were also detected, mainly from the charging-unloading pools. Though it should be stated that the main prokaryotic members of the waters of the pools were not these bacteria. To maintain the appropriate microbiological quality of the pool waters, recirculating operation mode should be applied in case of every pool, using alternative disinfections to protect the chemical compounds of the water which can be responsible for the therapeutic effects of the water. With proper regulation and technical conditions the microbial contamination of pool waters can be reduced, therefore, usage of thermal waters is possible to keep safe.