

Bacteria belonging to genus *Legionella* i *Aeromonas* are usually an autochthonous component of the microbial community inhabiting various aquatic environments. The presence of these potentially pathogenic bacteria, especially in high abundance, is assumed to be a serious threat to human health.

Occurrence of both genera is promoted by elevated (>25 °C) water temperature. Due to global warming, the short-term occurrence of thermal conditions favourable to the development of *Legionella* spp. and *Aeromonas* spp. in lakes of the temperate zone (during particularly hot seasons), becomes more probable.

The development of *Legionella* spp. and *Aeromonas* spp. could be inhibited by competition with other microorganisms like nonpathogenic species of aquatic bacteria. Interactions between these groups of microorganisms depending on the physico-chemical condition of water from lakes of different trophic status are still not fully elucidated. Thanks to the simultaneous usage of modern methodology from the fields of molecular biology, microbial physiology and limnology, the proposed project allows a detailed study of these interactions. By analysing the relationship of *Aeromonas* spp. and *Legionella* spp. with the coexisting bacterial community, the project will assess whether there is some specific bacteriocenosis which could efficiently prevent the spread and development of these pathogens in lake ecosystems.

The project allows to answer the following main questions:

- 1) Is there any relationship between the trophic status of lakes and the quantitative occurrence of bacteria belonging the genus *Legionella* and *Aeromonas* in lake water?
- 2) Is there any relationship between the phylogenetic structure of the bacterial community inhabiting the lake water and the occurrence of bacteria belonging to genus *Legionella* and *Aeromonas*?
- 3) Is there any relationship between the physiological diversity of lake microorganism community (based on the different carbon source usage preferences) and the occurrence of bacteria belonging to genus *Legionella* and *Aeromonas*?
- 4) Can short term-lake water temperature increases, typical for global warming, lead to an increase in the share of *Aeromonas* spp. and *Legionella* spp. (among them *Legionella pneumophila* and *Aeromonas hydrophila*) in the total number of bacteria living in lake water?

Additionally, the research will bring about advances in the methodology for the quantitative detection of *Aeromonas* spp. and *Legionella* spp., including dangerous *L. pneumophila* and *A. hydrophila*, without the need for time consuming and potentially hazardous pathogen cultivation.