

Master student project:

Influence of two different types of vortex treatment on bacterial physiology

Motivation:

A sustainable, additive free improvement of the quality of drinking water is of major importance. It is known that the flow pattern of water in nature is always spiral, and vortices are naturally occurring in every river. This behaviour was first studied in detail by Austrian forester Victor Schaubberger, according to whom sustainable technology should be developed according to the principle "first understand, then copy nature". Indeed, there are all sorts of mechanical treatment based on natural processes on the market. Such mechanical treatments like twirling (or "vortexing" = twirling accompanied by the formation of a vortex) are said to have significant impact on the microbiological, chemical and physical properties. This impact is (partly) due to increased gas exchange and increased dissolution of solids, thereby changing physical and chemical properties of the water, and consequently also its microbiome. Field observation has shown that "vortexing" could treat surface water polluted with algae bloom, possibly due to the higher gas dissolution. The aim of the proposed master project is to start with basic physiological properties of microbial cells exposed to vortex treatment.

Research challenge

Two different types of vortex systems (hyperbolic funnel and a vortex created by a turning disc) are to be studied and compared to understand their influence on microbial cells.

Autoclaved surface water or other liquid media will be spiked with different concentrations of a cyanobacteria (known as blue algae) and the solution will be applied to the vortex systems. The influence of vortexing time, temperature, speed and volume on the growth behaviour of the cells and on their structural integrity will be studied. Therefore a number of different techniques (e.g. growth curve, flow cytometry, confocal laser scanning microscopy) have to be applied and developed.

Requirements

We are looking for a candidate with a MSc degree in the field of microbiology, molecular biology or biochemistry.

The project has a duration of 6 months. Starting preferably in September.