Supervisor's group: Ondřej Prášil's group – Laboratory of Photosynthesis

Supervisors: Louison DUFOUR and Futing ZHANG

Title of the project: Effect of a heatwave on a lake microbial community

For how many student/s: 1 or 2

Description of the project:

Lakes are crucial ecosystems that support an incredible biodiversity and prodive key socio-economic services. They hold 87% of Earth's liquid surface freshwater, providing drinking water, irrigation, fisheries and other recreational activities. However, lakes are sensitive to changes in climate, as recently highlighted by the Intergovernmental Panel on Climate Change (IPCC: https://www.ipcc.ch/). Specifically, alterations in water temperature, ice cover, water level have been observed in recent decades, amplifying existing stressors such as eutrophication, pollution and invasive species. For example, the increase in lake surface temperature, and particularly in shallow lakes, has multiple consequences. First, it accelerates lake evaporation which, if not balanced by increased precipitations or inflows, favour a decrease in lake surface and reduce habitat availability. Furthermore, increased temperatures modify lake mixing regimes and reduce oxygen dilution, encouraging the emergence of hypoxic 'dead zones' that threaten aquatic life. Finally, warmer water temperatures can lead to shift in species composition, and thus biodiversity loss, by increasing the vulnerability of cold-water species and allowing harmful algal blooms or non-native species to establish.

Unfortunately, all these different climate-induced changes are expected to have cascading ecological, economic and social consequences. In this context, *in situ* monitoring is essential to improve our global understanding of lake responses to a changing climate, and ultimately develop sustainable management practices to preserve freshwater resources. Here, we propose to investigate during this two weeks-long project the impact of a heatwave on a natural microbial community collected in the Třeboň region, which is notably renowned for its over 6,000 lakes.

In the proposed project the student will:

1. Collect a natural microbial community from a lake in Třeboň and maintain it in the laboratory under controlled conditions.
2. With the help of the supervisors, establish a coherent protocol for studying the effect of a simulated heatwave on the microbial community in the laboratory.
3. Perform the heatwave experiment and observe the responses of the microbial community (for example in terms of diversity, photosynthetic activity, etc.).
4. Analyze and summarise the results, and compare them with the existing literature on the topic.
5. Prepare a presentation of the study and its findings.

Requirements:

- The student(s) is(are) expected to be able to speak and write in English.
- Previous laboratory experience is an advantage (but not a requirement) as the project involves experimental work.
- Study degree is not essential, but being comfortable with basic scientific literature is important.
- As the project involves identifying and quantifying microorganisms using microscopy, we are preferably looking for enthusiastic (and patient) naturalist(s).