**UMR CNRS 6023 Laboratoire Microorganismes : Génome et Environnement, UCA**

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**Unicellular eukaryotes: The dark side of the microbial world**

Microbial communities are crucial components of the Earth’s ecosystem, underpinning all biogeochemical cycles. During the last decade, studies have uncovered evidence for a huge diversity of aquatic microbial eukaryotes (i.e. protists), matching at least the diversity observed for Bacteria and Archaea. Understanding relationships between this diversity and ecosystem function is therefore critical. However, most microbial eukaryotes taxa cannot be successfully cultivated (at least long-term) or go undetected due to their small size or morphological simplicity (i.e cryptic species) and the role of microbial eukaryotes in ecosystems is not always understood. Finally, microbial ecologists deduced their functions (phototrophy, heterotrophy, parasitism…) from the phylogeny.

This PhD aims therefore at deepening our knowledge on the functional role of the lacustrine unicellular eukaryotes by coupling innovative -omics approaches (cytometry, NGS, single cell genomics).

The main objectives will be:

1) To develop and implement metatranscriptomics and single-cell genomics specifically for microbial eukaryotes found in lakes.

2) From the expressed genes and genomes obtained, we will study uncultivated microbial eukaryotes biology and metabolic potentials (e.g. anoxia adaptation, mixotrophy, parasitism…). This will enhance our knowledge on their functional role and ultimately help to understand lacustrine ecosystem functioning.

According to the candidate profile this proposal can be focused on experimental approaches (1) or bioinformatics (2).

Jobard et al. 2020. Freshwater Perkinsea: diversity, ecology and genomic information. Journal of plankton research. 42: 3–17.

Lepère et al. 2016. Diversity and dynamics of active microbial eukaryotes in the anoxic zone of a freshwater meromictic lake (Pavin, France). Front Microbiol 7: 130