Project acronym: PHOTOBACT

Project title: Ecology and functioning of photoactive microbes in arctic plants

Project leader: Riitta Nissinen, University of Jyväskylä, Finland

Discipline: Life Sciences & Biotech: Molecular and cellular biology

Station(s): Villum Research Station (VRS) (Greenland/Denmark)

The main goal of this project was to dissect the ecology and functioning of phototropic bacteria, in particular aerobic anoxygenic photosynthetic bacteria, (AAPB) associated with arctic vegetation. During the stay at Villum research center we performed sampling at three distinct locations near Villum research center (distance 0,5 km, 2 km and ~4 km from the station), sampled phyllospheres and endospheres of eight plant species in all of the locations, processed the samples and plated out samples for bacterial isolation. The field campaign yielded a collection of over 2000 bacterial isolates, of which over 100 strains are currently characterized as AAPB. We are currently in process of analyzing the isolates, and only early 2023 will have the identities and genome sequences of the isolates available, but this far, the phenotypes of the isolates seem to be novel. Our preliminary results from this project seem to confirm our hypothesis, that AAPB are part of core microbiome of several (but not all) arctic and boreal plants. This work will greatly advance our goal of dissecting the (putative) role of AAP in plant microbe interactions in arctic climates, enabling comparative (genomic) studies from several climates. In addition, the collection (AAPB and other isolates from plant samples) enabled us to construct a unique collection of plant associated bacteria from High Arctic.

The results obtained in this study will broaden our understanding on this very poorly known group of bacteria. In case we will find association with plant performance or host, the results will add a novel concept to our understanding on plant-microbe interactions, especially in the strongly seasonal Arctic ecosystems. The methodology optimized during the project will accelerate research on environmental photobiology.