



ANTARCTIC 2023-2024

MicroWorlds: bringing the Antarctic microalgae diversity into culture

LEAD INSTITUTION, PI

PI: Catherine G erikas Ribeiro, Universidad Mayor, Faculty of Sciences Center for Genomics, Ecology and the Environment, Chile

ABSTRACT

The ecological complexity of polar environments is under an imminent threat. For decades it is known that sea-ice dynamics, water temperature and ocean currents in polar regions impact the presence and survival of the macrofauna, which are easier to observe, and which ecological patterns are more visible to the human eye. However, scientific research has been increasingly showing that the polar microbial diversity is also tightly linked to sea-ice age, extent, and type. Multi-year ice holds a diversity structure different from first-year ice. Pack ice, snow, melt ponds, all harbor a distinct plankton community, with distinct effects to the higher trophic levels. As polar temperature and ice cover shifts at an increasing pace, our knowledge regarding the base of the polar food web diversity remains scarce. One important gap is the lack of available cultivated representatives. For example, the number of strains deposited in the Roscoff Culture Collection – one of the largest and more diverse microalgal culture collection in the world – between Arctic and Antarctic is staggering: 574 strains from the former and only 105 from the latter, 89 of them being diatoms. The isolation and maintenance of eukaryotic plankton diversity in culture collections is important for several reasons: i) provide curated reference sequences to environmental studies; ii) allow for experiments on metabolic responses, acclimatation to environmental changes, nutritional regimes, predation, motility, etc.; iii) enable morphological analysis and imagery; iv) function as a diversity bank for endangered environments and for biotech screening, among others. The main objective of the present proposal is to analyze the culturable diversity of microalgae from both seawater and sea-ice from distant regions in Antarctica. We will use different isolation techniques and culture media in order to bring into culture a wide Antarctic microalgae diversity, from both water and ice samples. Seawater samples will be collected with the Sea Water System from the ship and the deployment of Niskin bottles to retrieve diversity from greater depths. Sea-ice samples will be thawed in filtered seawater before proceeding to microalgae isolation, which will be performed onboard by serial dilution, enrichment, and pipetting. Strains will be screened and identified morphologically with optical microscopy, and kept at 4°C in a 12/12 light cycle. Germanium will be added to most of the isolation process to avoid diatom over-representation. Back to the main land, selected strains will be analyzed by molecular taxonomy using a multi-marker gene approach, and deposited in public culture collections. The present proposal aims to fill an important scientific gap, with cascading effects to Antarctic microbial

ARICE-PONANT CALL FOR SHIP-TIME PROPOSALS

*Access to the Southern Ocean on board the Polar Exploration
Ship "Le Commandant Charcot" (PONANT, France)*



research. The Antarctic strains retrieved by the project μ Worlds will be available to the scientific community worldwide through international public culture collections, enabling diversity studies, but also experiments regarding taxa resilience, ecological dynamics, and bio-prospection for many decades to come.