

MASTS Small Grant Report (December 2018)

SG509: Probing elemental and macromolecular diversity of calcareous microalgae: new insights for marine ecology and bioprospecting of coccolithophores

Naomi Villiot, The Lyell Centre, Heriot-Watt University

Overview

Calcifying marine microalgae – coccolithophores – are a key functional phytoplankton group responsible for the majority of oceanic CaCO₃ production and export. They play important roles in the efficiency of carbon pumping from the atmosphere into the upper ocean and the transport and eventual sequestration of CO₂ in the deep-sea. Despite representing a taxonomically diverse and ecologically successful group, our physiological and metabolic understanding of coccolithophores is biased towards only a few species. We proposed to widen our understanding of coccolithophore elemental and molecular stoichiometry through a broad sampling survey of diverse species and strains maintained in laboratory culture. To do so, we used the MASTS Small Grant to (1) get specialist training in coccolithophore cultivation at the Roscoff Culture Collection (RCC), (2) perform bio-chemical elemental analyses (i.e., particulate organic carbon, nitrogen and phosphorus), and (3) collect proof-of-concept samples for more in-depth bio-molecular analysis (i.e., proteins, lipids, carbohydrates and nucleic acids).

Benefit of the MASTS Small Grant

The grant was used to (1) allow the establishment of a small coccolithophore culture collection (training and purchase) at the Lyell Centre (Heriot-Watt University) as an open resource, (2) gather essential biological data on particulate organic nutrient content on a few new species that has been added to a first-author publication currently in preparation, and (3) collect proof-of-concept data on bio-molecular composition that has been used to apply for and secure a small European grant (ASSEMBLE plus) for further work in this area. Combined together, the MASTS funds have allowed me to begin investigating the main hypotheses of my PhD project.

Justification

The MASTS contribution (£500) funded sample analyses and strain purchase as followed:

£150 for purchasing coccolithophore strains, £168 for particulate organic matter analyses and

£180 for in-depth bio-molecular analyses.