2023_69_NHM_Brodie: Diversity, biogeography and ecology of Falkland Islands crustose coralline algae

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Background and aims

Crustose coralline algae are a highly numerous and morphologically diverse group of ecologically important habitat-forming red seaweeds. They support a high diversity of organisms and play a role in blue carbon but are vulnerable to environmental impacts including rising sea temperatures and ocean acidification. The Falkland Islands, which remained unglaciated in the Last Glacial Maximum, are pivotal for marine diversity in the South Atlantic and indeed the Southern Ocean. This archipelago lies in a vast area of ocean with other isolated islands and distant land masses influenced by polar currents, making the region a biogeographic laboratory. It supports a rich seaweed flora including many crustose coralline algae, most of which are undescribed. This project provides a unique opportunity to i) document coralline algal diversity using novel genomic approaches, ii) undertake an in-depth study of species ecology/distribution, iii) explore holobiomes of specific species, and iv) study the Falkland Islands’ results in relation to global phylogenies, and by exploring historical and contemporary collections data from around the world. The outcome will provide an important baseline for conservation and management of South Atlantic Marine Protected Areas.

Research methodology

The project will involve field and laboratory work in the Falkland Islands and at the Natural History Museum, London (NHM). To document diversity, specimen collections will be made extensively around the Falkland Islands. There will also be access to contemporary collections at the NHM. Algal diversity will use a combination of molecular approaches including whole genomes and barcoding. Ecological studies will involve coarse and fine scale mapping of coralline algal habitats with scope for metabarcoding of coralline crusts. Holobiomes will be explored using metagenomics techniques. Determining biogeographical relationships within and beyond the Falkland Islands will involve phylogenetic analysis on a global scale in collaboration with international partners.

Training

There will be the opportunity to develop a wide range of skills, including remote fieldwork and ecological techniques. Laboratory skills will include molecular techniques including next generation sequencing. Skills will be developed in molecular data analysis including bioinformatics and phylogenetic reconstruction, with potential for molecular dating in relation to genotypes and biogeographic relationships. There will also be the opportunity to engage with the new Holobiont Centre at Imperial College and to develop networks with the global microbiome community. Outreach and engagement will also be part of the training.

For more information on how to apply to us please visit: https://www.imperial.ac.uk/grantham/education
References
