



Biogeographic patterns and connectivity

LEAD: Ana Riesgo, Natural History Museum London, UK and Joana Xavier, University of Bergen, Norway

Objectives

The aim of this Work Package is to describe patterns of evolution, distribution and connectivity of deep-sea sponge populations and both the ecological and historical processes behind their maintenance and regeneration. To reach this aim, the following objectives will be addressed:

- Development of a toolbox of genomic resources;
- Assessment of the evolutionary history of key sponge groups;
- Investigation of the reproductive ecology of key species; and
- Evaluation of the genetic structure and connectivity of sponge grounds at different spatial scales using next-generation sequencing technology and particle tracking modelling.

connectivity patterns, all of which are crucial for the development of management and protection measures for these potentially vulnerable habitats, and it will support possible new conservation plans (e.g. design of spatially-managed protection areas).

What are the key knowledge gaps to address?

Present knowledge on how deep-sea species reproduce and disperse, and consequently on how their populations are sustained and connected is very limited.

Expected major outputs

Through this WP we will describe the reproductive cycle of the main habitat-forming sponge species.

Focus

The Work Package will contribute to the understanding of the biological communities in the deep-sea, and especially how, when and why these sponge grounds were established in the North Atlantic. We will also describe the patterns of distribution of species and their genetic diversity as well as dispersal routes across the deep Atlantic.

Why is this important?

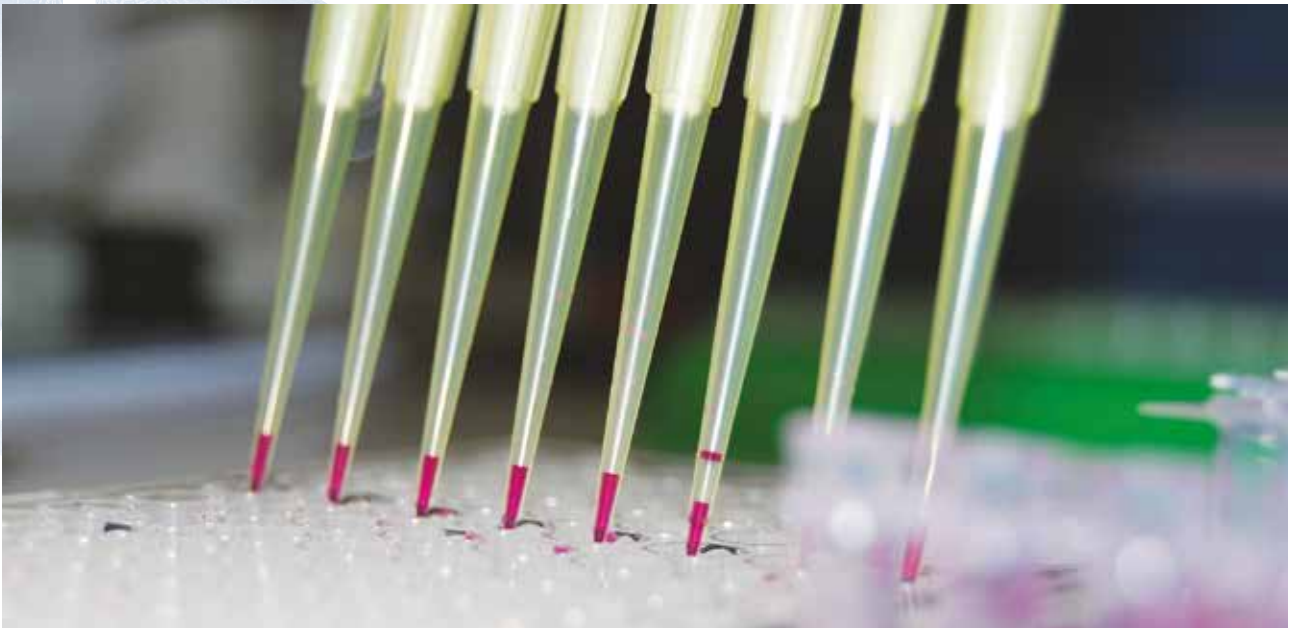
The work will deliver information on the reproduction, genetic diversity, dispersal and



Boreal sponge ground on the deep Canadian shelf (Photo credit: Fisheries and Oceans, Canada)



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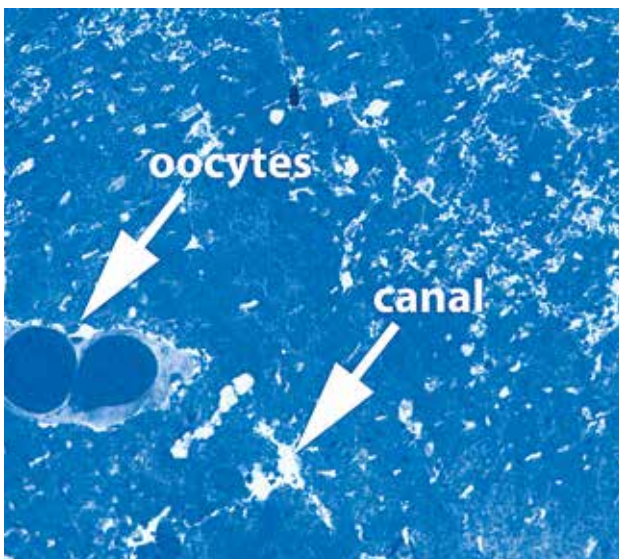


Multicanal pipette taking up PCR products of barcode amplifications of deep-sea sponges (P. Ana Riesgo Gil, Natural History Museum London)

In addition, we will describe and map the genetic diversity contained within these ecosystems, alongside with the main dispersal routes across the North Atlantic.

Results achieved so far

We now know when some species spawn, and how long their propagules/larvae may stay in the water



Mature oocytes in ready to be released through the sponge canals (P. Ana Riesgo Gil, Natural History Museum London)

column. We are also gaining a better understanding on the relationships between key structuring species occurring in different areas and depth strata of the North Atlantic.

What methods/technologies/ approaches are you using?

We are combining classical histological and cytological techniques (light and electron microscopy) and advanced molecular methods (genomics and transcriptomics). We also use chemical analysis of lipids to understand the energy reserves of the larvae. We are coupling this information with data on oceanographic circulation using particle tracking modelling to simulate the dispersal of the larvae.

The EU-funded SponGES project will contribute to the sustainable management of deep-sea fisheries, and the protection of sponge-dominated vulnerable marine ecosystems in the North Atlantic through the collection of data and the development of knowledge on the vulnerability and threats as well as protection measures leading to a sustainable use of the deep-sea areas.



✉ info@deepseasponges.org
🏠 deepseasponges.org
📘 @DeepSeaSponges
🐦 @DeepSea_Sponges