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Genomic diversity of an emblematic species, the red coral *Corallium rubrum*: a collaborative effort for its management

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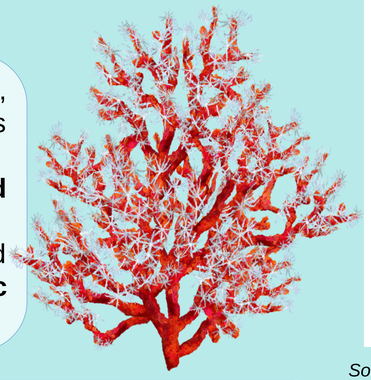
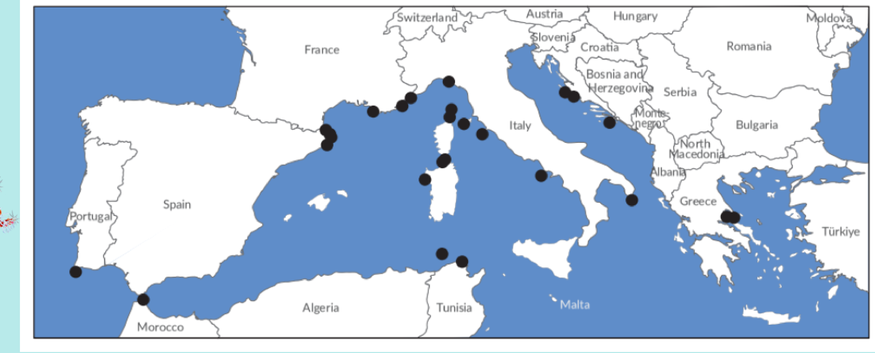
Background

Corallium rubrum is an emblematic **benthic species** of the Mediterranean Sea and neighboring Atlantic, exploited since antiquity for its red skeleton that is used for jewellery. Nowadays, specimens found at depths below 50 m are still **harvested** in some countries by authorized red coral scuba divers.

In past decades, studies have reported that the species is **impacted by climate change, harvesting, and other anthropogenic pressures**.

The GFCM launched in 2020 a research programme involving partners from countries currently exploiting red coral or with a history of exploitation. The Action 3 of this programme was dedicated to the study of **genetic diversity, an important target for management and conservation.**





Source: base map adopted from UN. 2025. United Nations Geospatial Clear Map. In: *United Nations*. New York, USA. [Cited 23 May 2025]. https://geoservices.un.org/Html5Viewer/index.html?viewer=clearmap

Questions

- What are the main genetic lineages?
- Are there areas with low or high genetic diversity?
- May genetics become a tool for the traceability of this commercialized species?

Material and methods

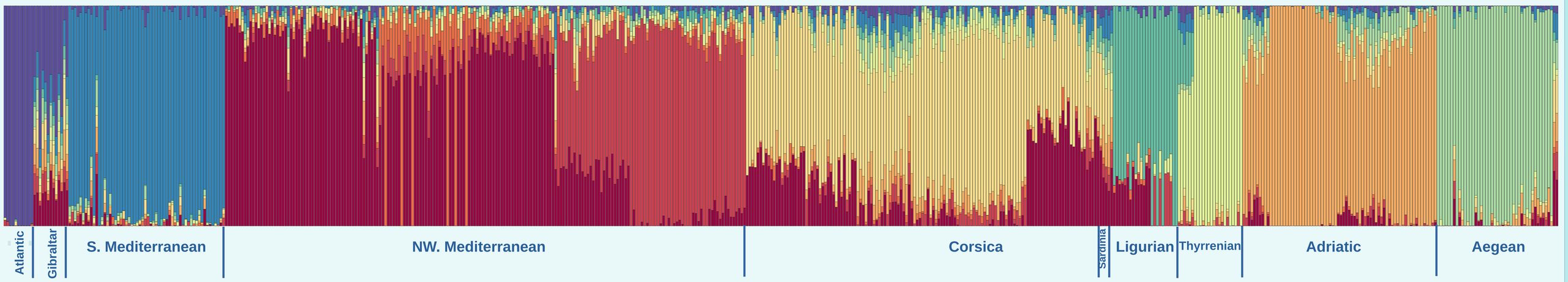
• Sampling:
- cooperation of scientific scuba divers and fishers
- 7 countries (with new locations in Greece) with a focus on harvested populations (below depths of 50 m)

• Genetics:
- **Restriction site-associated DNA sequencing of 574 colonies**
- analysis of over **22 904 genetic markers (single nucleotide polymorphisms)**

Results

Genetic structure

Our results reveal the structuring of red populations in regional lineages. We find evidence of the originality of Aegean, Adriatic and Atlantic populations. The Gibraltar samples indicate a potential transition zone.



Genetic diversity

Estimates of genetic diversity indicate that the eastern Mediterranean populations (Croatia and Greece) have lower genetic diversity than the other studied areas.

Traceability

The observed genetic structure is promising for the development of a set of genetic markers to identify the origin of commercialized red coral colonies. Further analysis will concentrate on the protocols for working on dry material (e.g. from poaching or historical samples).

Implications for conservation

These results underline the importance of the management of red coral populations at the regional scale. Future studies will investigate the adaptative abilities of red coral in a context of global change.

Acknowledgements

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