

An underwater photograph showing a large school of small, silvery fish swimming in clear blue water. Below them is a dark, rocky seabed covered in green algae and coral. Sunlight filters down from the surface, creating a shimmering effect on the water.

GLOBAL CHANGE ECOLOGY AND SUSTAINABILITY
a.a. 2023-2024

Conservation and Management of Marine Ecosystems
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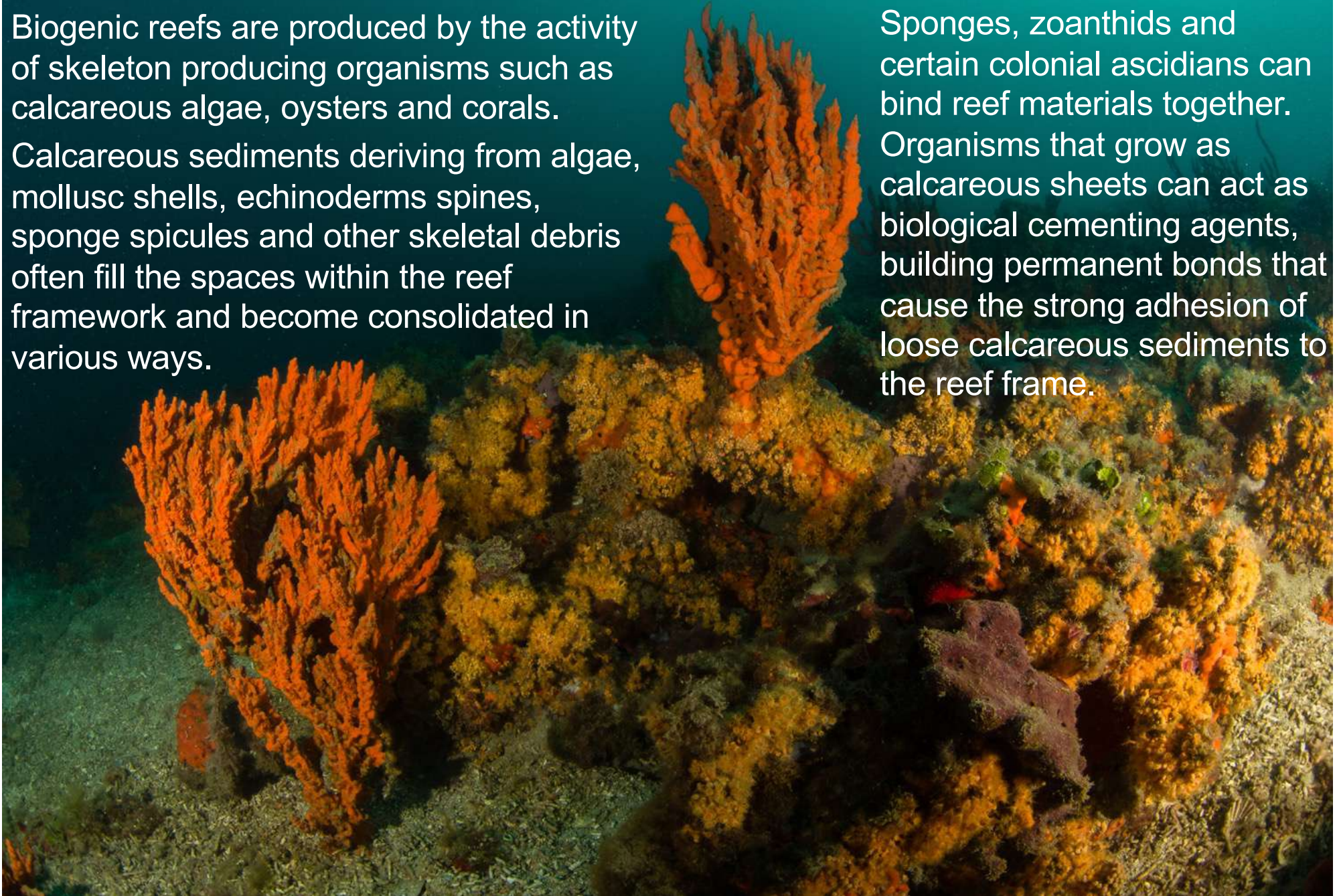
**Coralligenous and other subtidal
bioconstructions**

Bioconstructions

Biogenic reefs are produced by the activity of skeleton producing organisms such as calcareous algae, oysters and corals.

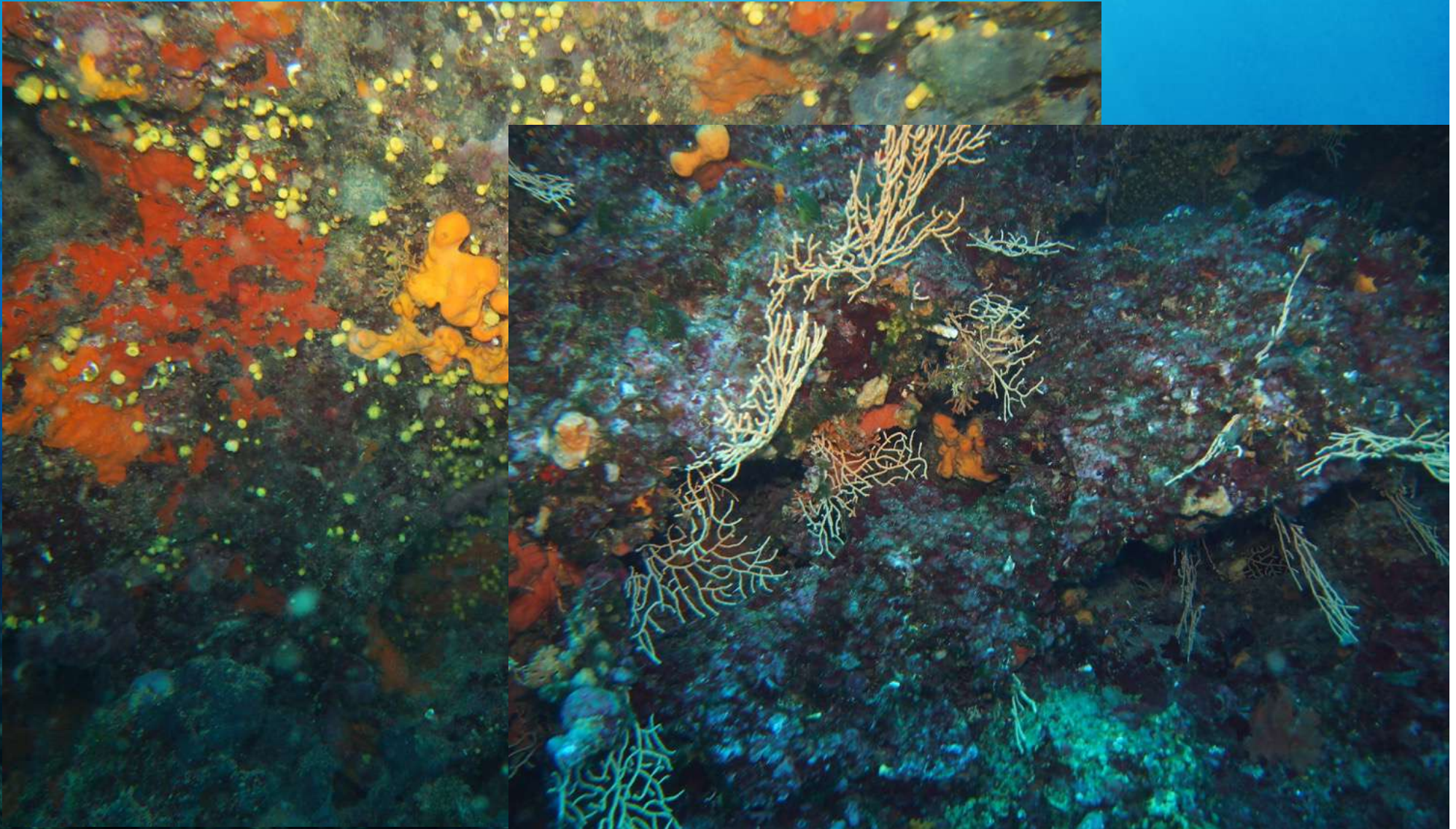
Calcareous sediments deriving from algae, mollusc shells, echinoderms spines, sponge spicules and other skeletal debris often fill the spaces within the reef framework and become consolidated in various ways.

Sponges, zoanthids and certain colonial ascidians can bind reef materials together. Organisms that grow as calcareous sheets can act as biological cementing agents, building permanent bonds that cause the strong adhesion of loose calcareous sediments to the reef frame.



Bioconstructions

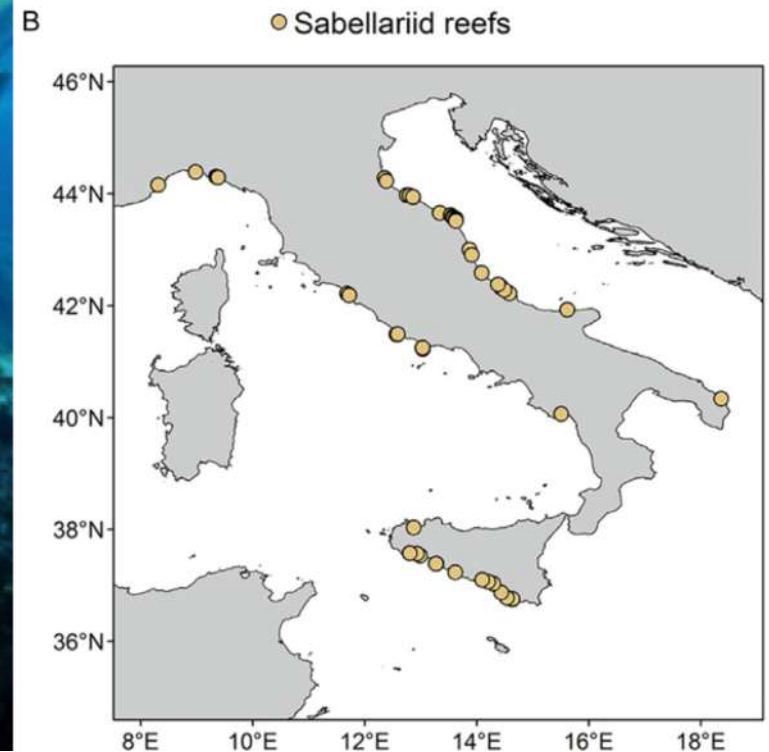
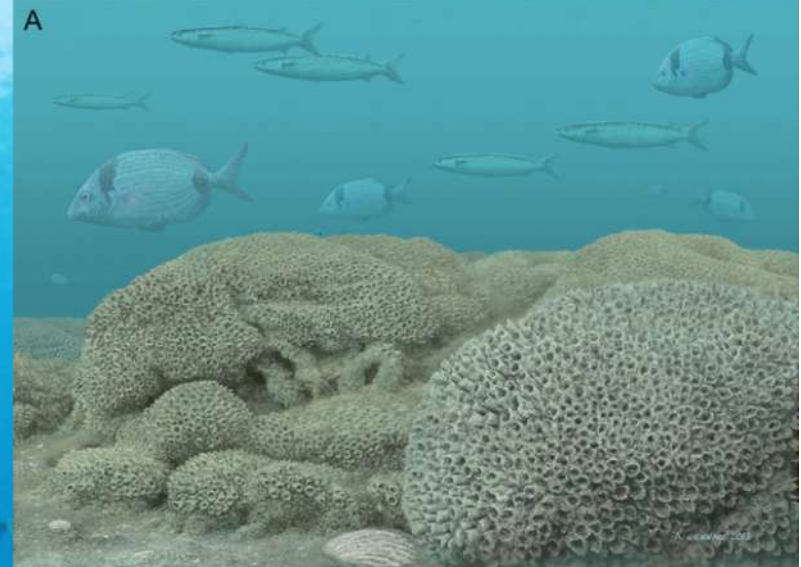
Bioconstructors modify primary (i.e. geological) substrates and provide secondary (i.e. biogenic) substrates for new bioconstructors and for nonbioconstructors who simply inhabit them



Bioconstructions of the Mediterranean Sea

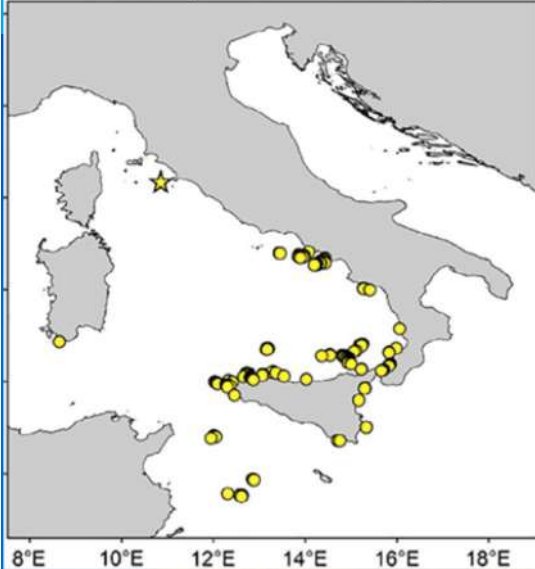
- *Lithophyllum byssoides* concretions/trottoirs
- *Astroides calycularis* formations/reefs
- Coralligenous assemblages
- *Cladocora caespitosa* formations/reefs
- Vermetid reefs
- Sabellariid reefs
- Cold-water corals
- Serpulid reefs, including biostalactites

Sabellariid reefs are compact bioconstructions resulting from the aggregation of tubes made up of sand grains and bioclasts, cemented with mucus, which develop on both solid and soft bottoms. The worms construct these tubes around themselves, in close proximity

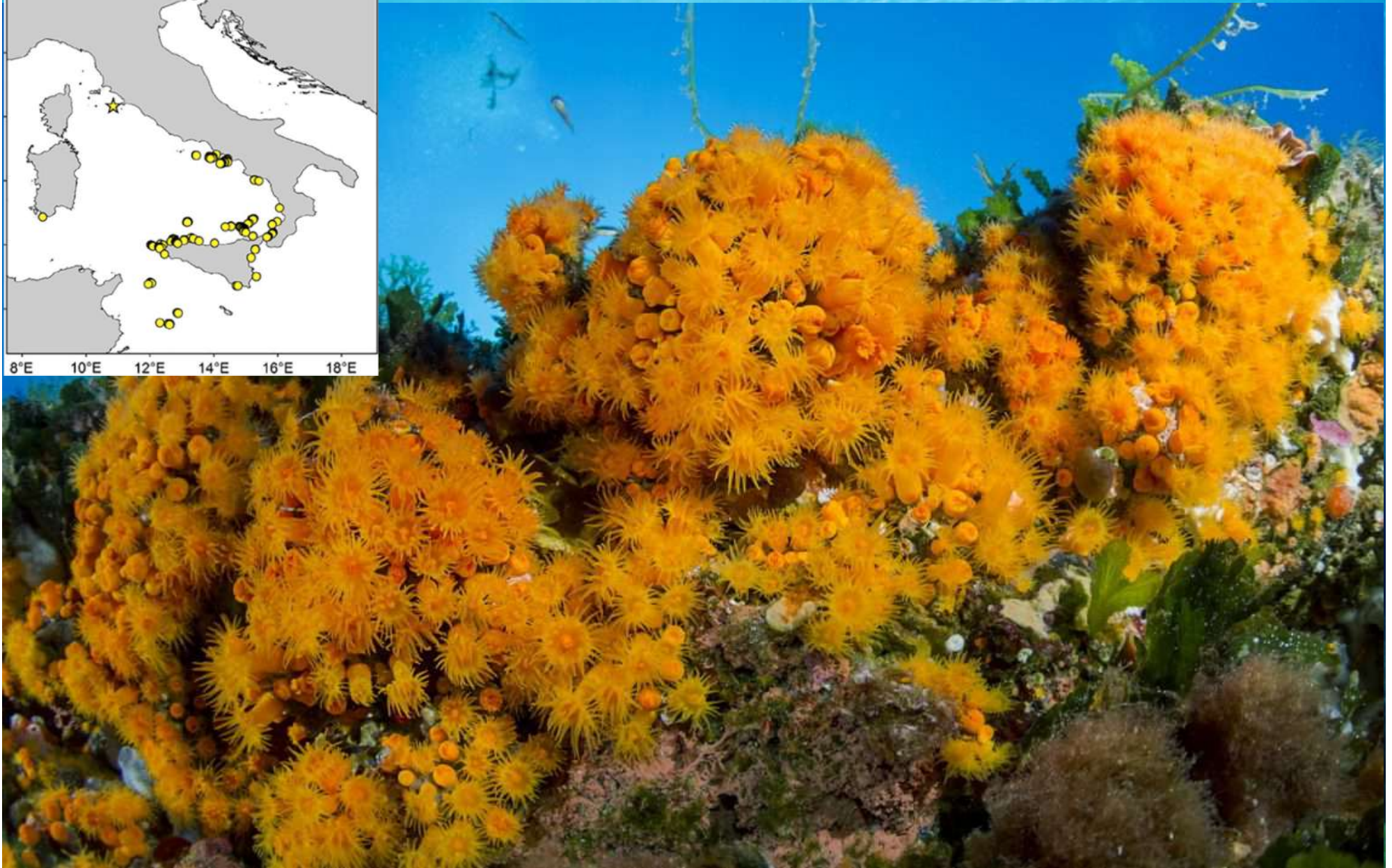


Bioconstructions of the Mediterranean Sea

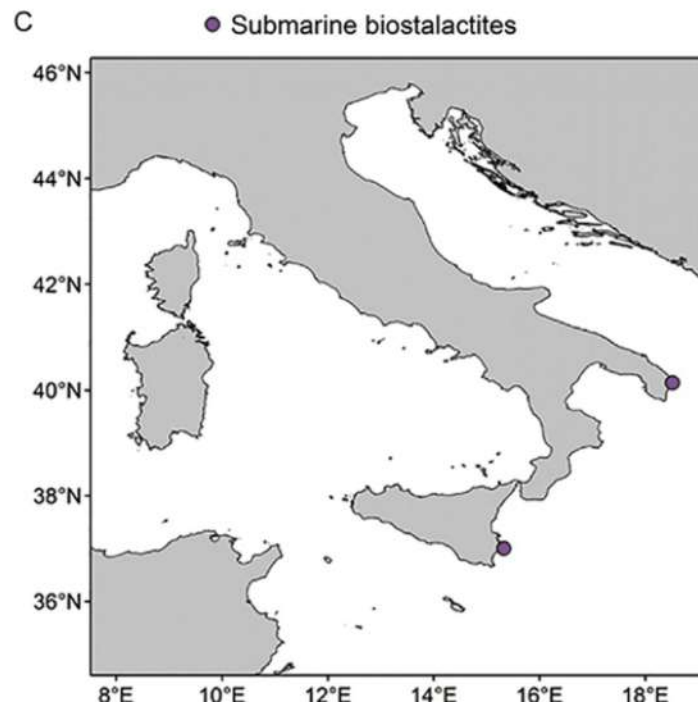
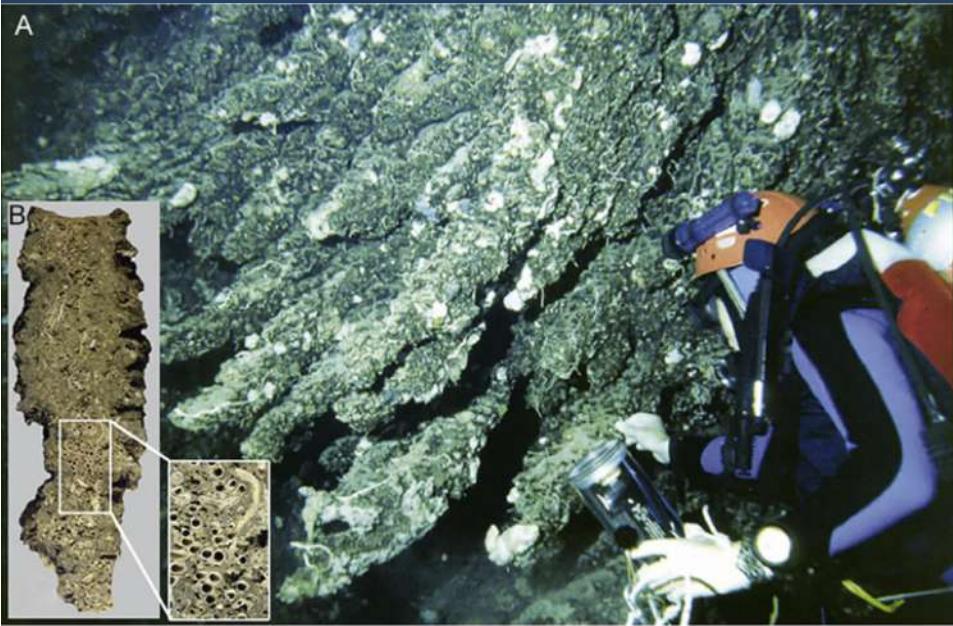
- C
- *A. calycularis* formations/reefs
 - ★ *A. calycularis* dead colony



Astroides calycularis scleractinians not zooxanthellate



Biostalactites



Particular serpulid structures in submarine caves are the so called biostalactites.

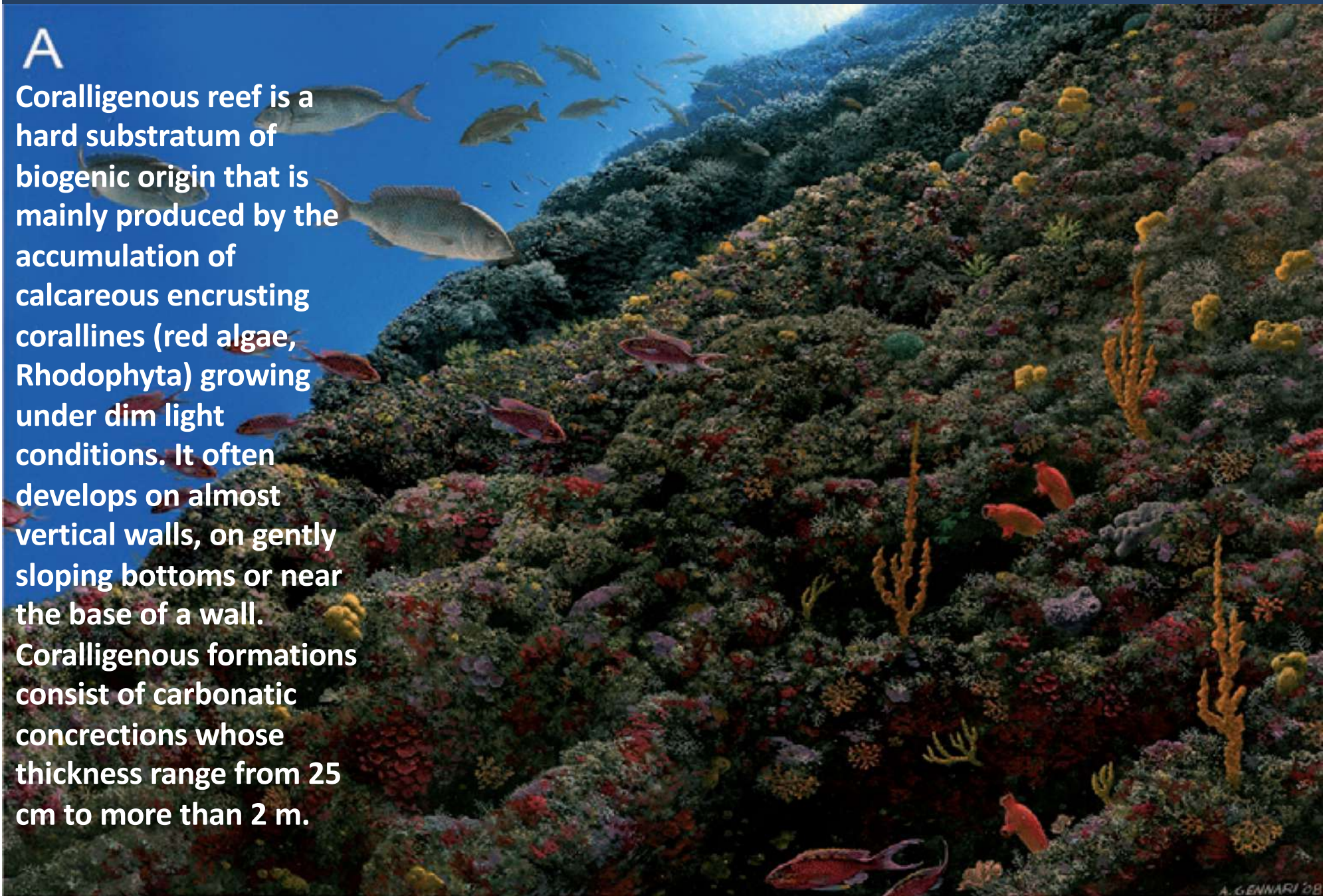
They are formed by single or few serpulid species (mostly *Protula* spp.) whose aggregations become substrate for smaller invertebrates and bacteria. Biostalactites can protrude a few cm up to 2 m.

Coralligenous assemblages

A

Coralligenous reef is a hard substratum of biogenic origin that is mainly produced by the accumulation of calcareous encrusting corallines (red algae, Rhodophyta) growing under dim light conditions. It often develops on almost vertical walls, on gently sloping bottoms or near the base of a wall.

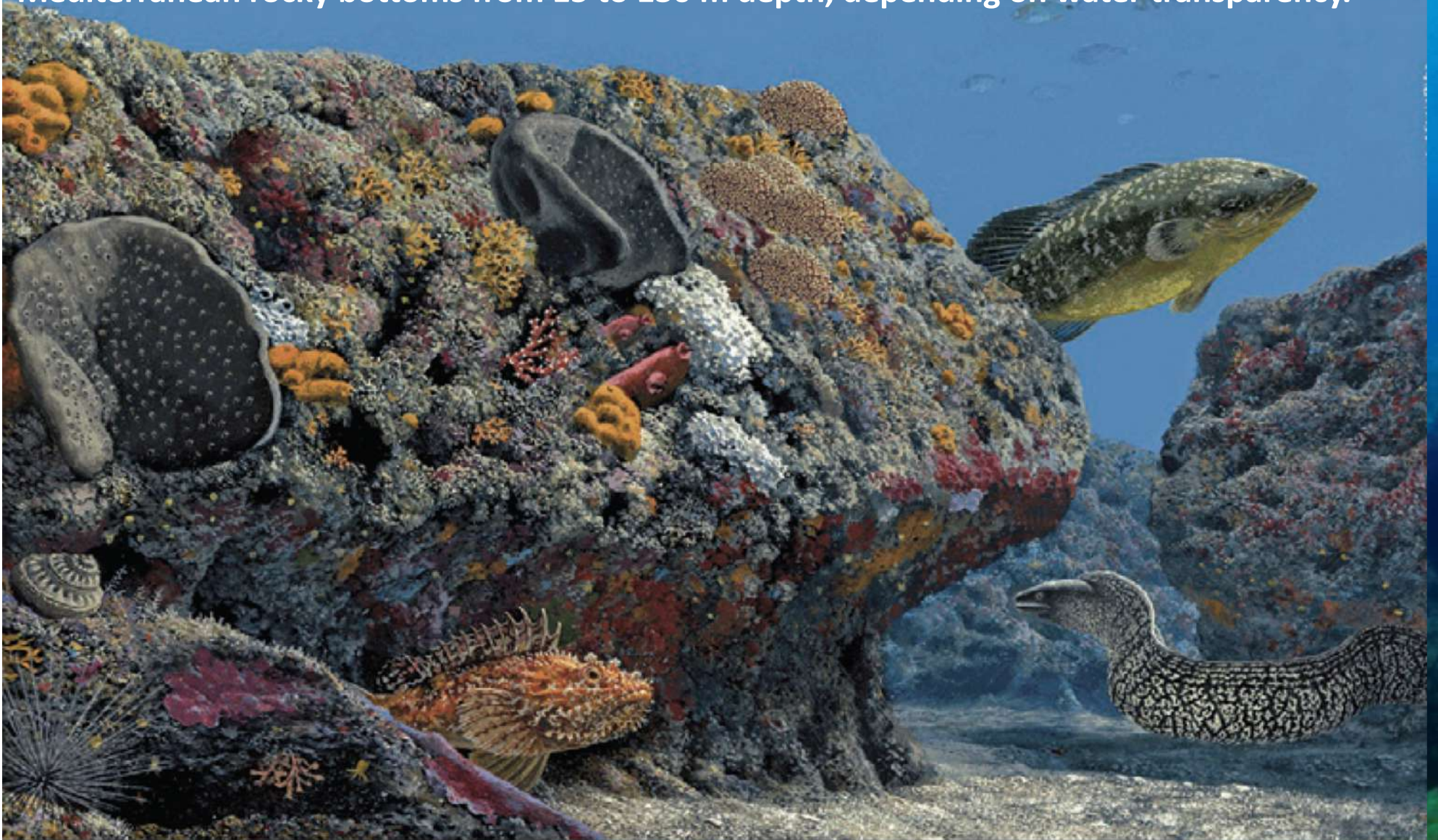
Coralligenous formations consist of carbonatic concretions whose thickness range from 25 cm to more than 2 m.



Coralligenous assemblages

B

It can also form platforms (from tens of cms to several m) on the continental shelf. Mediterranean rocky bottoms from 15 to 130 m depth, depending on water transparency.

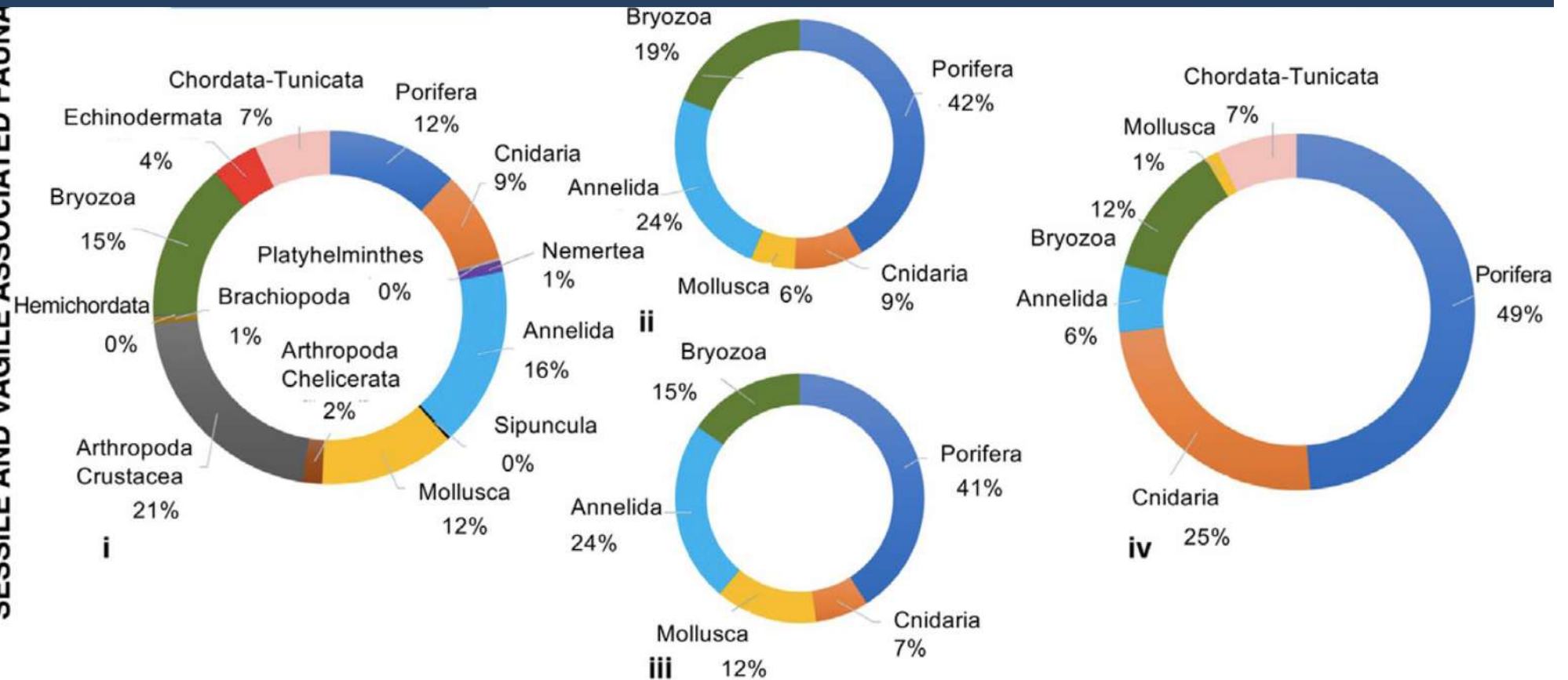


Coralligenous assemblages



Coralligenous assemblages

SESSILE AND VAGILE ASSOCIATED FAUNA



Algal bioconstruction
(coralligenous *sensu stricto*)
Built by coralline algae
Depth range 20-120 m

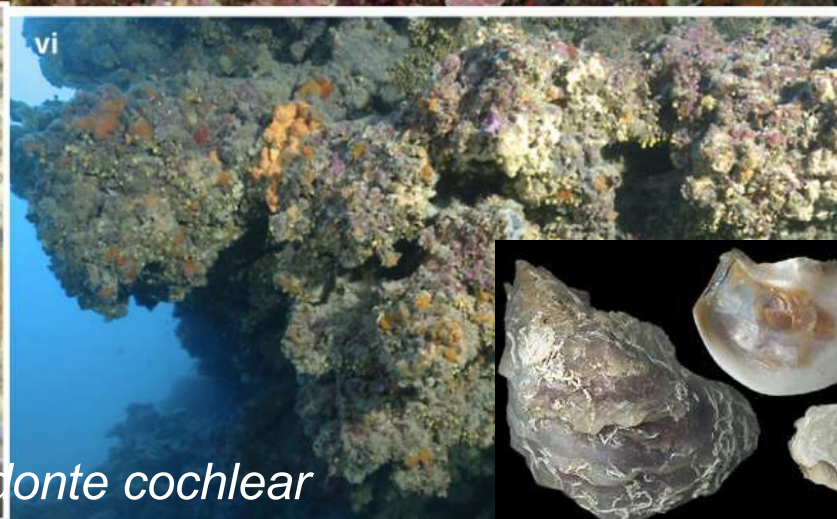
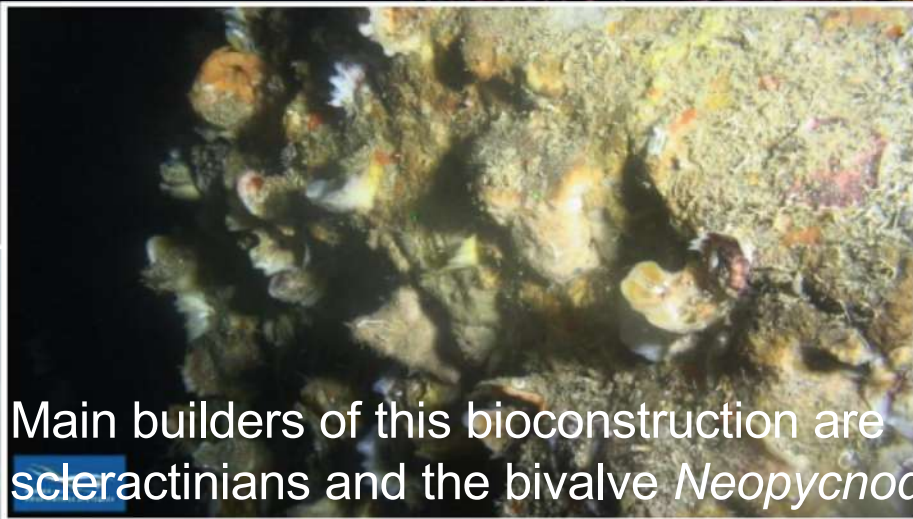
Animal bioconstruction
Built by animal remains
Depth range 30-70 m

Thin bioconstruction
Built by animal on granitic rocks
Depth range 30-70 m

Coralligenous assemblages

vii

Reduced
bioconcretion on
granitic bottom

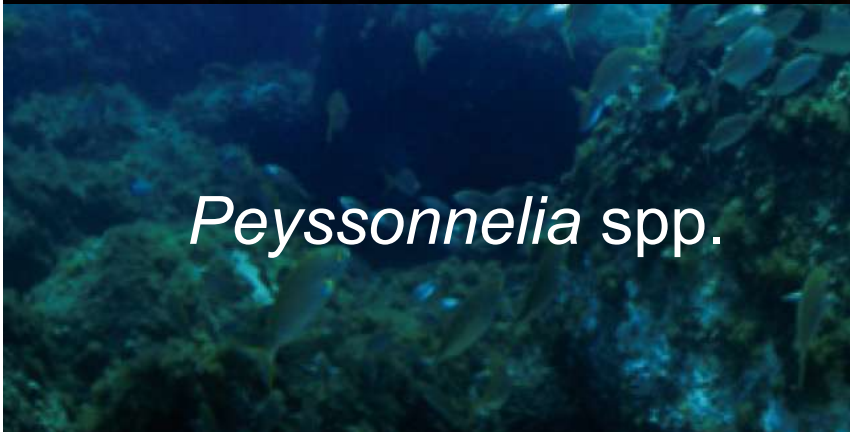


Main builders of this bioconstruction are
scleractinians and the bivalve *Neopycnodonte cochlear*

Typical species



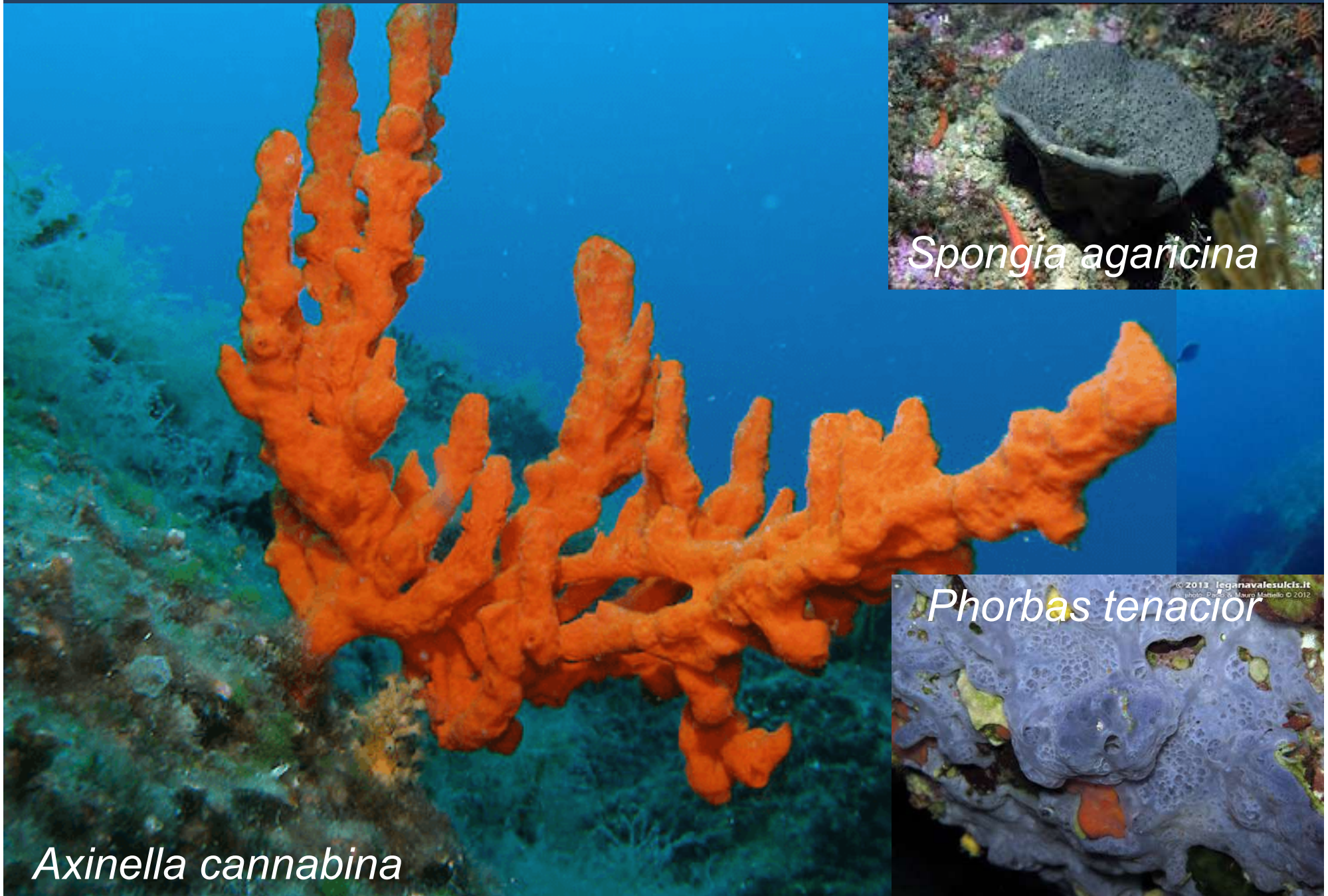
Lithophyllum spp.



Peyssonnelia spp.



Typical species



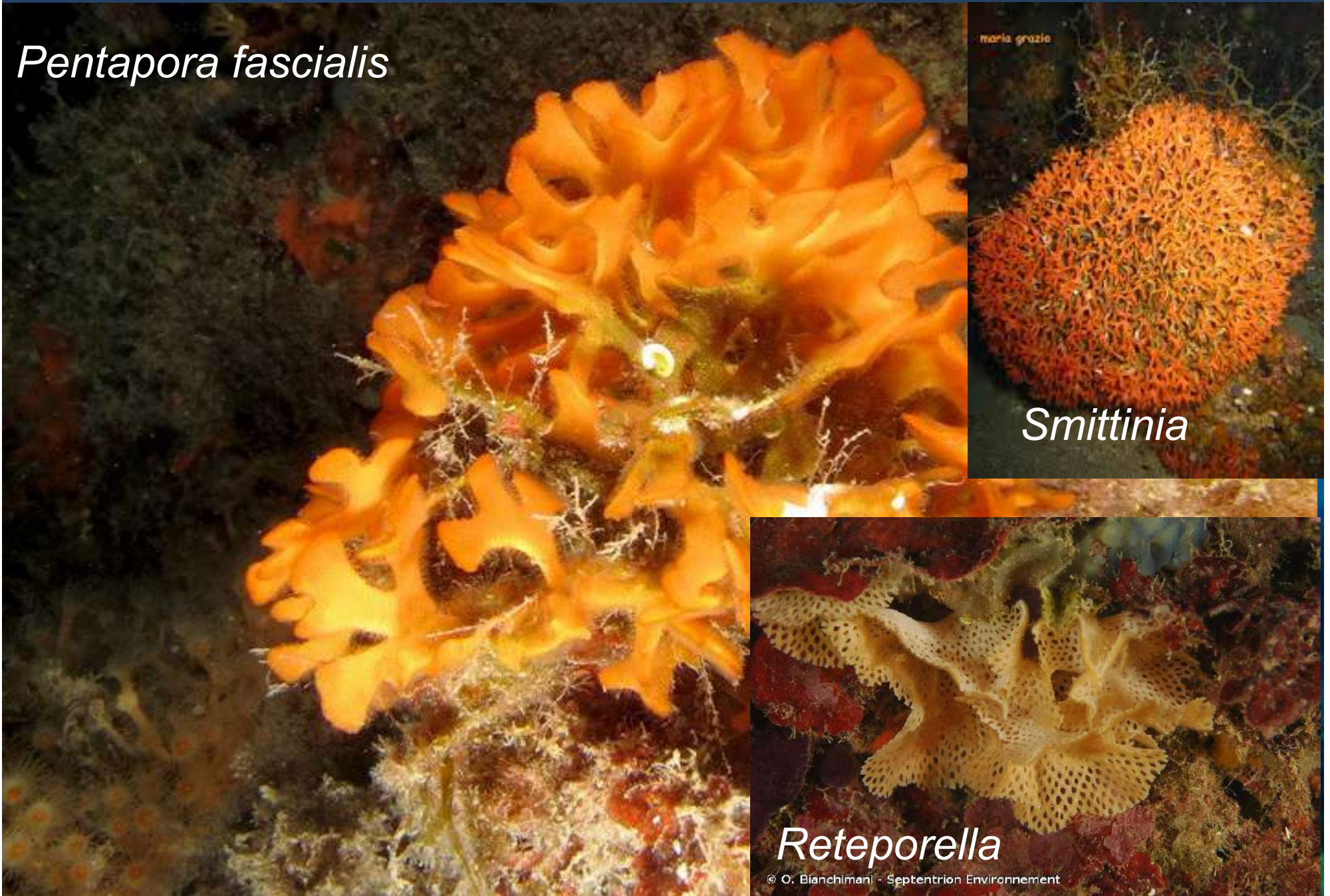
Spongia agaricina

Phorbastenacior

Axinella cannabina

Typical species

Pentapora fascialis



maria grazia

Smittinia

Reteporella

Typical species



Parazoanthus axinellae



Scyllarides latus



Halocynthia papillosa



Palinurus elephas



Centrostephanus longispinus

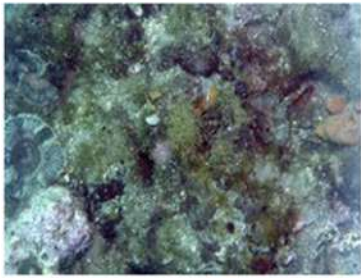


Sphaerechinus granularis

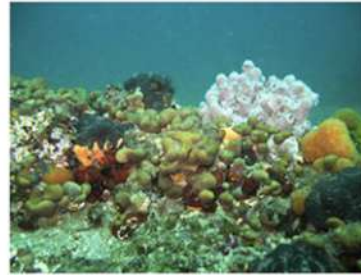
Typical species



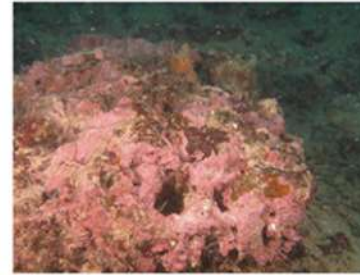
Trezze or tegnue



turf
encrusting sponges
bioeroders
sediment



massive sponges
Peyssonnelia spp.
ascidians



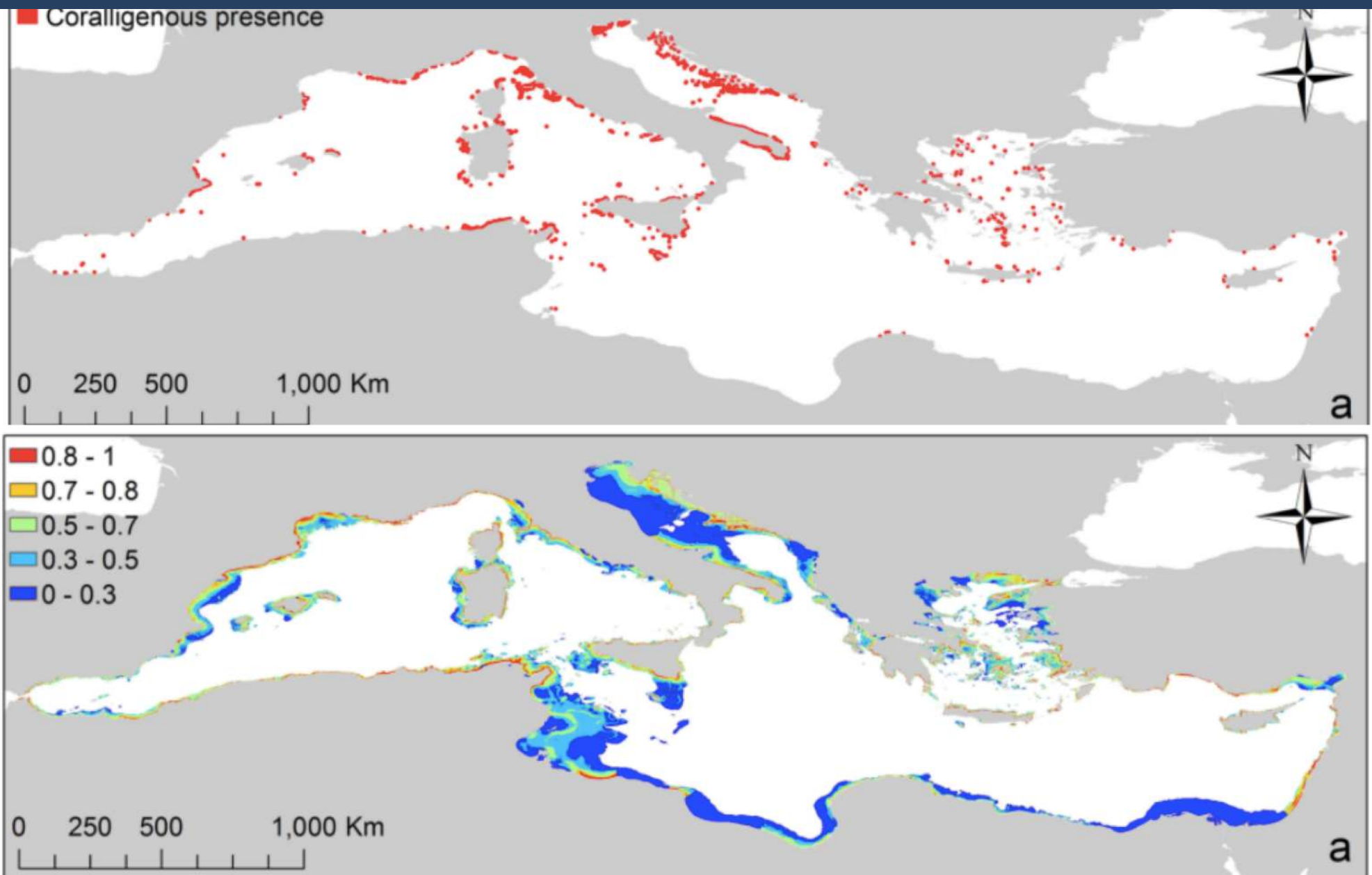
reef builders
Polycitor adriaticus

Different types of bioconcretions are present depending on the main components, which in turn, depends on environmental features such as distance from the coasts and human influence

Falace et al., 2015

In the northern Adriatic continental shelf, biogenic frameworks are generally superimposed on hard bottoms. Marine sediments may be consolidated by methane-related calcium carbonate cementation, thanks to seepage of CH₄-rich fluids, observable near many offshore reefs. Pleistocenic rivers, Holocene tidal channels and beach bars which are initial substrate for current coralligenous build-ups.

Distribution



Surface areas reported here for coralligenous outcrops (2,763 km²) based on data resulting from *in situ* observations limited to the 0 to 200 m depth band. Martin et al. 2014

Maërl

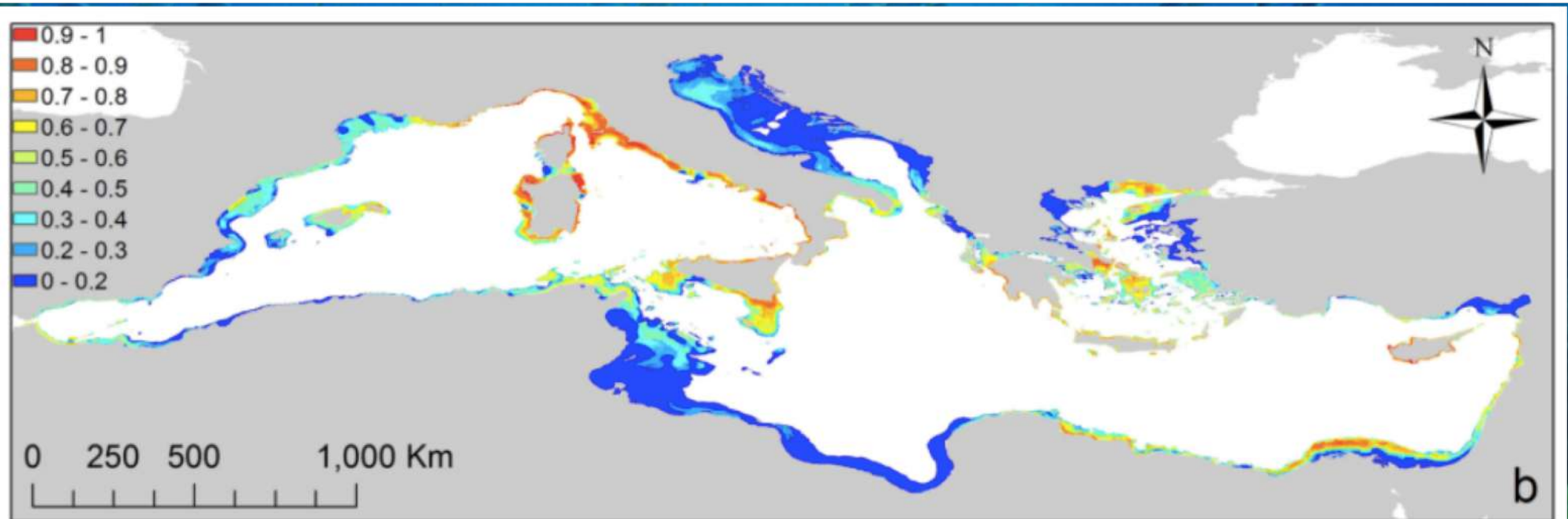
Biogenic structure formed by several coralline algae growing and accumulating (dead and alive) on soft bottom, living unattached to the substrate with thalli as nodules of ramified shapes.

Algae can live >100 y.

Phymatolithon calcareum



Distribution



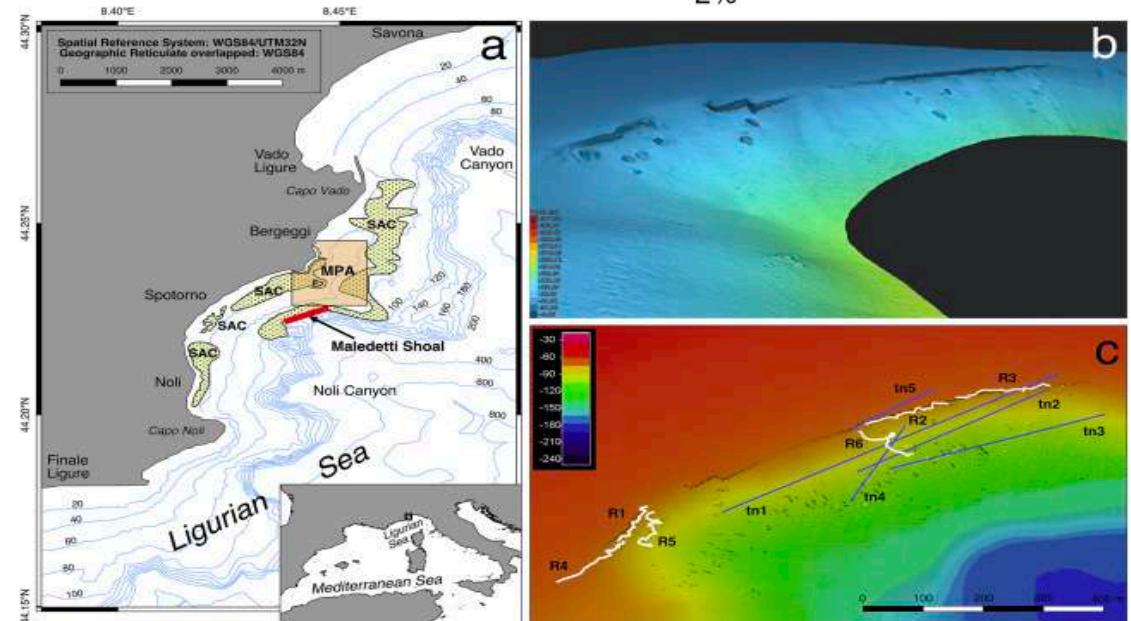
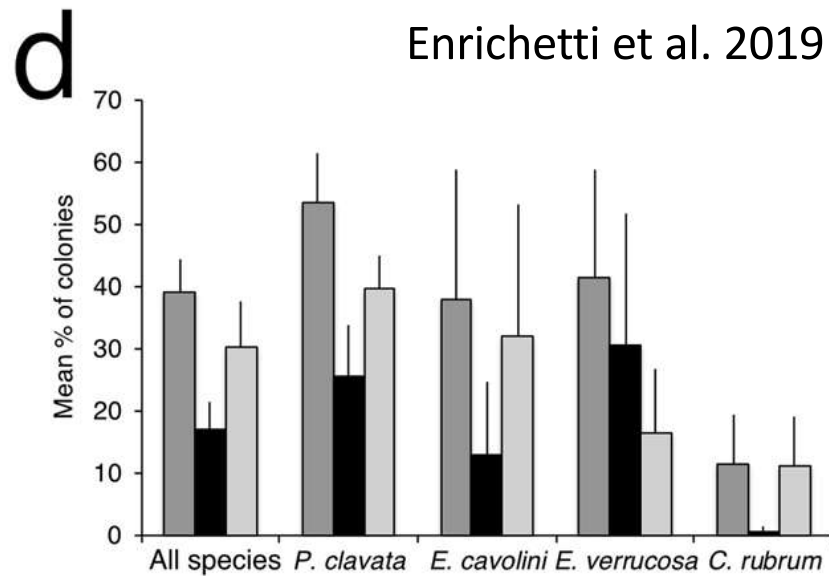
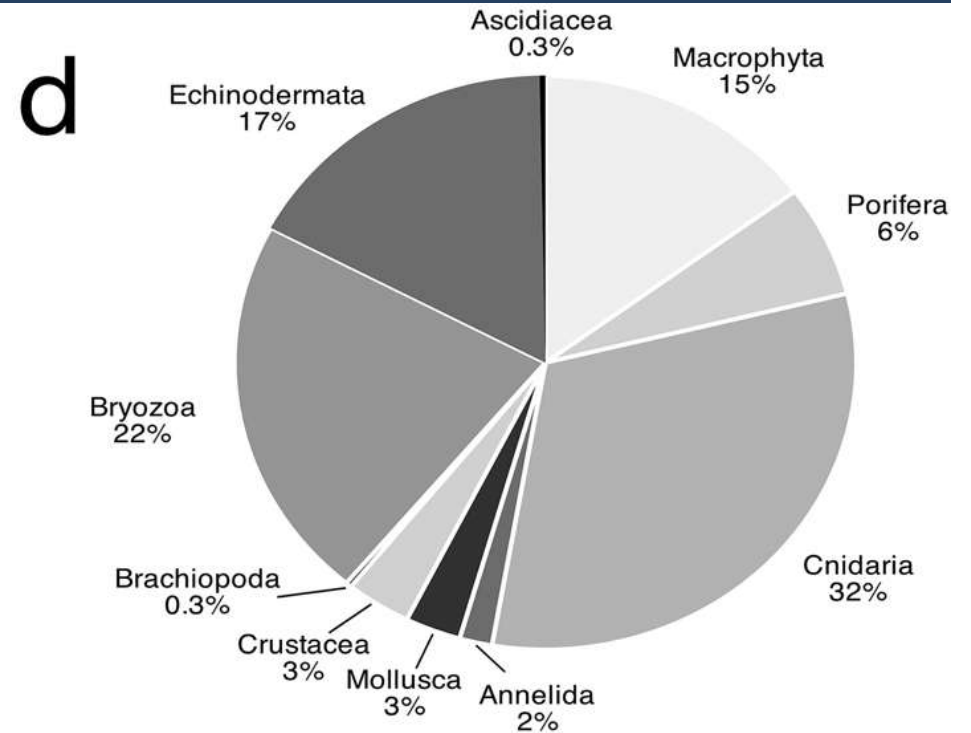
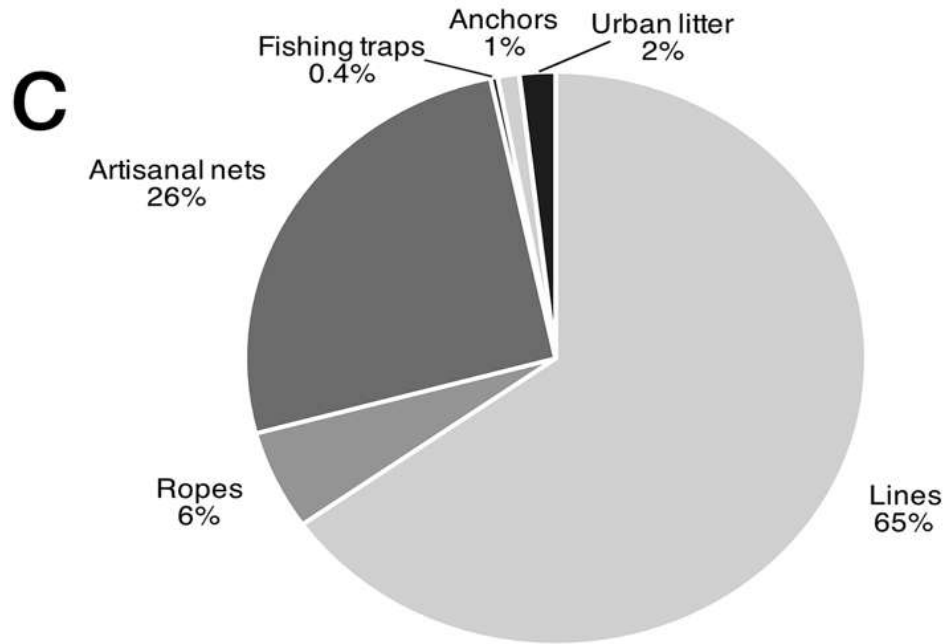
Threats



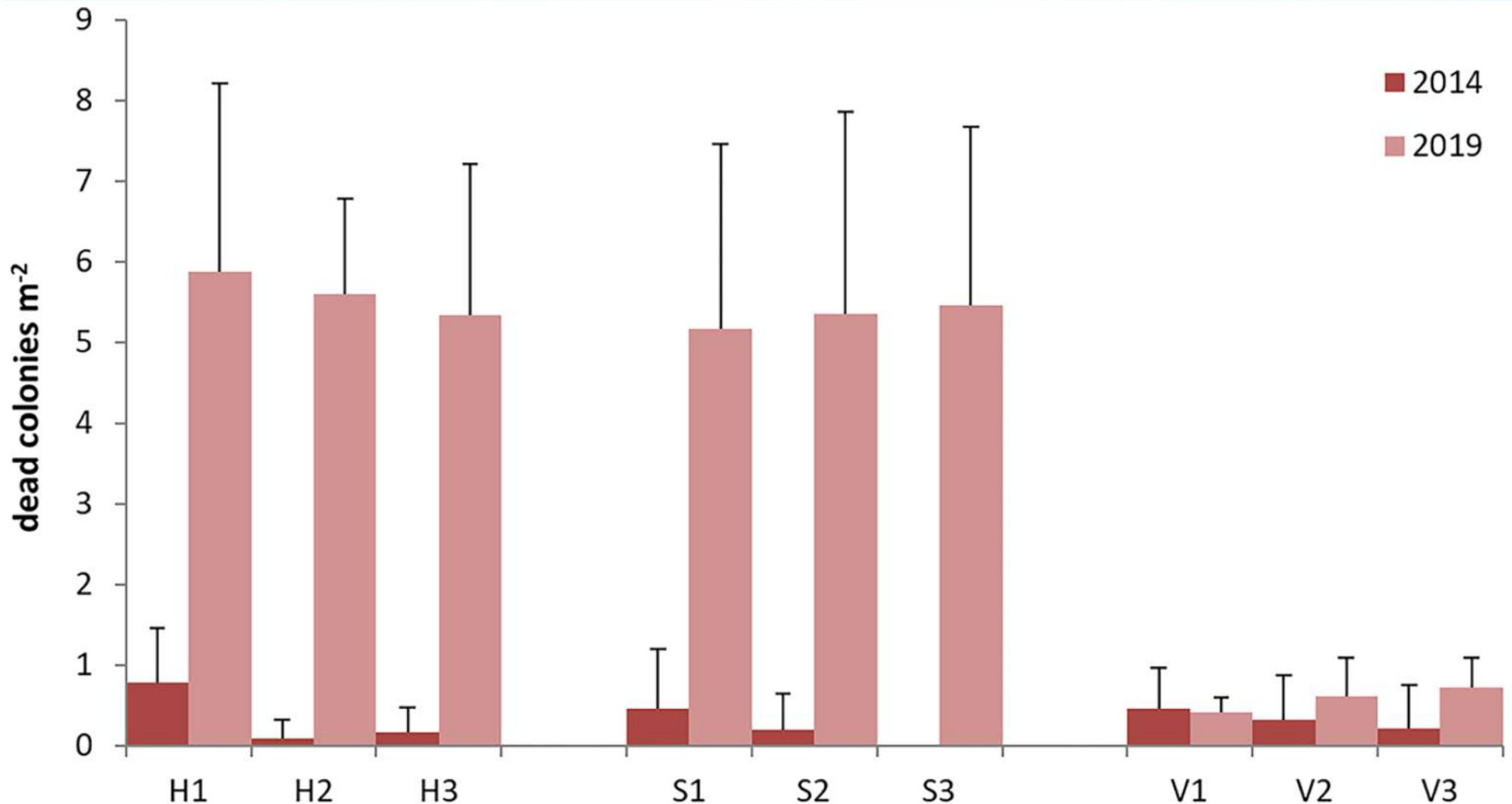
Threats: trawling



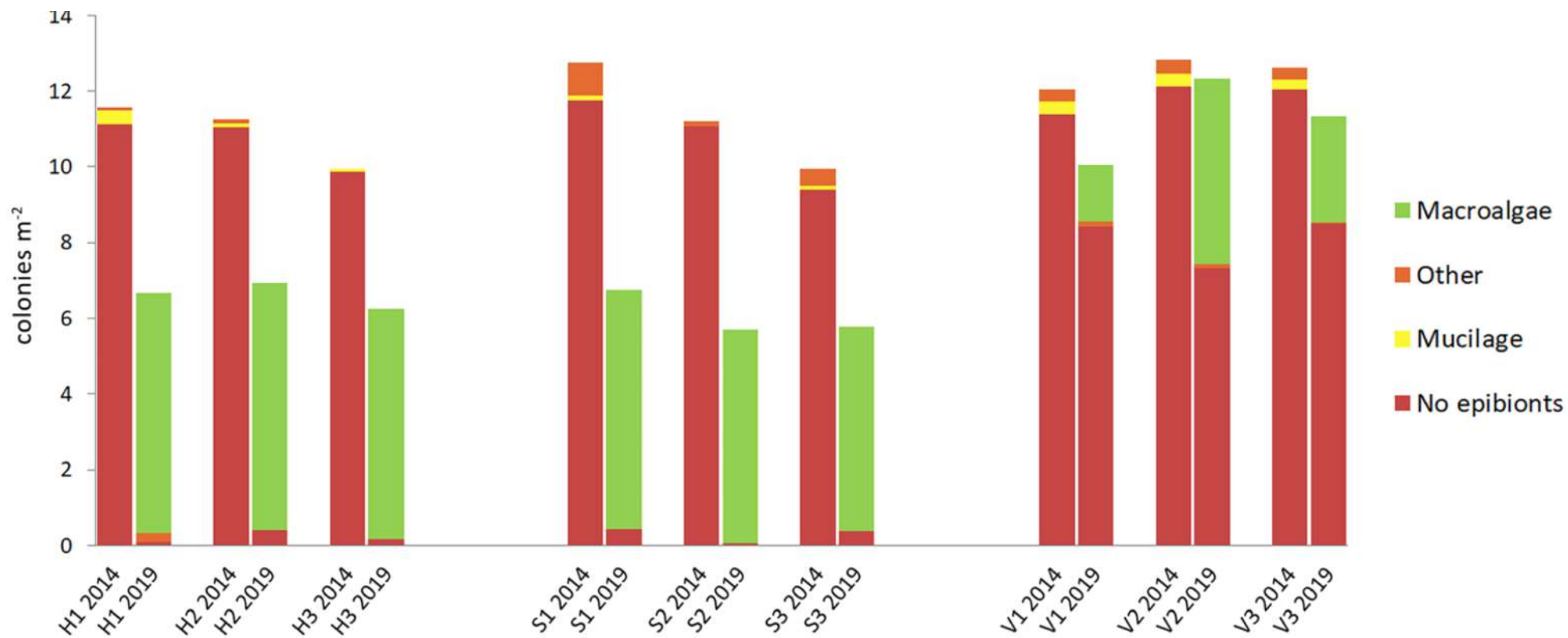
Threats: fishing



MMEs



Paramuricea clavata monitored during five years (2014–2019, Tremiti Islands). Massive mucilagenous blooms occurred from 2015 until 2018. The gorgonians at 30-40 m were entirely covered with mucilage. Below 40 m colonies were almost unaffected. Chimienti et al. 2021



Horizontal

Sub-vertical

Vertical

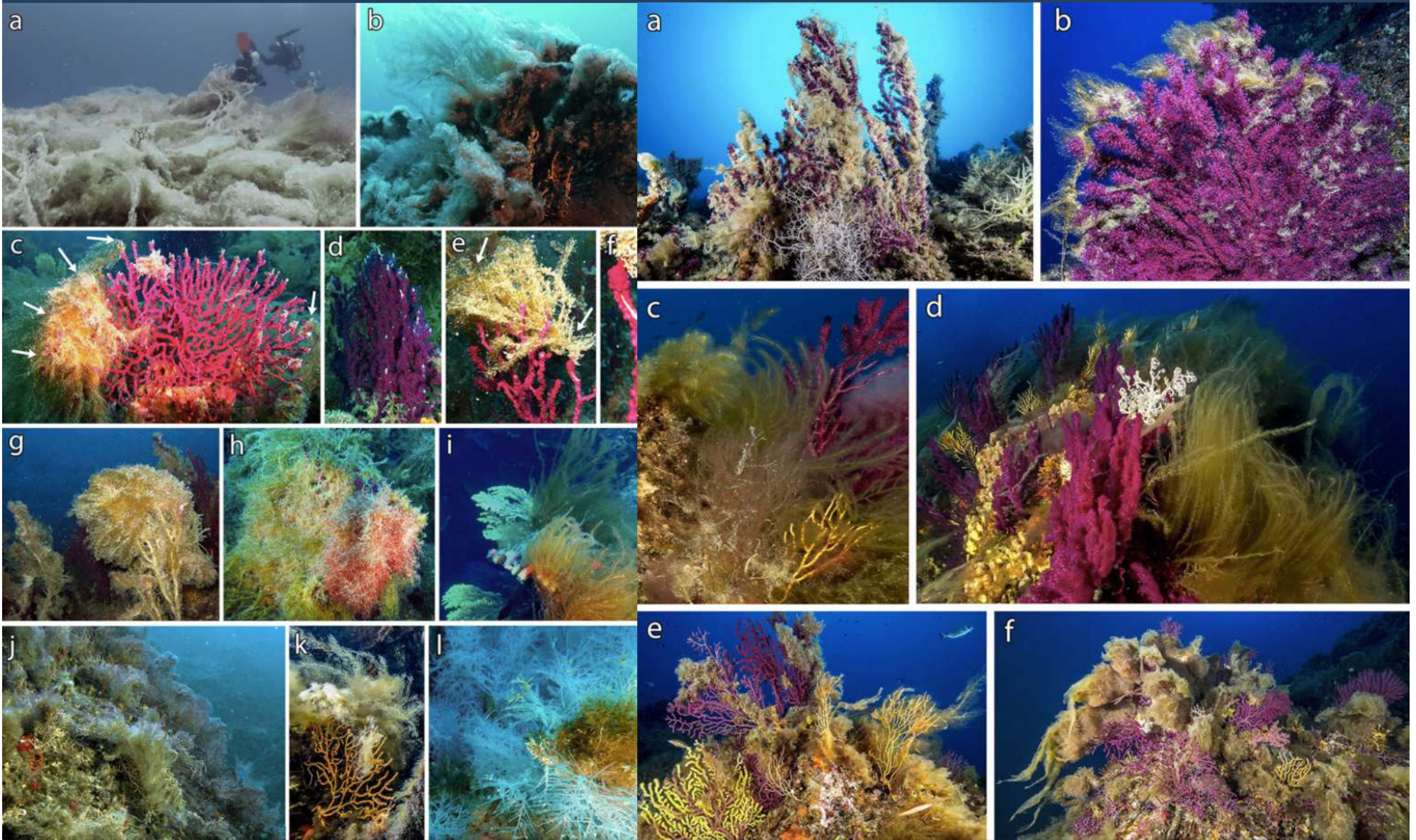
2014



2019



MMEs



Tremiti Islands

Tuscan Archipelago