An underwater photograph showing a large school of small, silvery fish swimming in clear blue water above a coral reef. The sun's rays are visible filtering down from the surface. The text is overlaid on the upper portion of the image.

**GLOBAL CHANGE ECOLOGY AND SUSTAINABILITY**  
**a.a. 2025-2026**

**Conservation and Management of Marine Ecosystems**  
**Prof. Stanislao Bevilacqua ([sbevilacqua@units.it](mailto:sbevilacqua@units.it))**

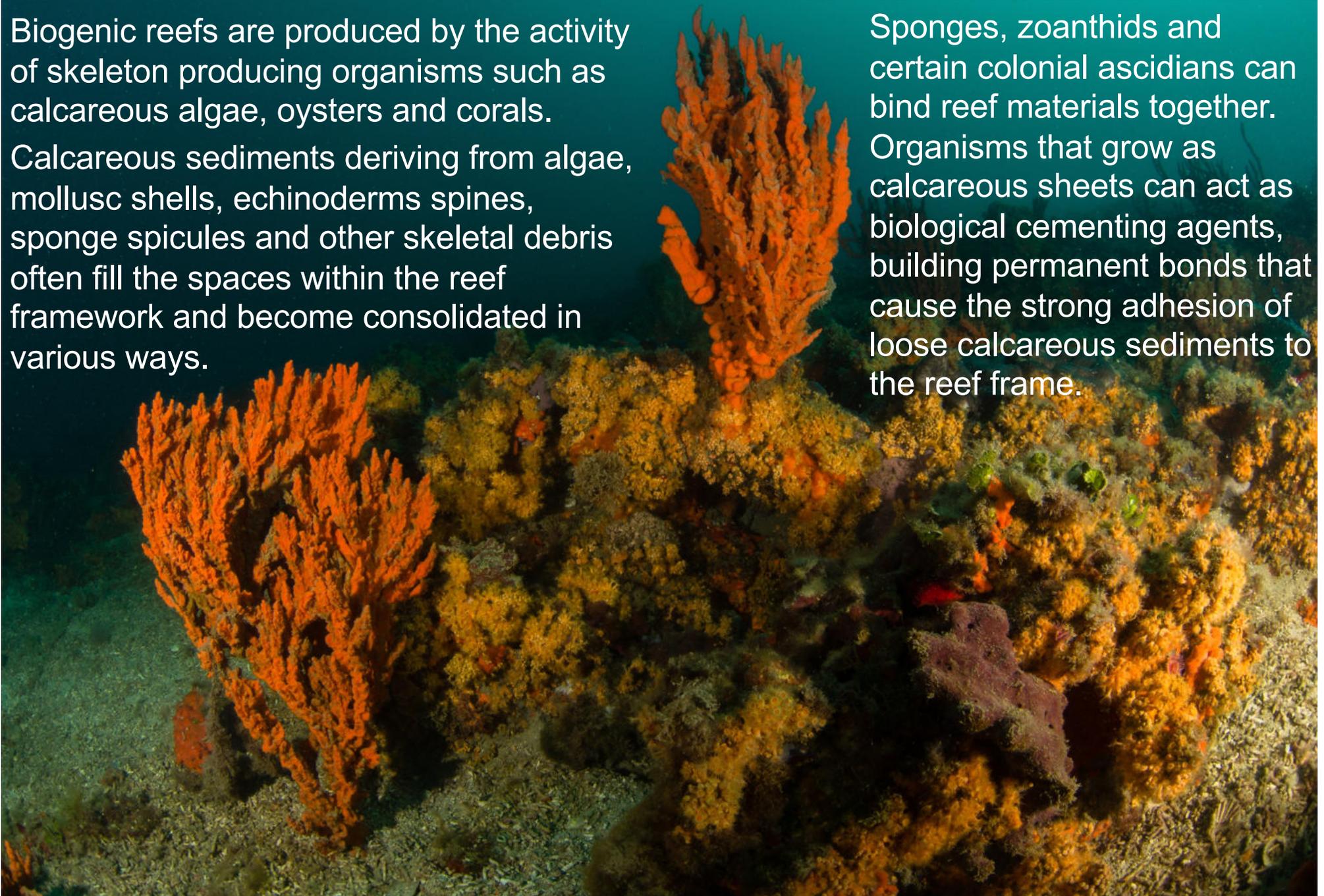
**Coralligenous and other subtidal  
bioconstructions**

# Bioconstructions

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

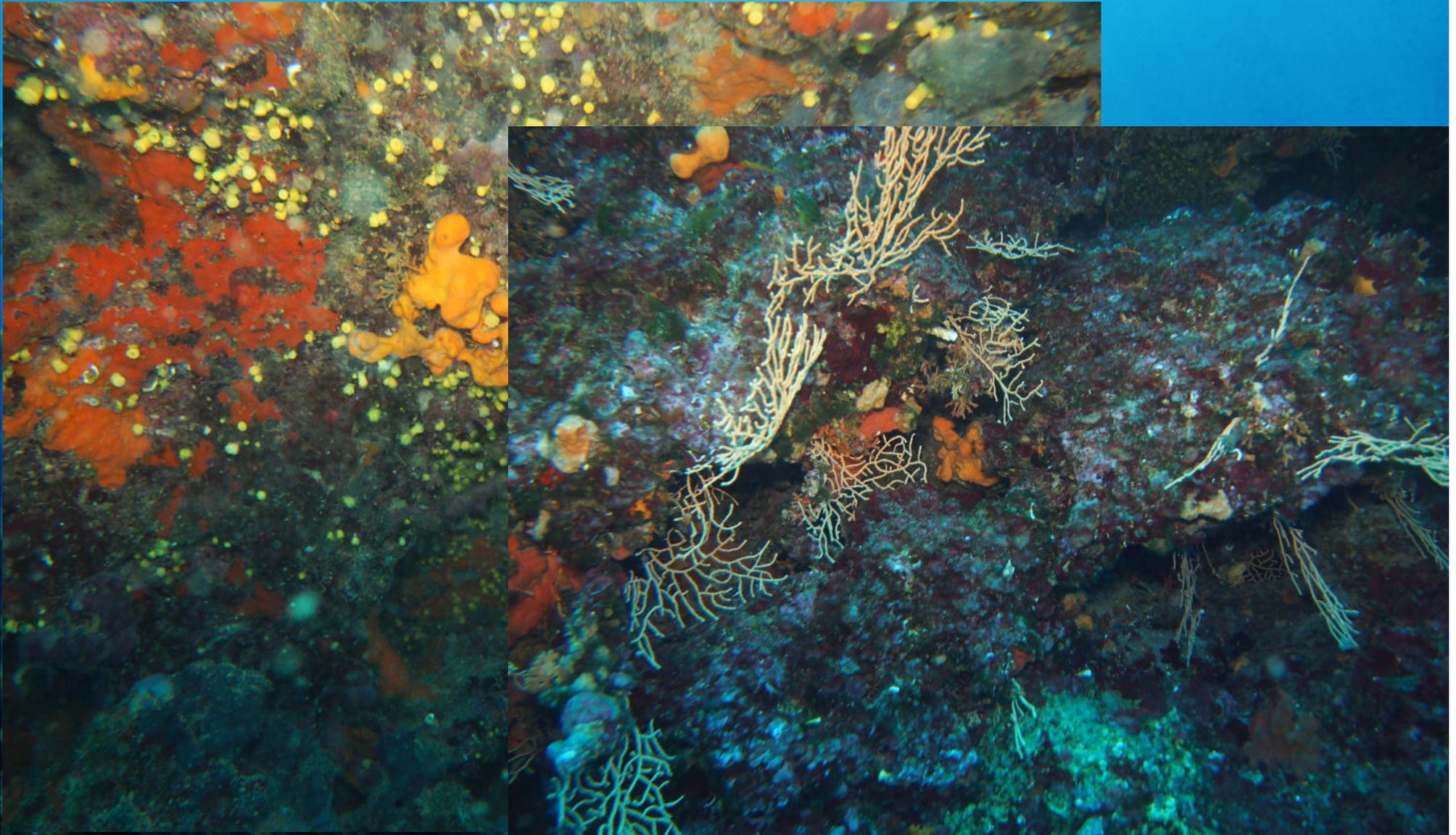
Calcareous sediments deriving from algae, mollusc shells, echinoderms spines, sponge spicules and other skeletal debris often fill the spaces within the reef framework and become consolidated in various ways.

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

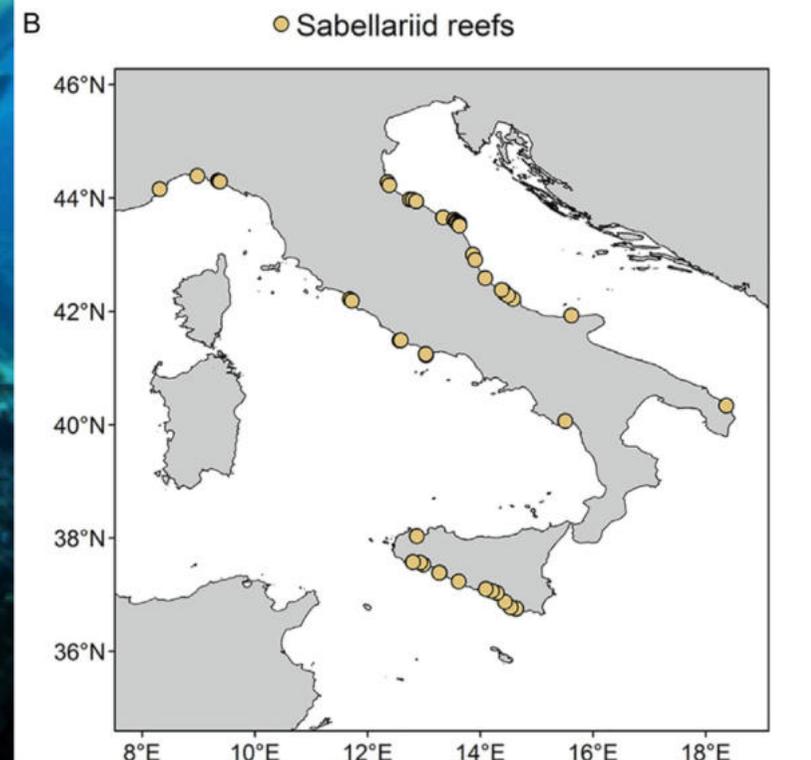
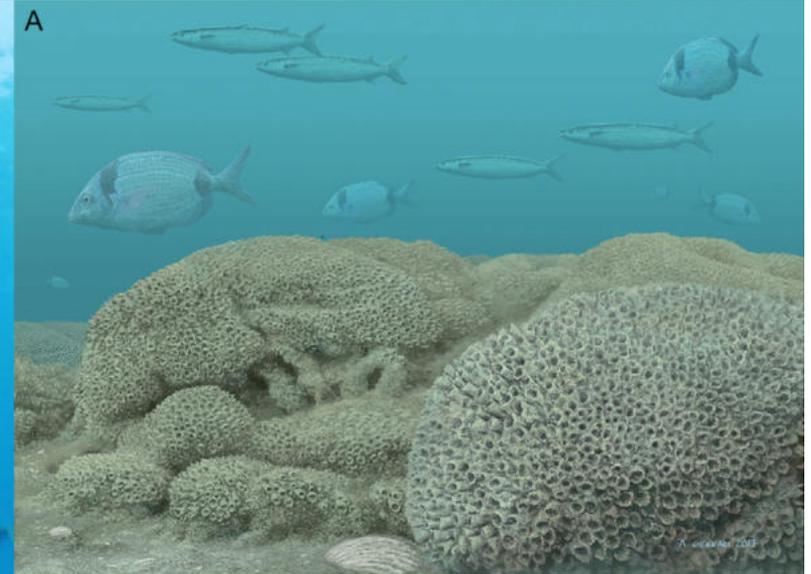
Bioconstructors modify primary (i.e. geological) substrates and provide secondary (i.e. biogenic) substrates for new bioconstructors and for nonbioconstructors who simply inhabit them



# Bioconstructions of the Mediterranean Sea

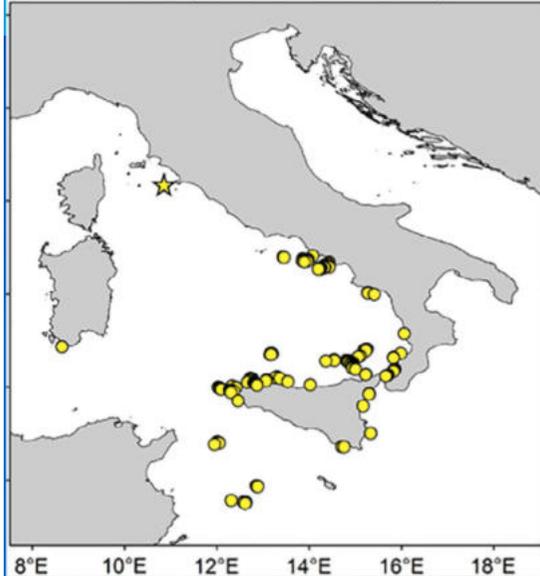
- *Lithophyllum byssoides* concretions/trottoirs
- *Astroides calycularis* formations/reefs
- Coralligenous assemblages
- *Cladocora caespitosa* formations/reefs
- Vermetid reefs
- Sabellariid reefs
- Cold-water corals
- Serpulid reefs, including biostalactites

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

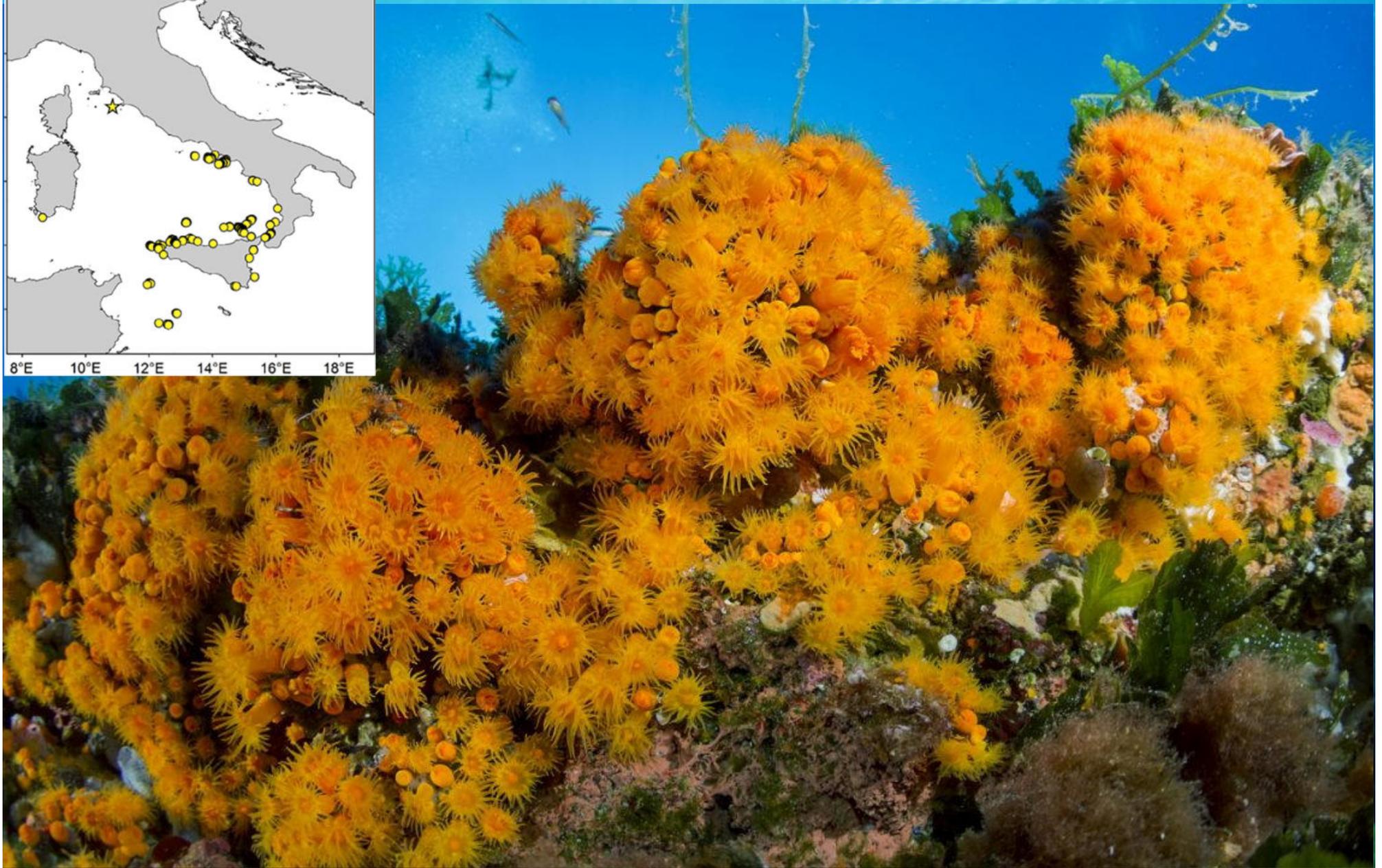


# Bioconstructions of the Mediterranean Sea

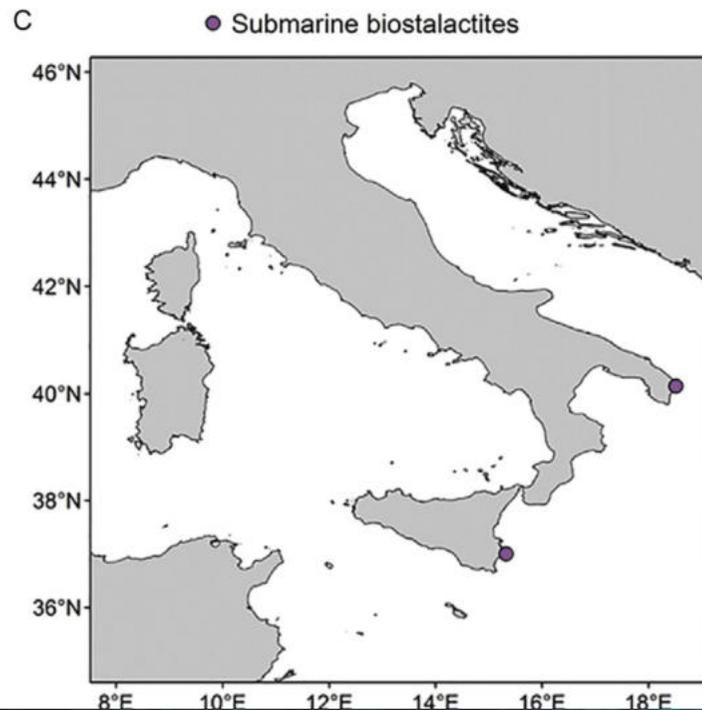
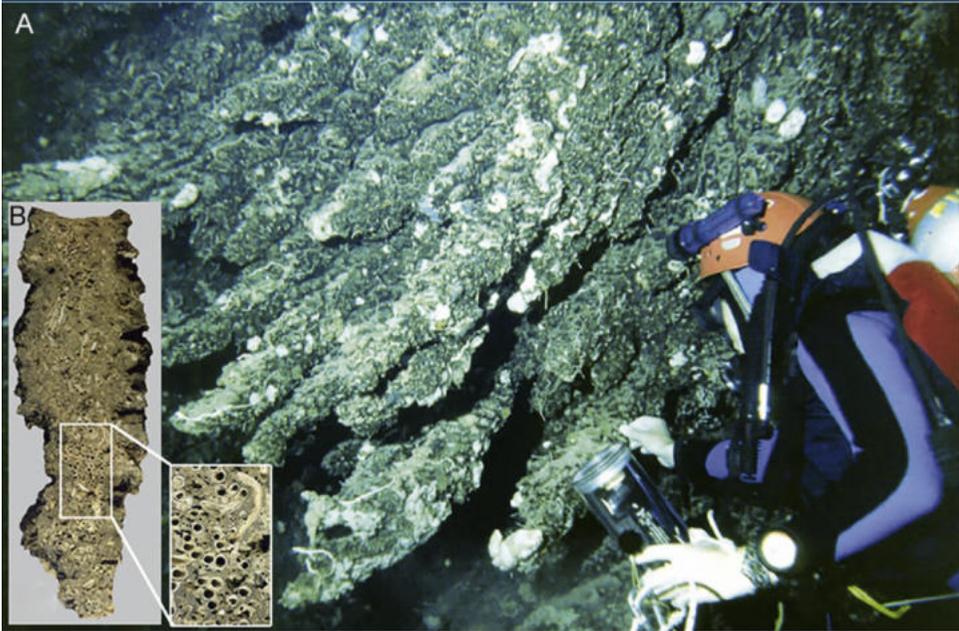
C ● *A. calycularis* formations/reefs  
★ *A. calycularis* dead colony



*Astroides calycularis* scleractinians not zooxanthelate



# Biostalactites



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

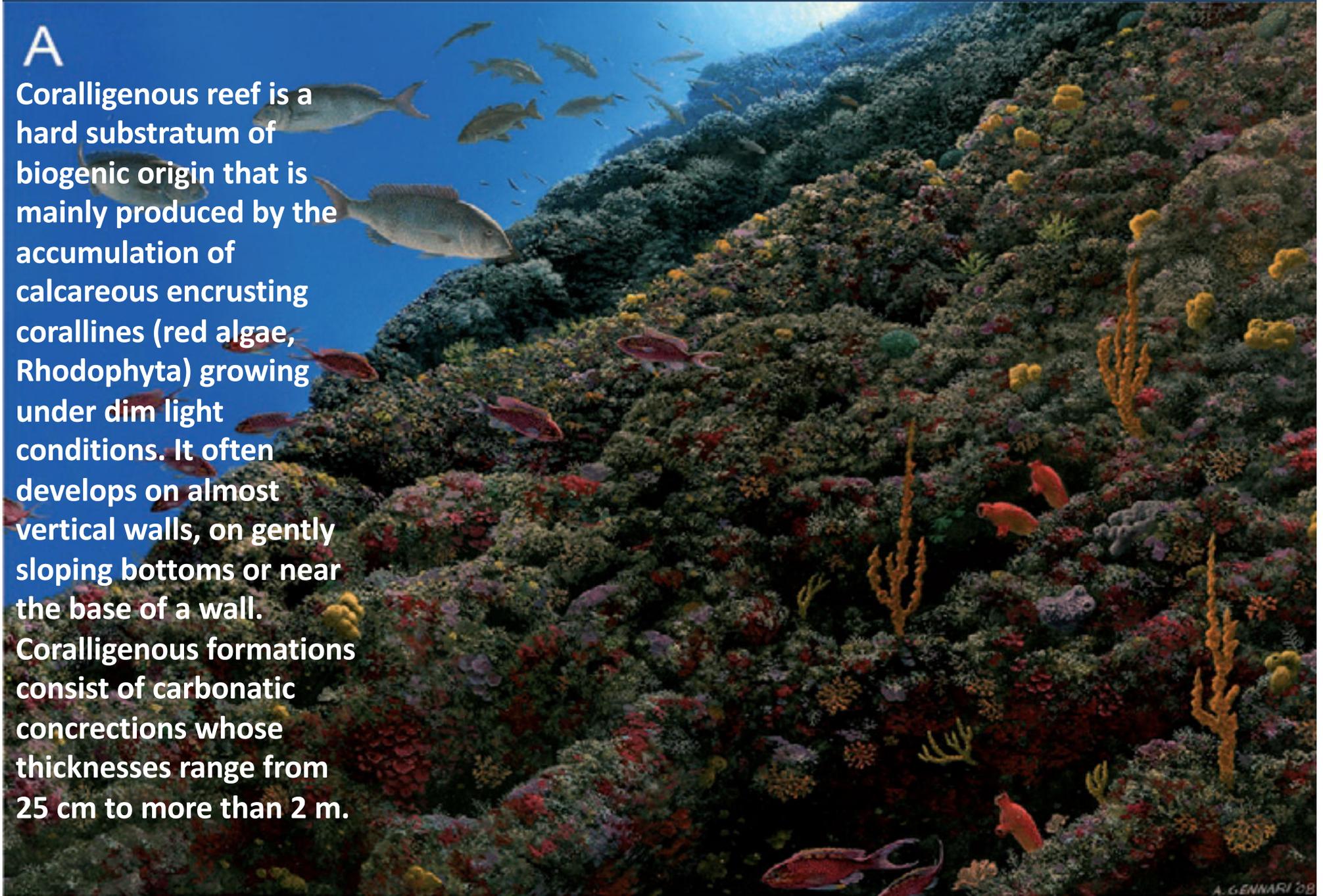
They are formed by single or few serpulid species (mostly *Protula* spp.) whose aggregations become substrate for smaller invertebrates and bacteria. Biostalactites can protrude a few cm up to 2 m.

# 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 thicknesses range from 25 cm to more than 2 m.



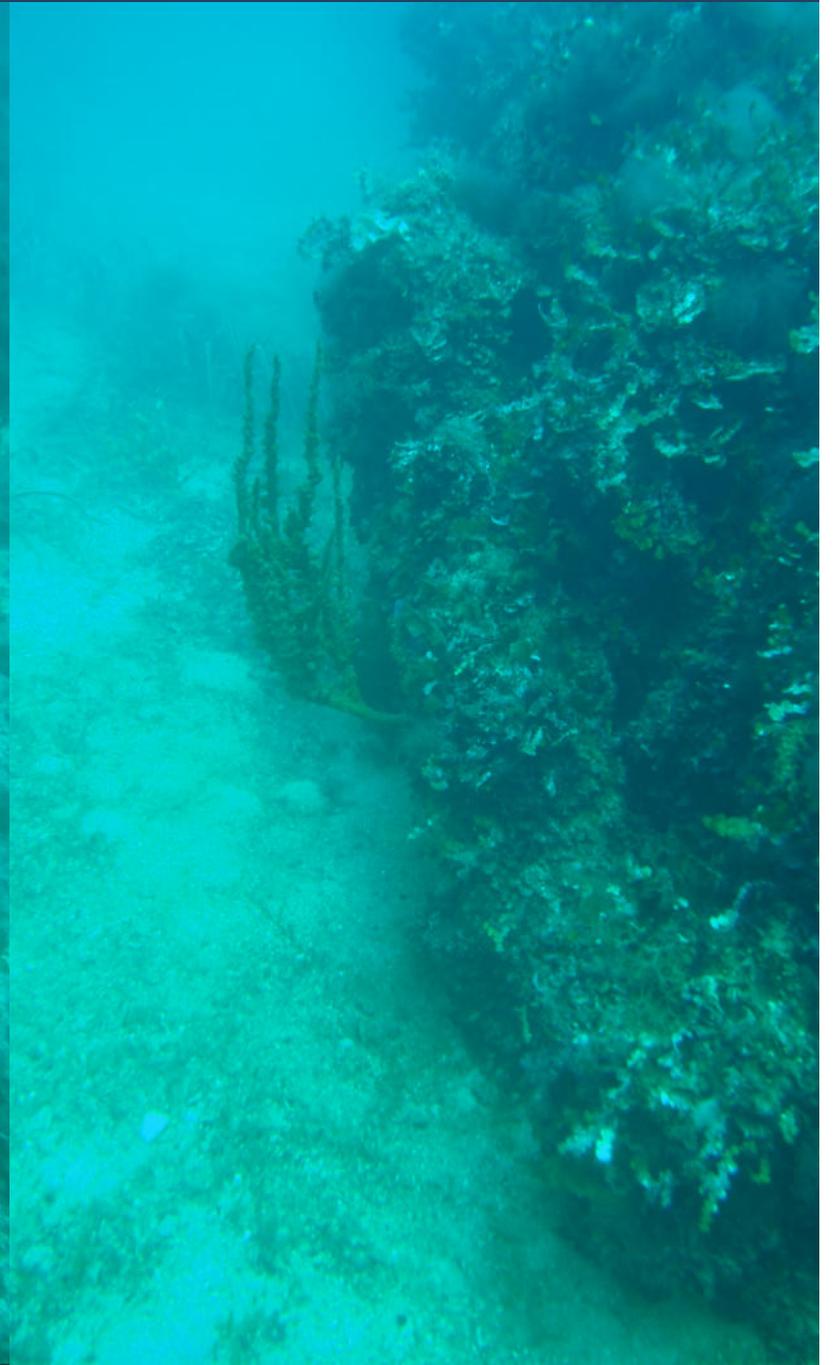
# Coralligenous assemblages

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.

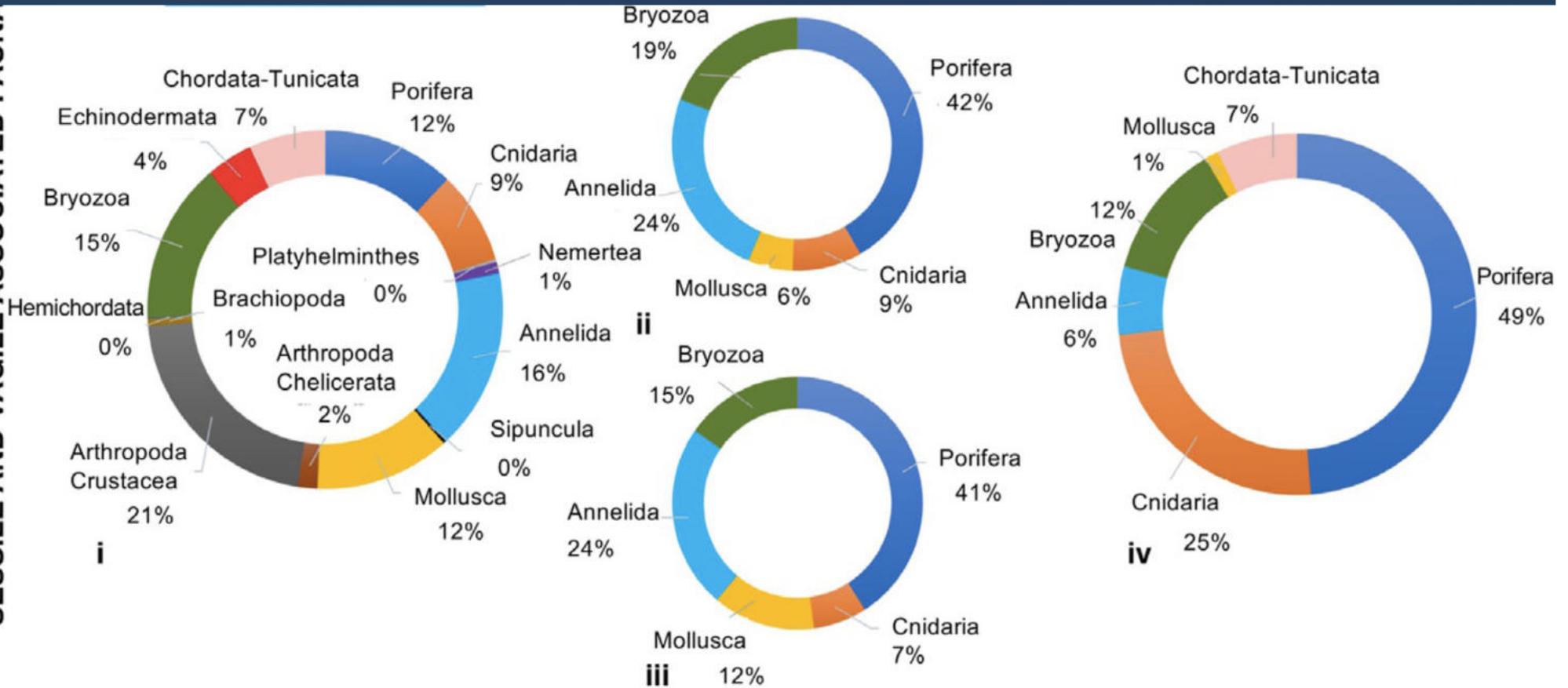


# Coralligenous assemblages



# Coralligenous assemblages

SESSILE AND VAGILE ASSOCIATED FAUNA



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

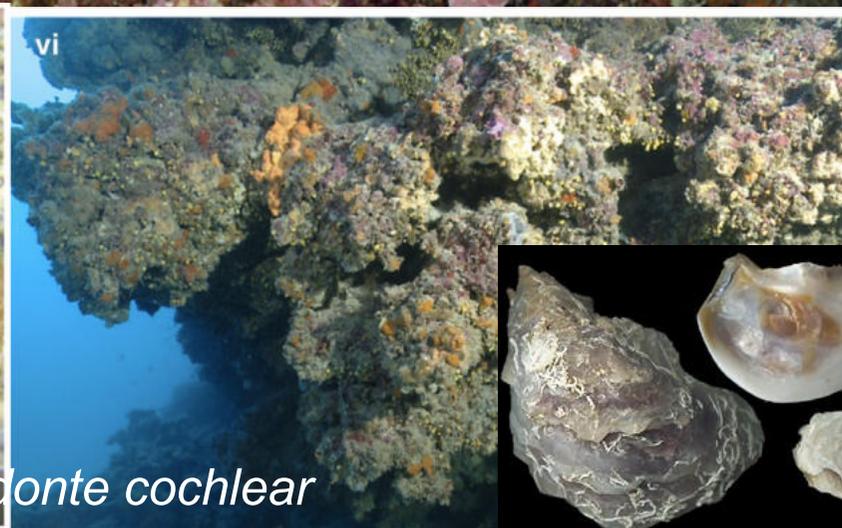
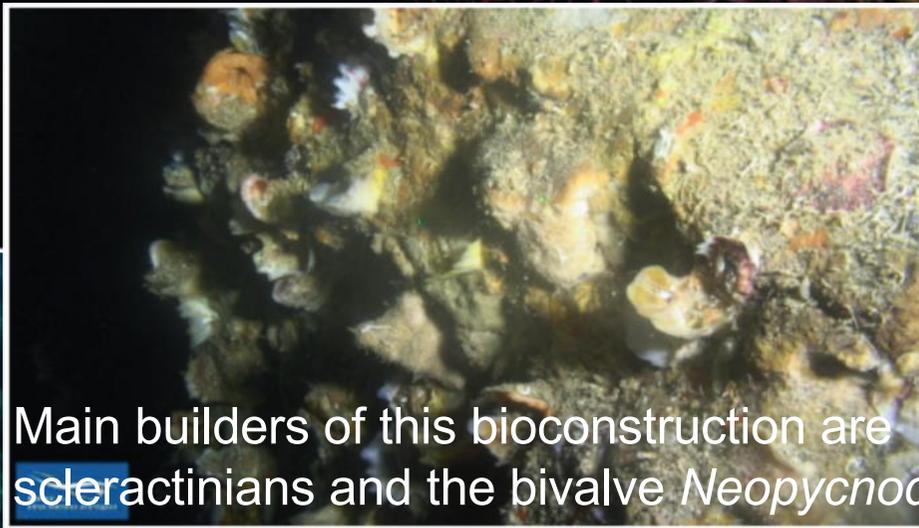
Animal bioconstruction  
Built by animal remains  
Depth range 30-70 m

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

# Coralligenous assemblages

vii

Reduced  
bioconcretion on  
granitic bottom



# Typical species



*Lithophyllum* spp.



*Peyssonnelia* spp.



# Typical species



*Axinella cannabina*

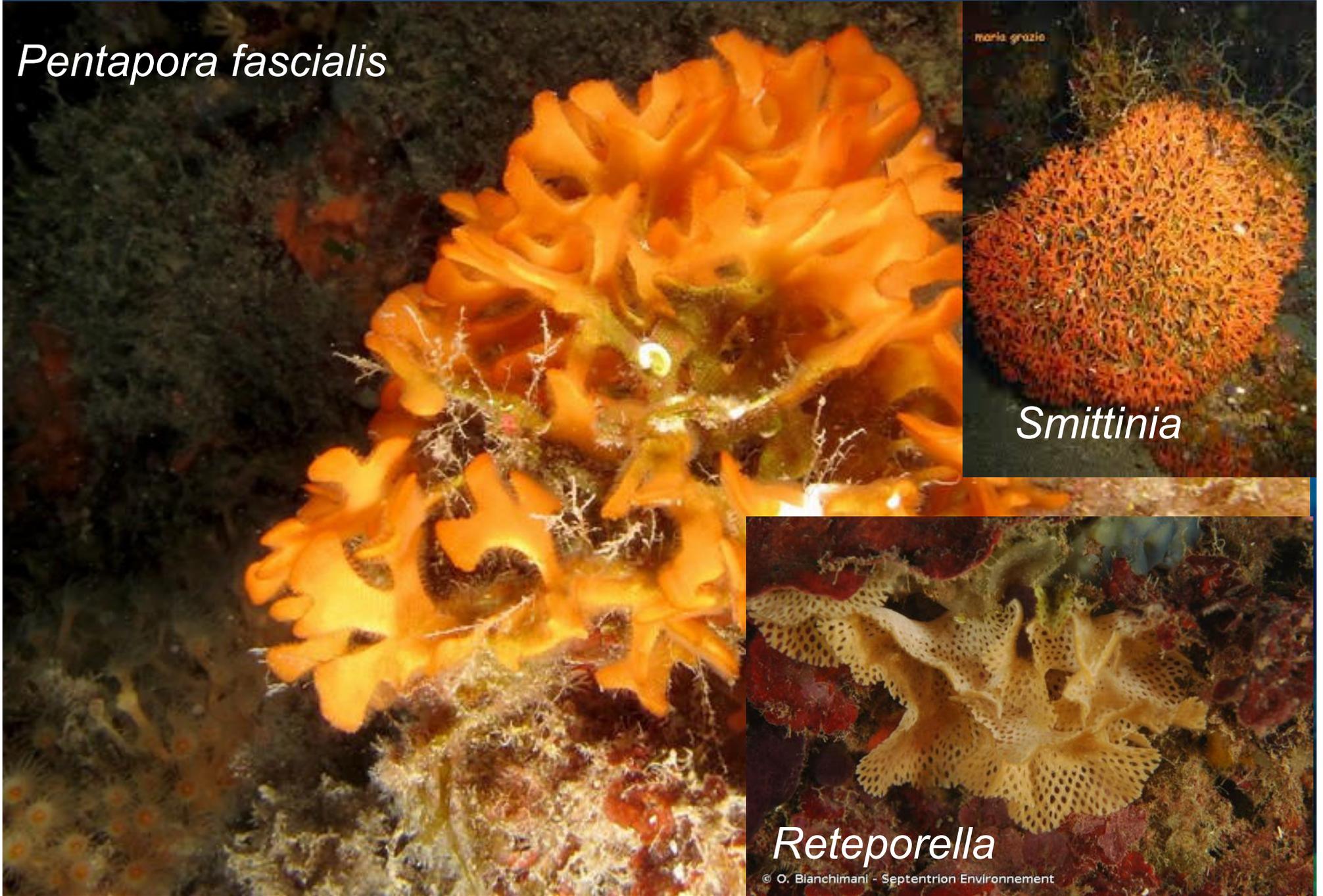
*Spongia agaricina*

*Phorbas tenacior*

© 2013 [teganavalesulcis.it](http://teganavalesulcis.it)  
photo: Paolo & Maura Mattiello © 2012

# Typical species

*Pentapora fascialis*



maria grazia

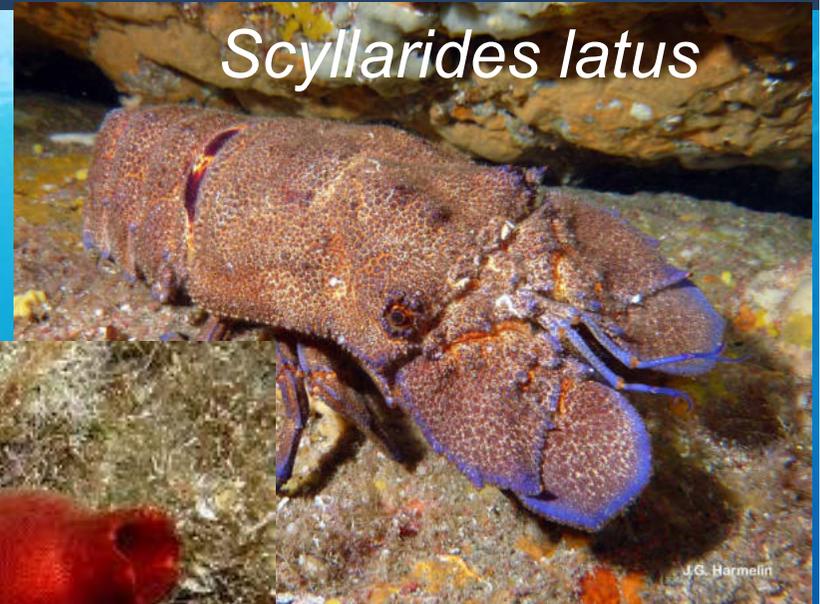
*Smittinia*

*Reteporella*

# Typical species



*Parazoanthus axinellae*



*Scyllarides latus*



*Halocynthia papillosa*



*Palinurus elephas*

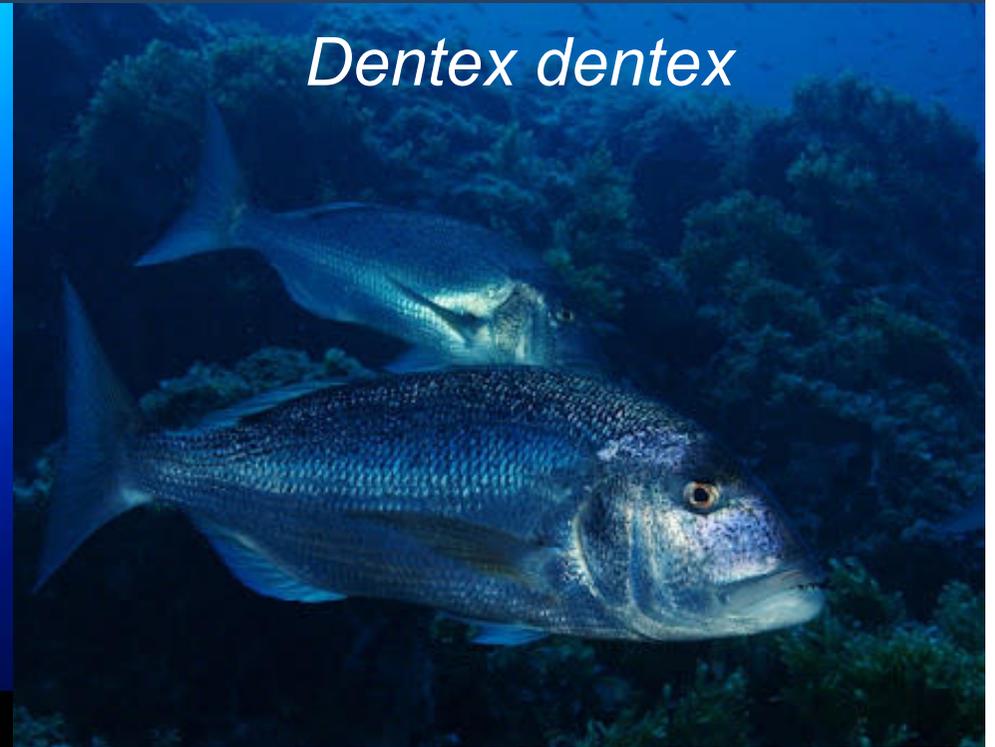


*Centrostephanus longispinus*

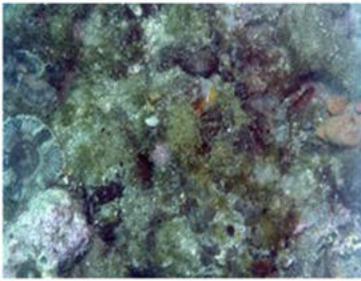


*Sphaerechinus granularis*

# Typical species



# Trezze or tegnue



**turf**  
encrusting sponges  
bioeroders  
sediment



**massive sponges**  
*Peyssonnelia* spp.  
ascidians



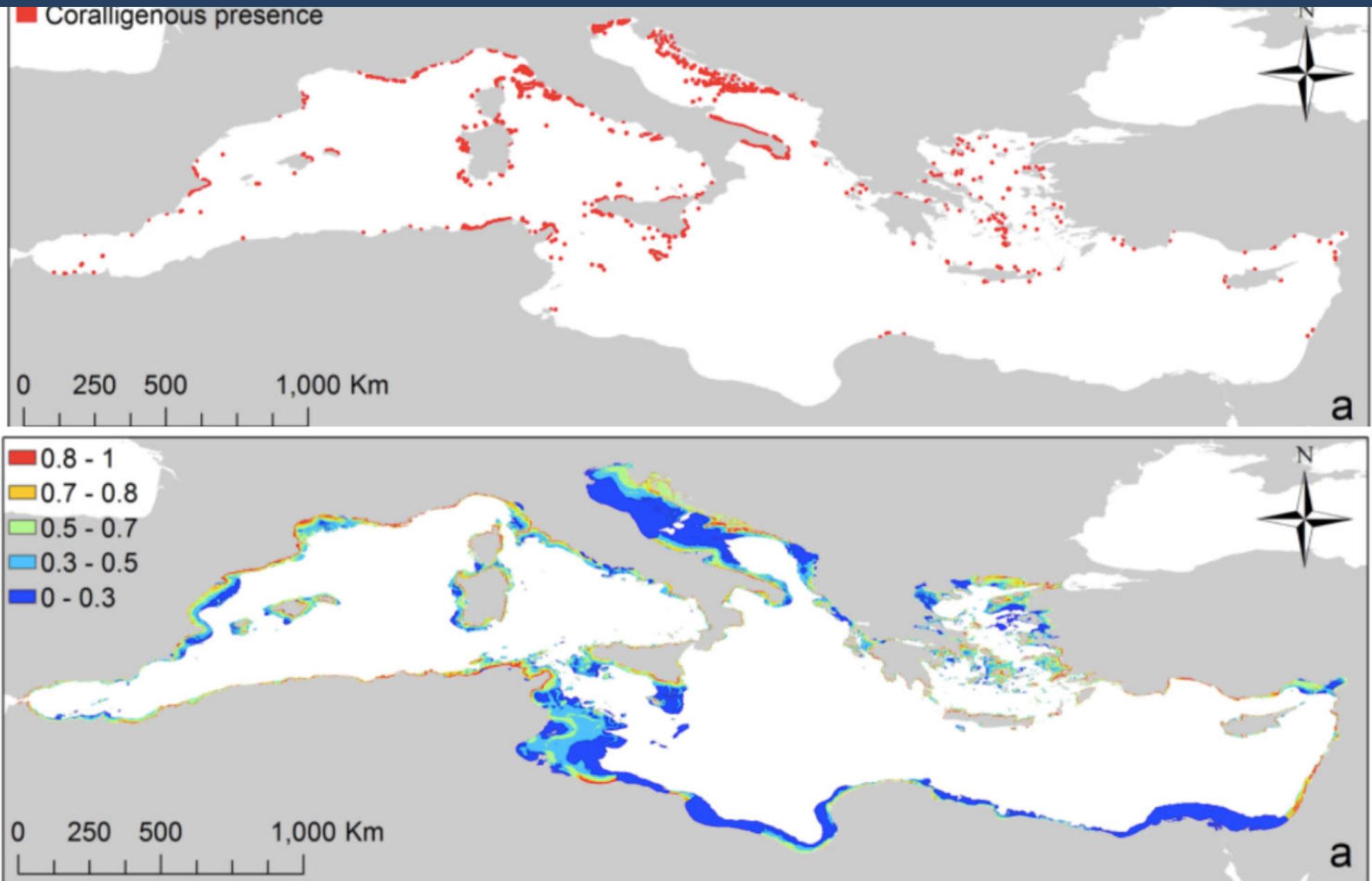
**reef builders**  
*Polycitor adriaticus*

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 CH<sub>4</sub>-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



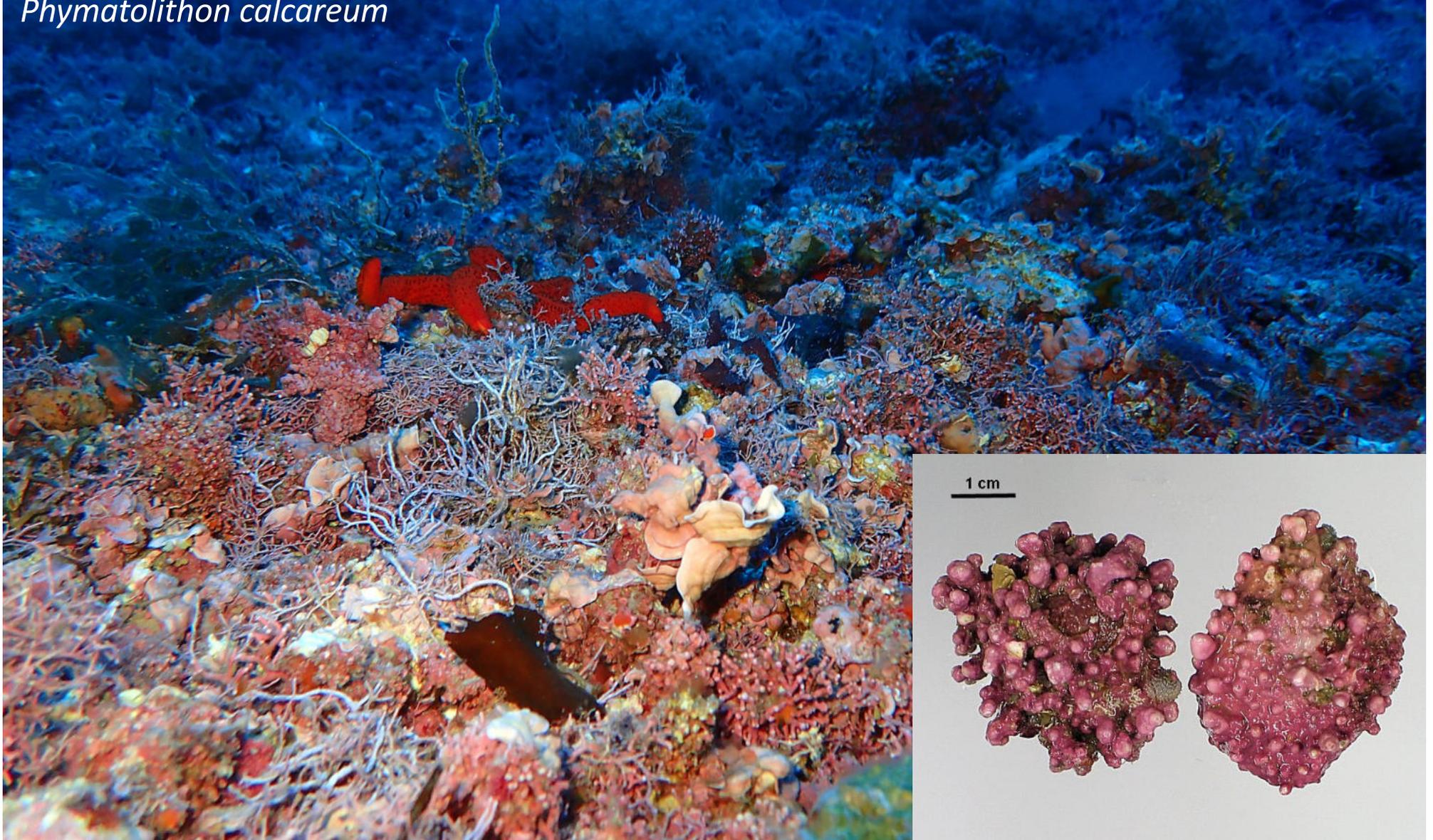
Surface areas reported here for coralligenous outcrops (2,763 km<sup>2</sup>) based on data resulting from *in situ* observations limited to the 0 to 200 m depth band. Martin et al. 2014

# Maërl

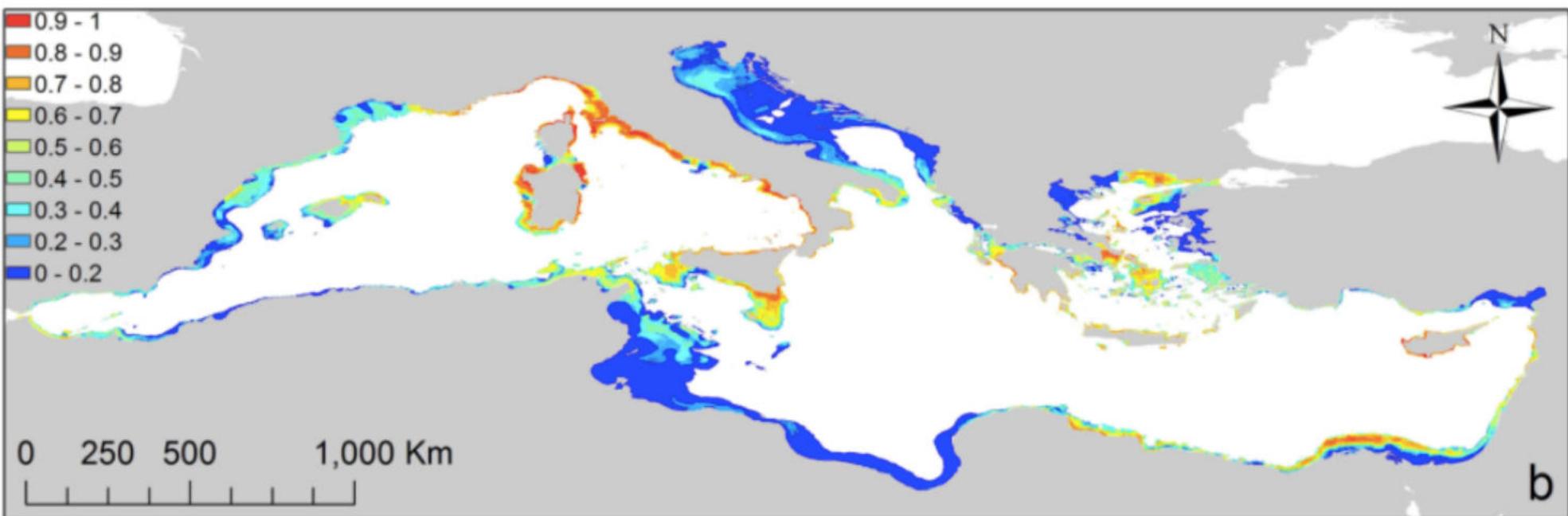
Biogenic structure formed by several coralline algae growing and accumulating (dead and alive) on soft bottom, living unattached to the substrate with thalli as nodules of ramified shapes.

Algae can live >100 y.

*Phymatolithon calcareum*



# Distribution



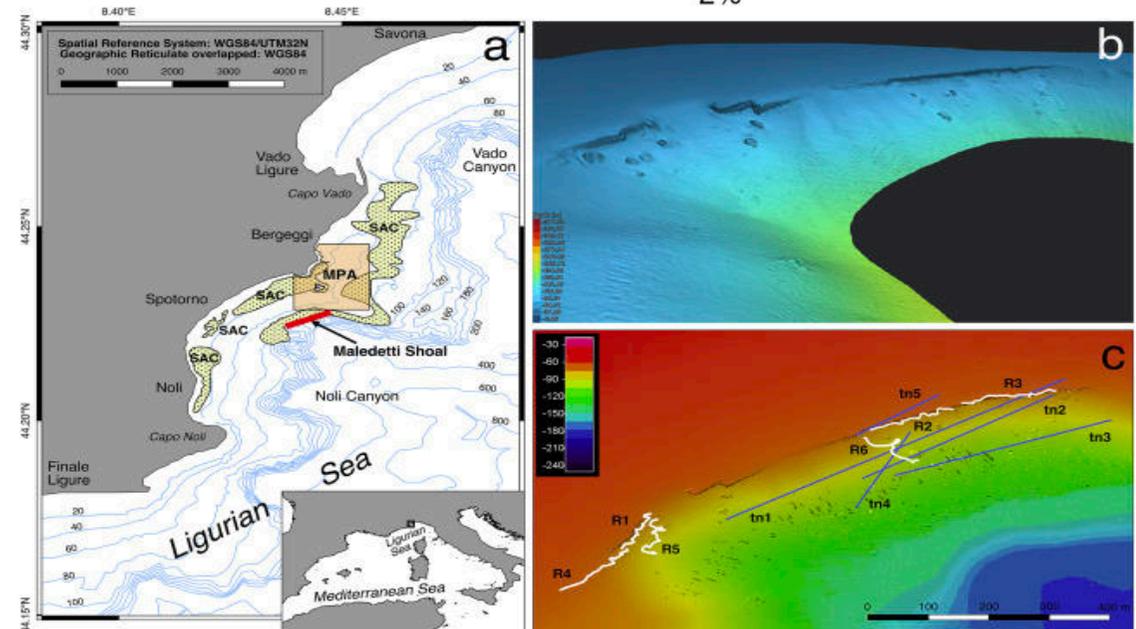
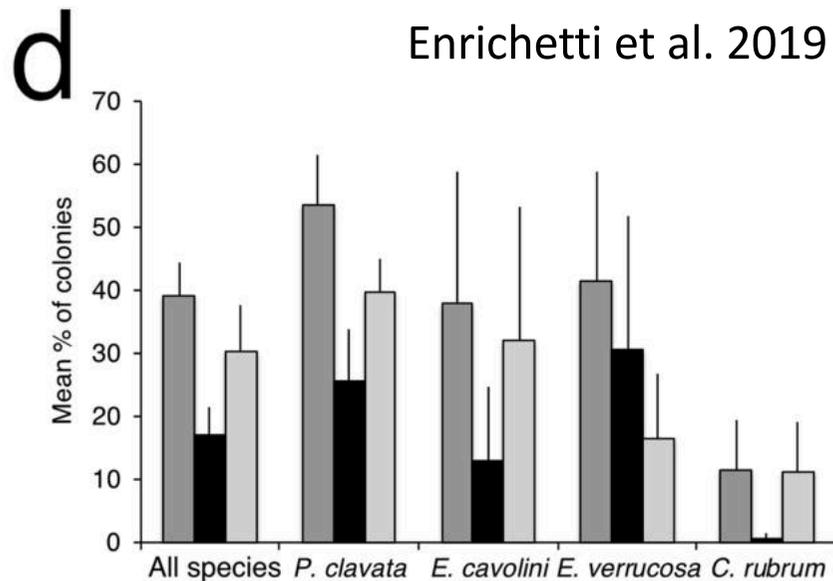
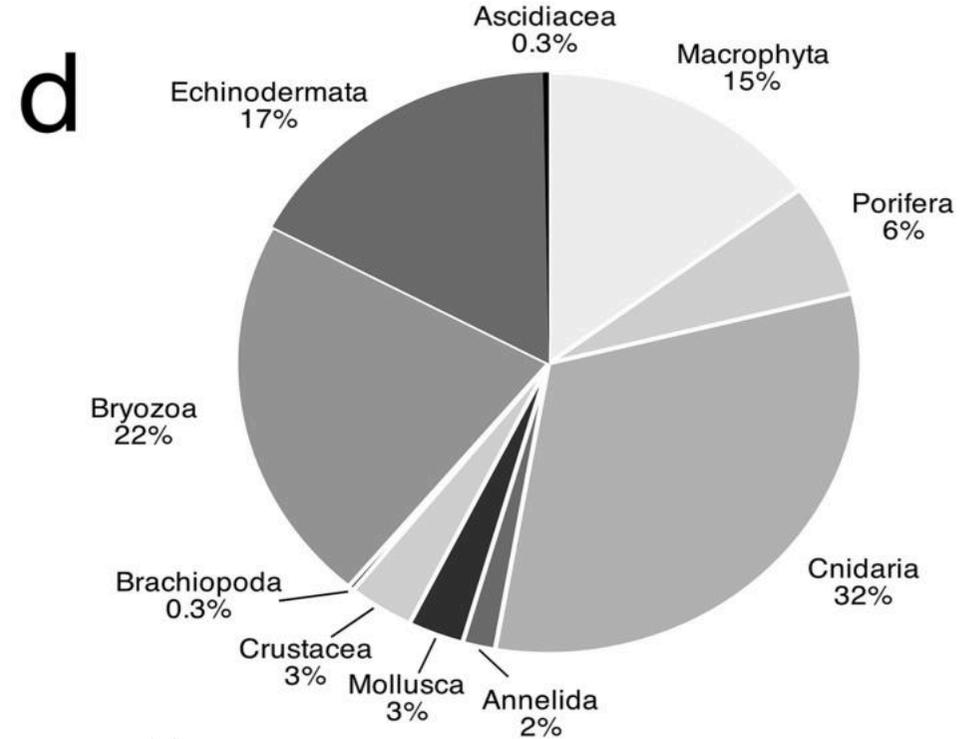
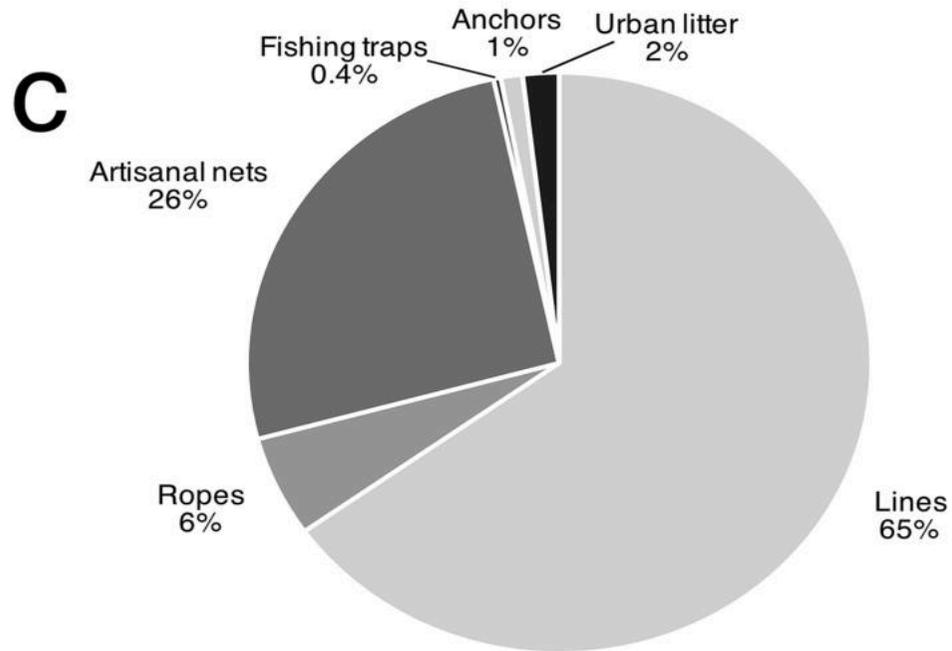
# Threats



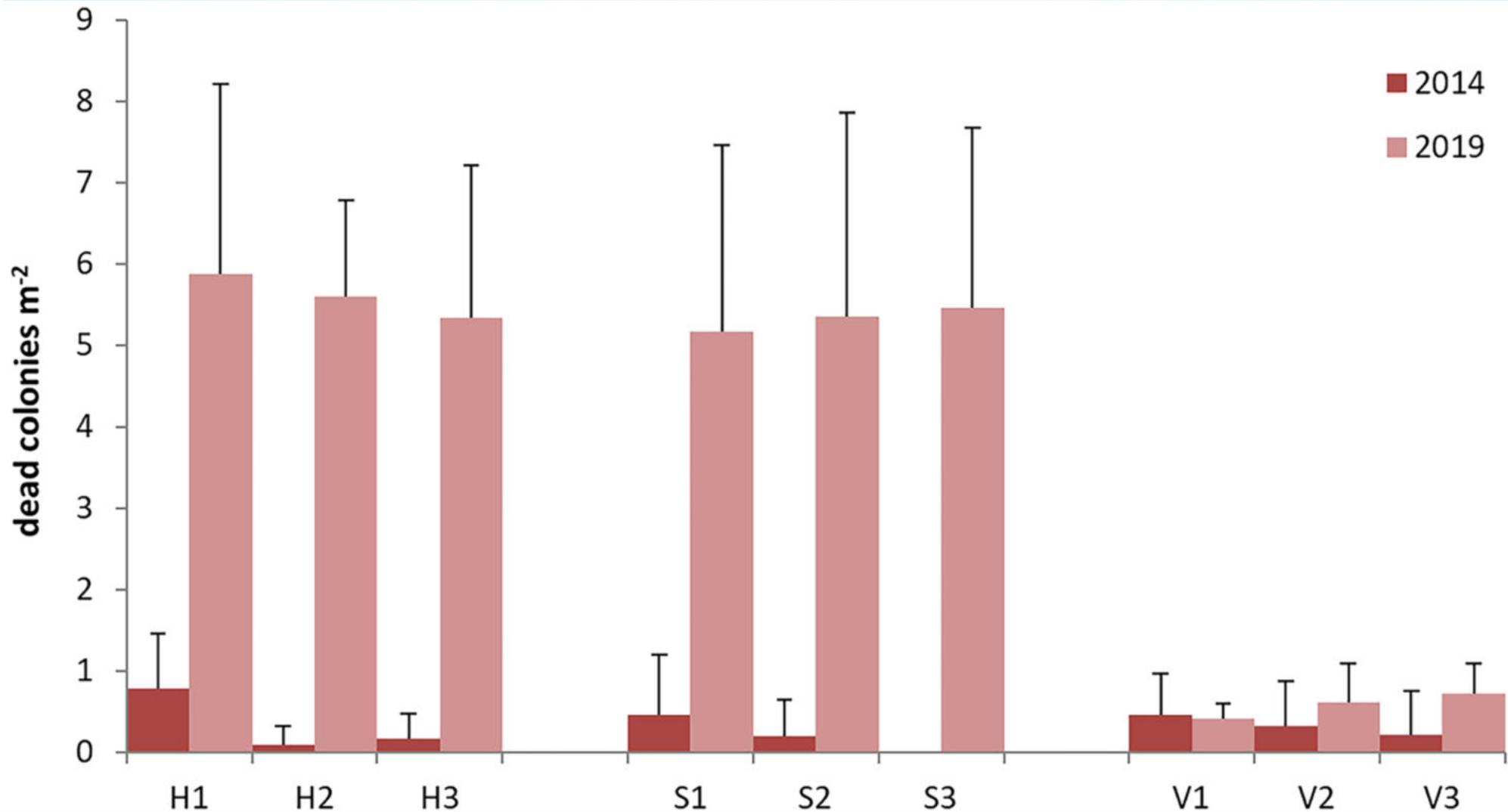
# Threats: trawling



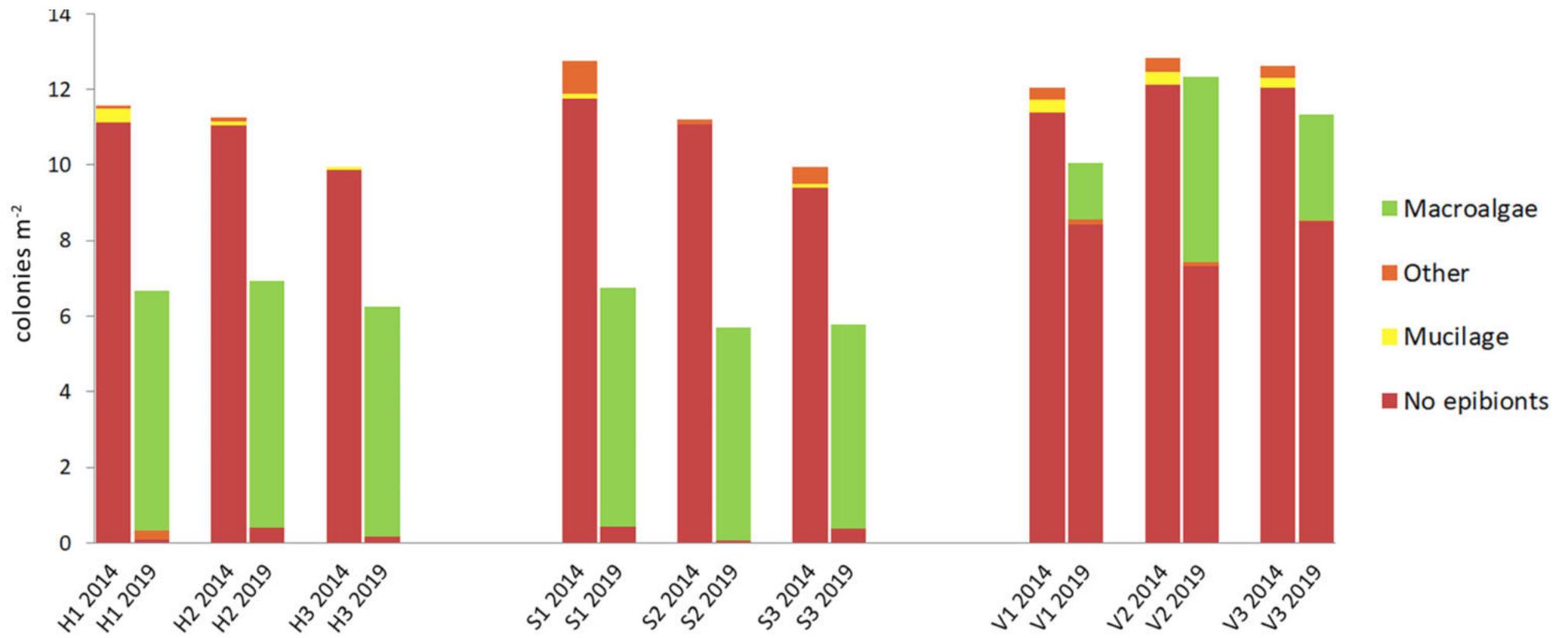
# Threats: trawling



# 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

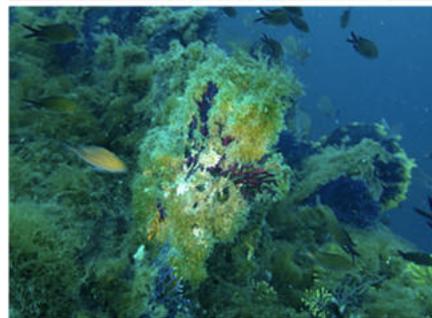
Sub-vertical

Vertical

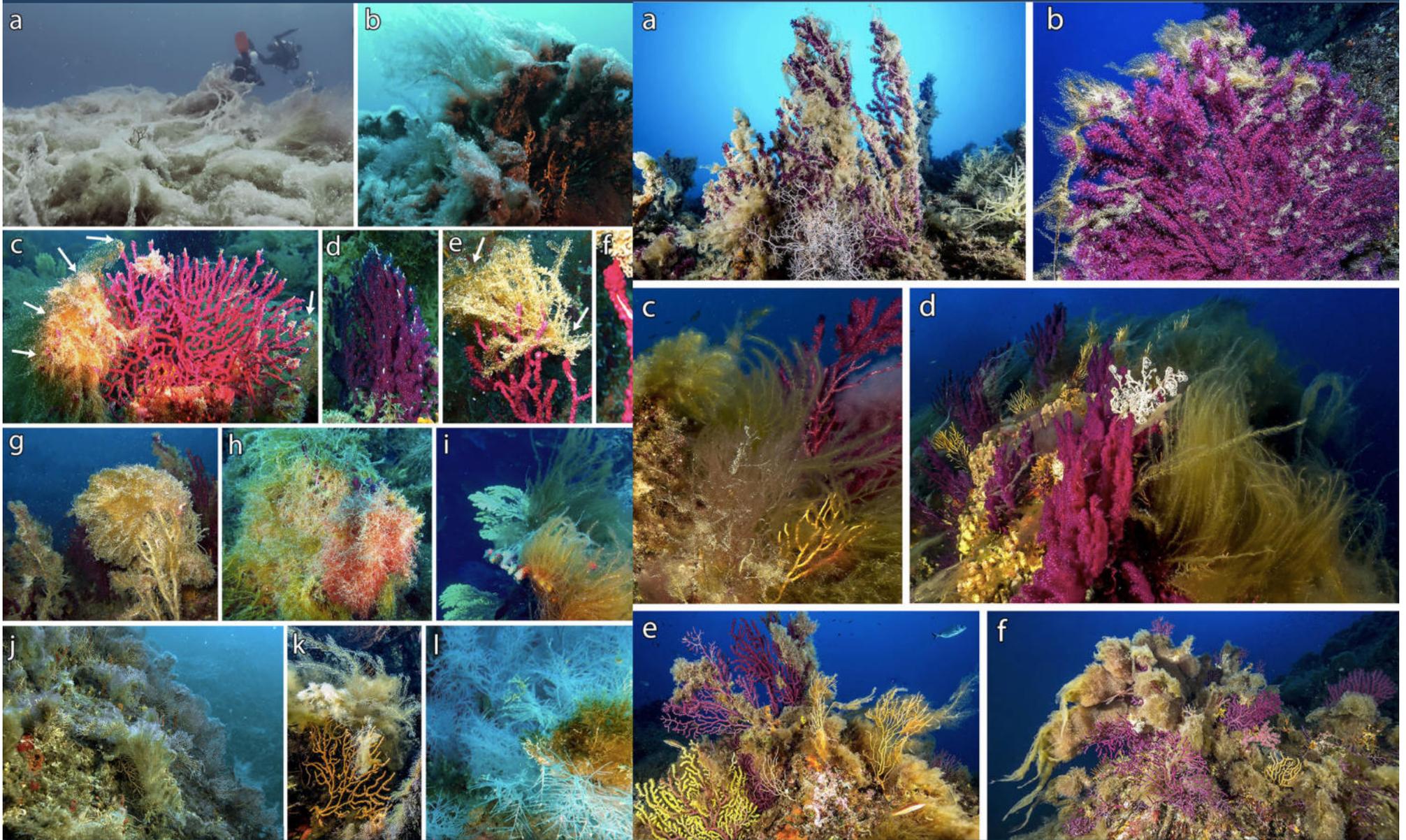
2014



2019



# MMEs



Tremiti Islands

Tuscan Archipelago