

# Climate change impacts on octocoral holobionts: from emerging pathogens to probiotic solutions



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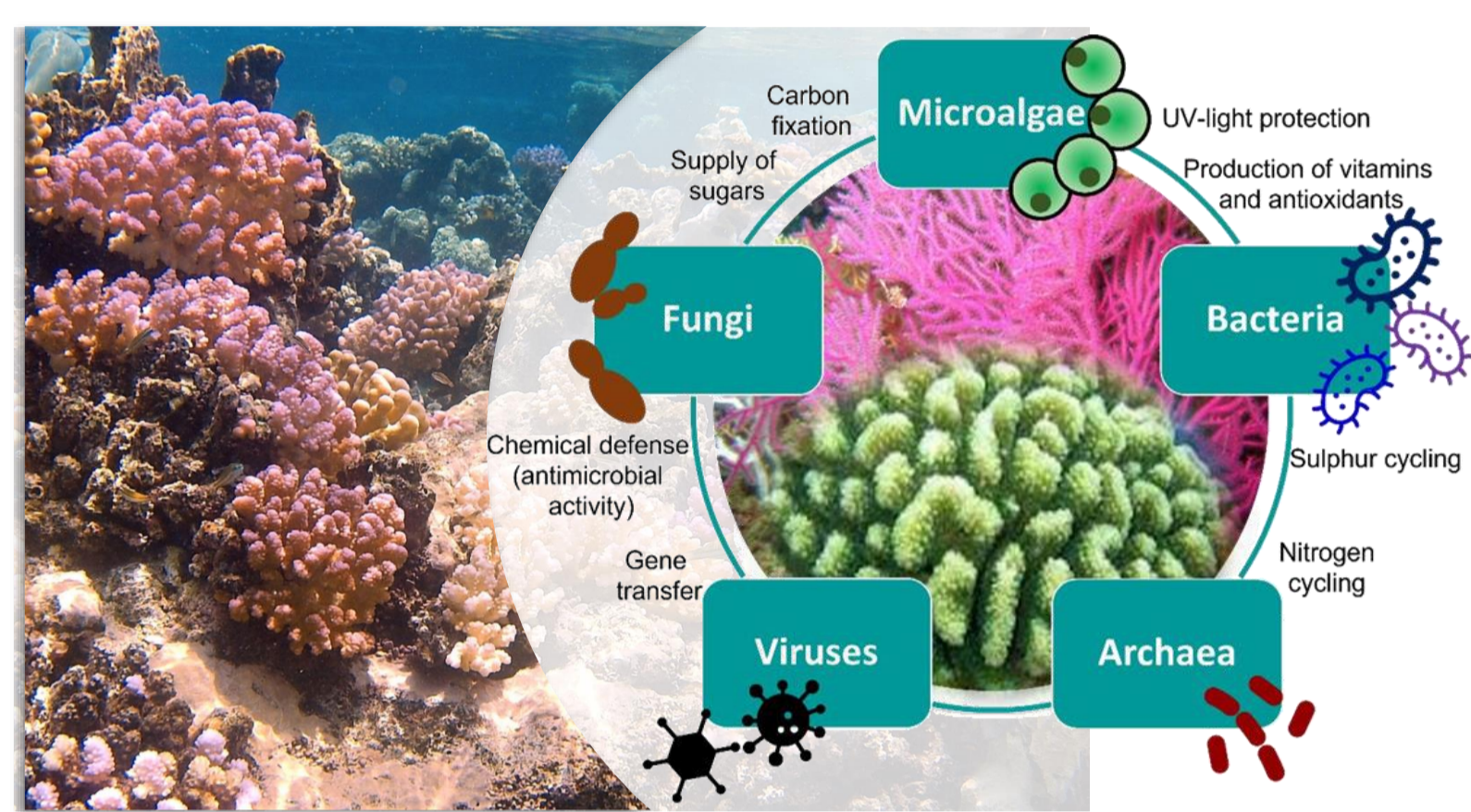
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MIT Portugal  
2024 Annual Conference

## Background



➤ Coral reefs are facing significant pressure due to climate change.

➤ Coral-microbiome interactions play key roles in coral health in climate change scenarios.

➤ BUT the response of octocorals and their microbiomes to climate change-induced stress such as rising temperature and pathogens is not well known.

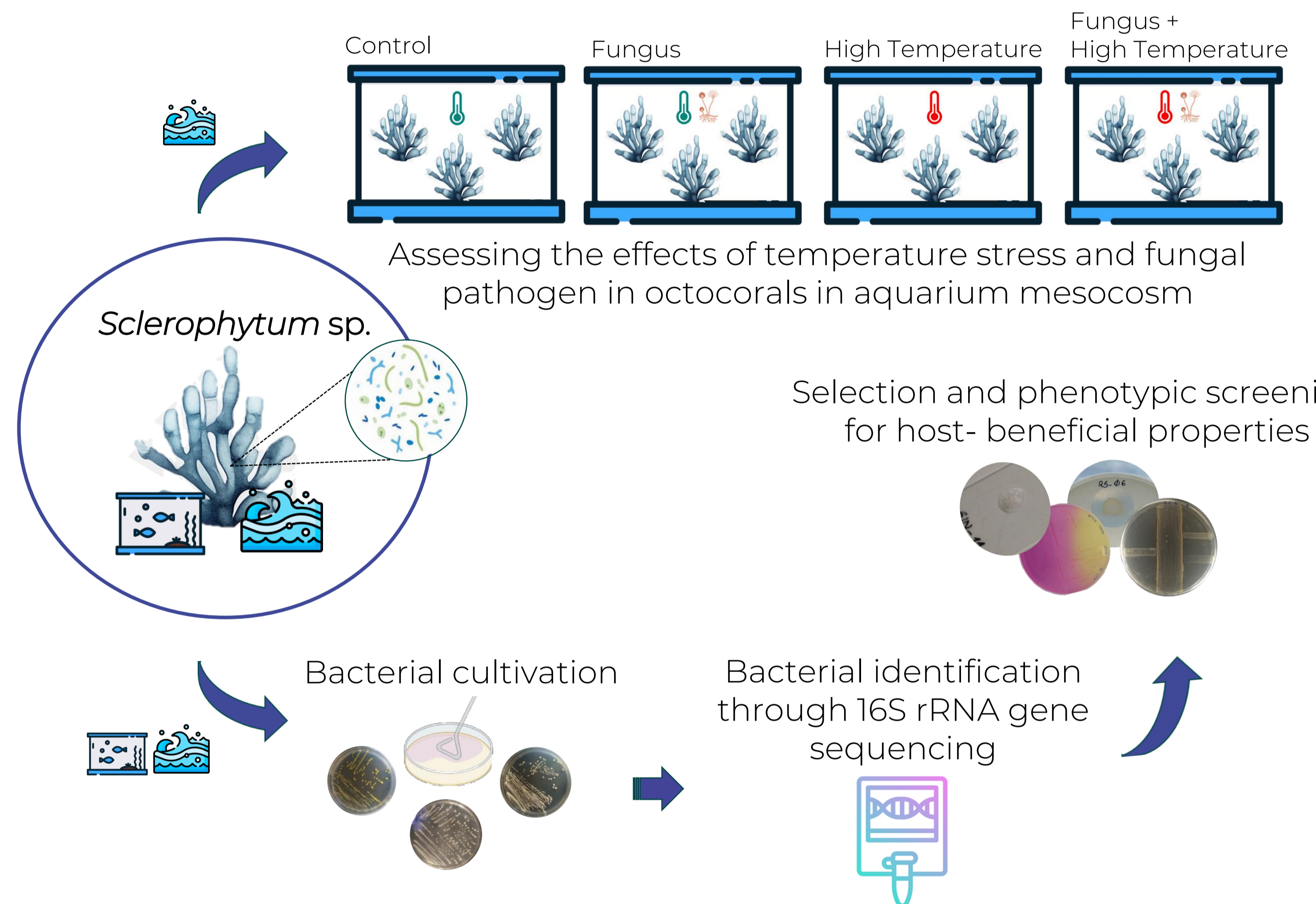
➤ Microbiome manipulation and the use of probiotics can improve coral resilience. However, probiotics for octocorals have never been designed.

Aim:

To examine how octocorals and their microbiomes respond to the synergism between environmental and pathogenic stressors.

To investigate the role of aquarium facilities in octocoral microbiome conservation and the potential benefits of bacterial isolates in mitigating climate change-induced stress.

## Methods

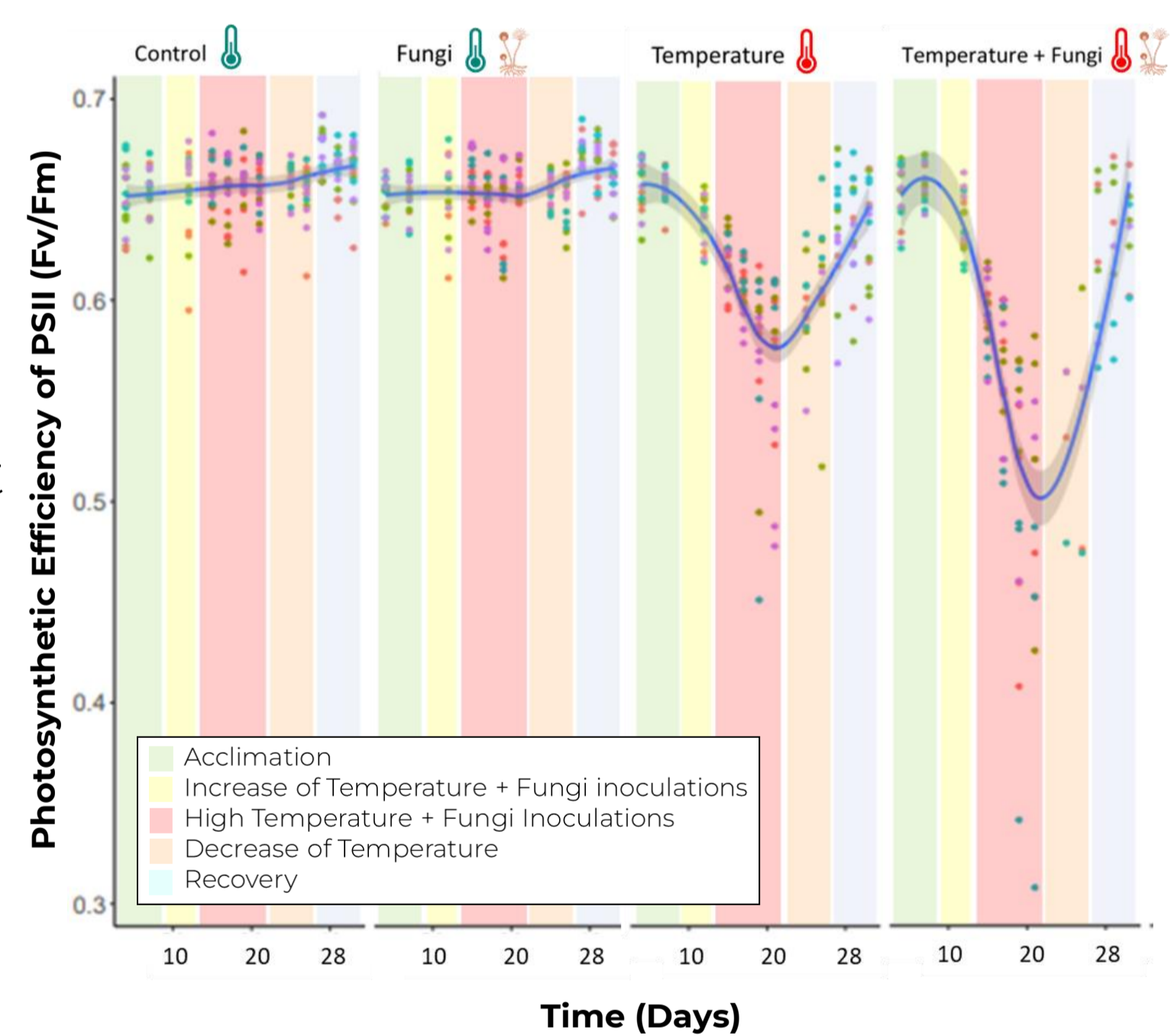


## Results

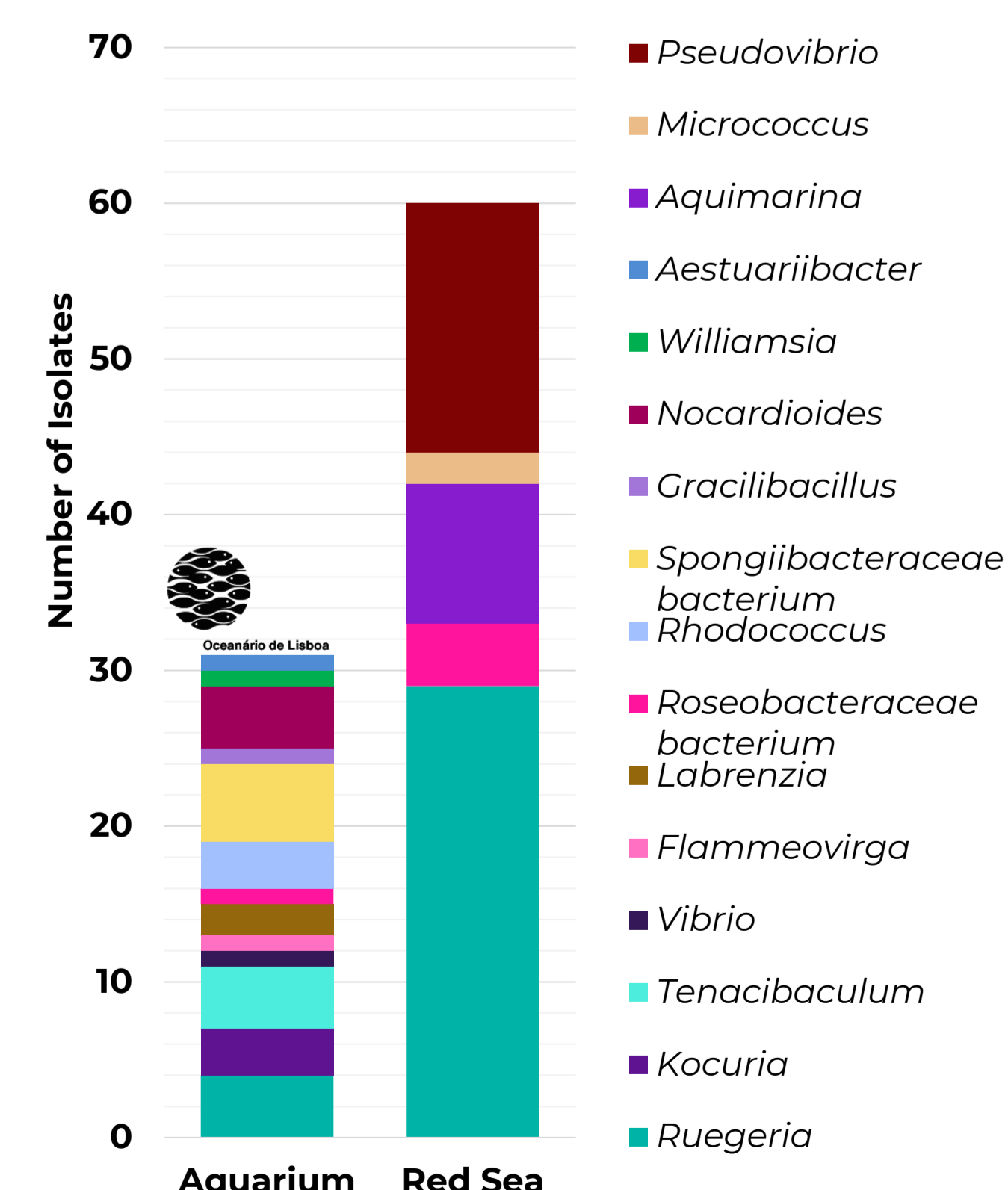
### 1 Aspergillus sydowii is a disease-causing agent in octocoral under increased temperature regimes.

➤ Octocorals exposed to elevated temperatures exhibited a significant decline in photosynthetic efficiency (Fv/Fm).

➤ This decline was exacerbated in the presence of the fungus in the water.



### 2 Man-made ecosystems can serve as effective repositories for maintaining the culturable bacterial fraction of healthy octocoral microbiomes.

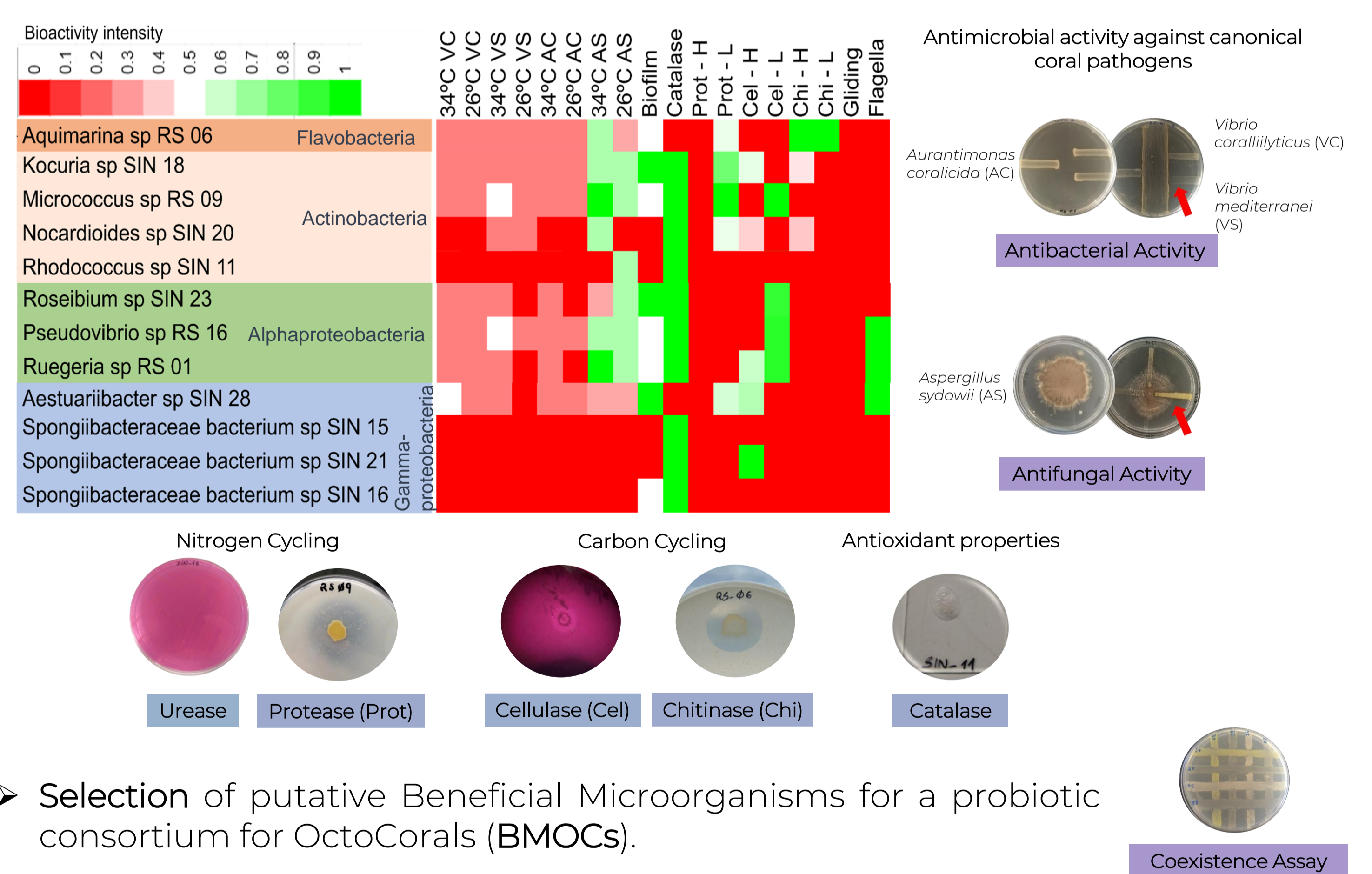


➤ Total of 91 bacterial isolates.

➤ 10 bacterial isolates not classified at genus level, likely presenting new genera in the Roseobacteraceae and Spongiibacteraceae (Cellvibrionales) families.

➤ Sclerophyllum sp. appears to maintain part of its culturable genera, such as Ruegeria and Roseobacteraceae bacterium, in aquarium mesocosms compared to those in the wild (coral reefs in the Red Sea).

### 3 Antimicrobial and enzymatic activities indicate potential beneficial traits to design a putative consortium of Beneficial Microbes for Octocorals.



➤ Selection of putative Beneficial Microorganisms for a probiotic consortium for OctoCorals (BMOCs).

## What comes next:

➤ Cultivation-independent analysis through amplicon sequencing based on 16S rRNA gene for prokaryotes and ITS1-2 region for microeukaryotes of:

- Microbiome dynamics in response to stress;
- Aquarium and wild octocorals.

Data analysis ongoing!

➤ Through mesocosm experiments, validate colonization capacity, safety and efficacy of the putative probiotic consortium against the effect of climate change and pathogenicity combined.

Acknowledgements:



The author acknowledges Elsa Santos, Núria Baylina, MSc. Joana Couceiro, Rita Militão, Daniela Silva, Miguel Viegas, Dr. Helena Villela and Dr. Francisca Garcia for their contributions to this work.

Funded by:

