



Exploring the Marine Sponge Microbiome



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BACKGROUND

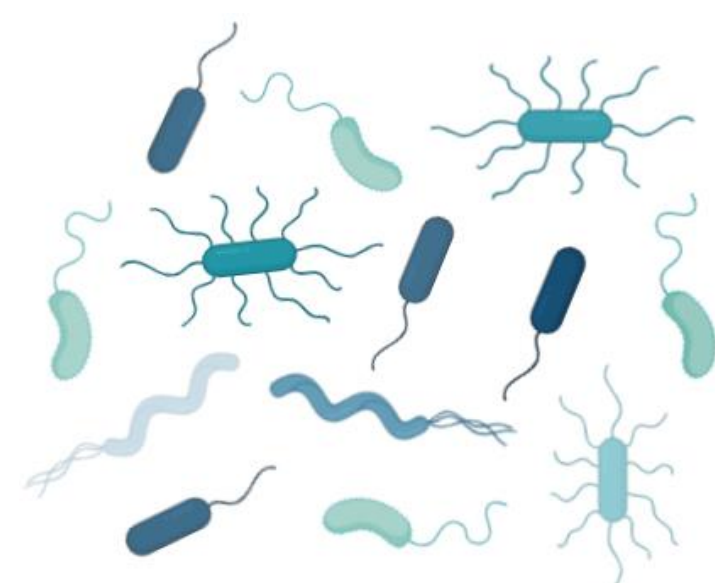
- The microbiome of marine sponges has not been fully explored
- Sponges make interesting natural products and act as an environment for microorganisms to make natural products
- Microbes can account for more than 40% of the biomass of a sponge¹
- Bacteria are a major biological force in the oceanic ecosystem and play significant roles in its health and sustainability²
- We aim to isolate the microorganisms from the sponge and identify the natural products they produce when in competition with each other
- Clathria prolifera*, also known as the red beard sponge, is native to shallow waters in the western Atlantic ocean³



C. prolifera

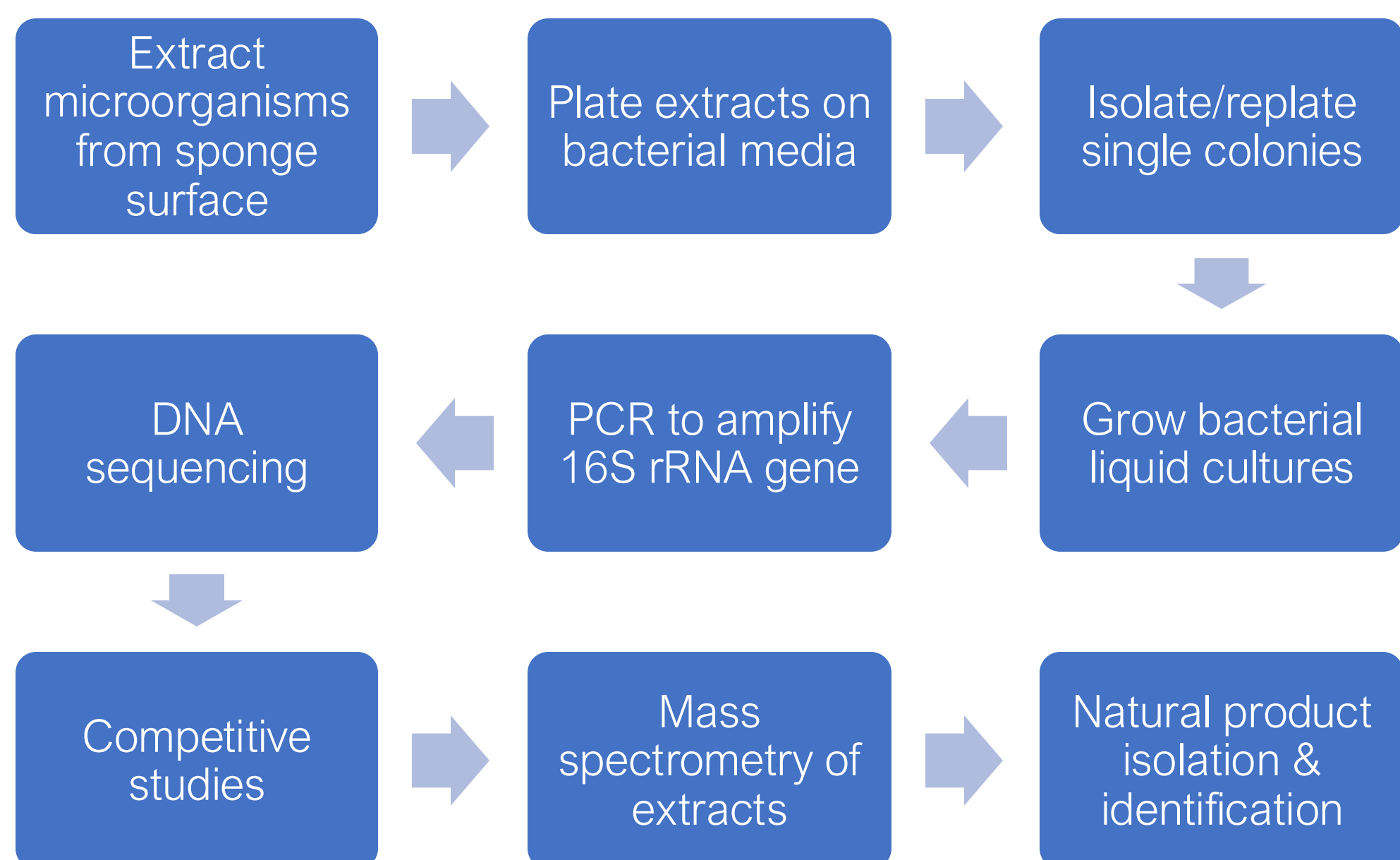
Photo by Andrew N. Cohen

extraction



accessing microbial diversity
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EXPERIMENTAL DESIGN



BACTERIAL ENRICHMENT

Choice of medium influences bacterial growth

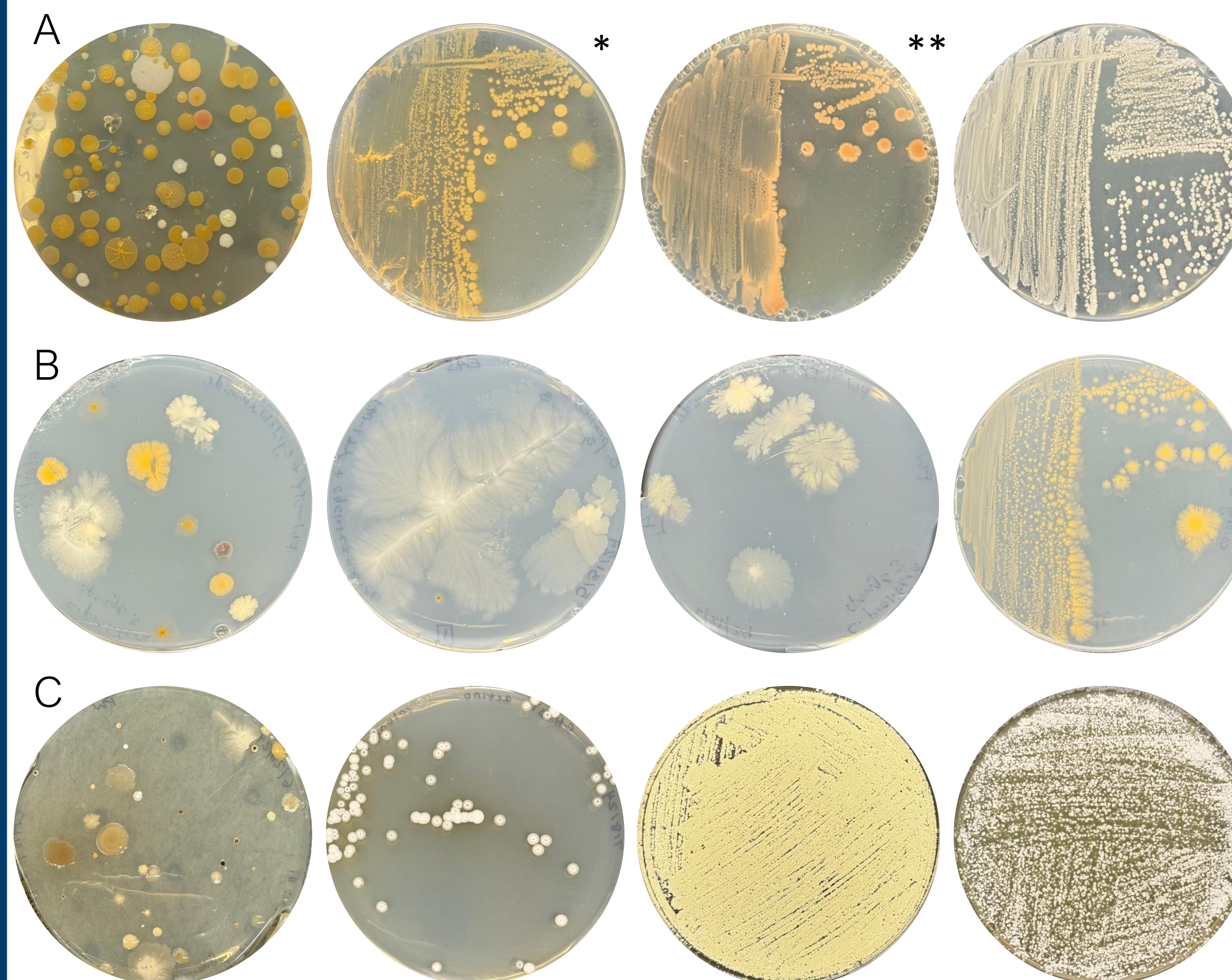


Figure 1.

(A) From left: Sponge extract plated on marine broth; three bacteria from this plate restreaked for purity. (B) From left: Three sponge extracts plated on freshwater medium; far right, single colony restreaked for purity from plate 1. (C) Sponge extract plated on actinomycete enrichment medium; single colonies restreaked for purity.

PCR of 16S rRNA to identify bacteria

- 16S rRNA gene can be used to differentiate species of bacteria
- Sequenced gene and used BLAST to identify species via comparison to known bacterial genomes

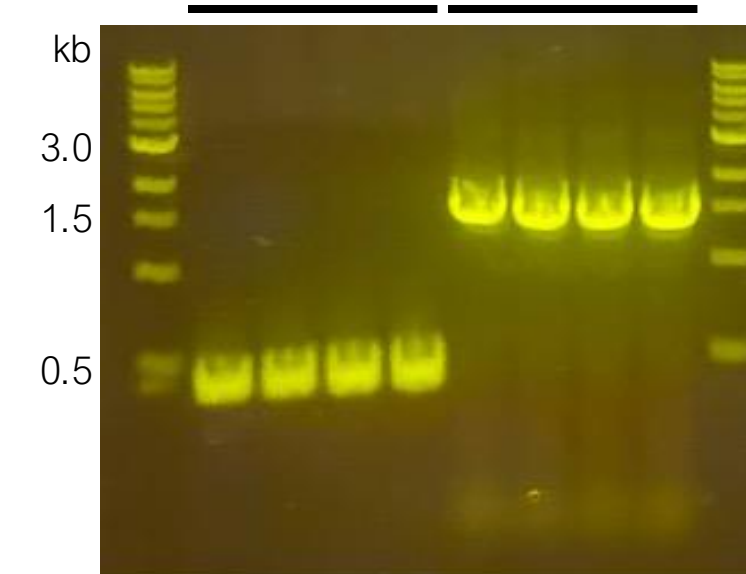


Figure 2. 16S genes confirmed via gel electrophoresis.

Species	* <i>Pseudalkalibacillus hwajinpoensis</i> ⁴	** <i>Rosellomorea vietnamensis</i> ⁴
Color	Orange	Pink
Gram	Positive	Variable
Oxygen tolerance	Aerobe	Aerobe
Shape	Rod-shaped	Rod-shaped
Originally isolated from	Sea water in Korea	Vietnamese fish sauce
Biosafety level	1	1

MICROBIAL FIGHT CLUB

- Inoculated 5 flasks with first bacteria and further inoculated with second (competitive) bacteria
- Future directions include using mass spectrometry to determine if bacteria in competition produce interesting natural products

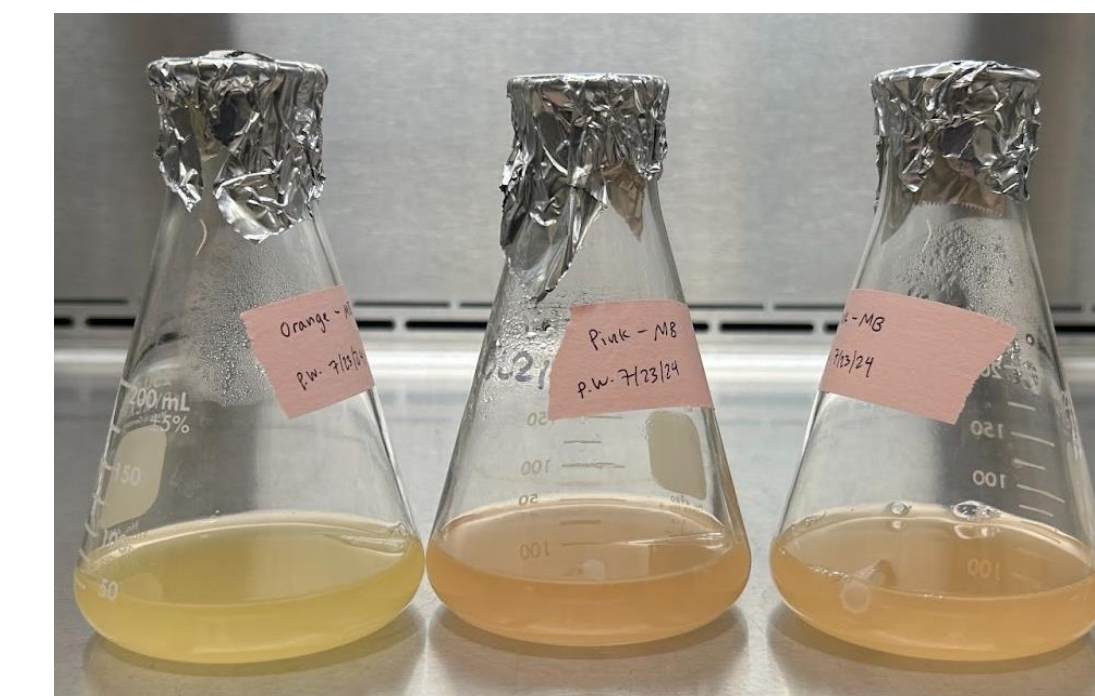


Figure 3. Testing response of microbes in liquid cultures when placed in a competitive environment with a second bacteria.

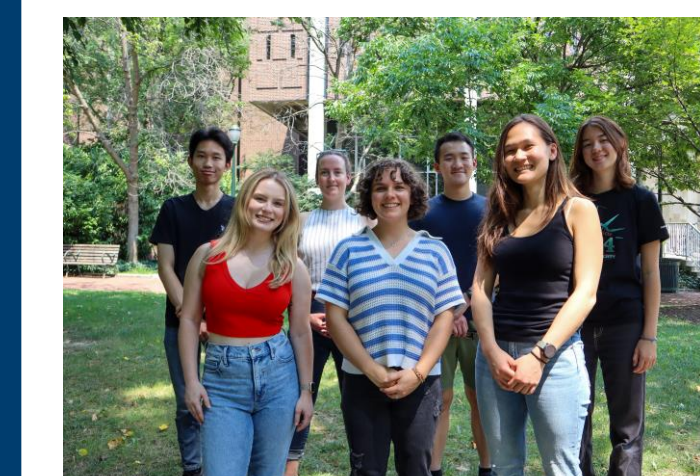
CONCLUSIONS & FUTURE DIRECTIONS

- We isolated multiple *Bacillus* sp. and an actinomycete from the surface of the marine sponge *C. prolifera*
- Continue fight club studies with additional isolated bacteria
- Sequence new strains of bacteria
- Use imaging mass spectrometry to understand the spatial production of metabolites produced by bacteria in competition

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