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Environmental and Anthropogenic Factors Affecting Coral Health

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Environmental and Anthropogenic Factors Affecting Coral Health

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Background

Terms

Microplastics: any plastic less than 5 millimeters in diameter (Hall et al. 2015)

Palythoa corals: species from the *Zoantharia* family from the phylum Cnidaria

Healthy *Palythoa*

Problem

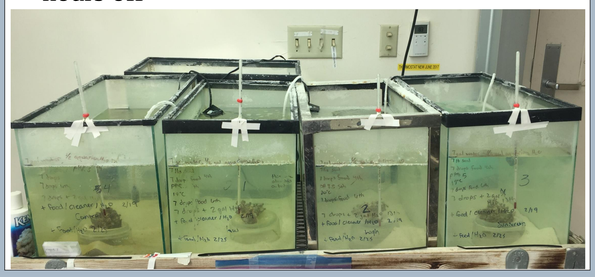
- Plastic pollution in the oceans causing microplastic production
- Microplastic ingestion by marine animals
- Corals cannot digest real food after ingesting plastic (Hall et al. 2015)
- Toxic chemicals (oxybenzone, octinoxate) from sunscreen poison marine life
- Sunscreen causes bleaching and promotes infections in corals (Danovaro et al. 2008)

Methods

Phase 1

Tank 1: Low microplastic (0.198 g/L)
Tank 2: High microplastic (0.395 g/L) (Hall et al. 2015)
Tank 3: Sunscreen (0.03 g)
Tank 4: Control

- 7 gallons of salt water + 7 pounds of live reef sand
- Corals were checked and measured every day
- Coral food was added 3 times a week
- Kept on a light cycle of 12 hours on and 12 hours off



Methods Continued

Phase 2

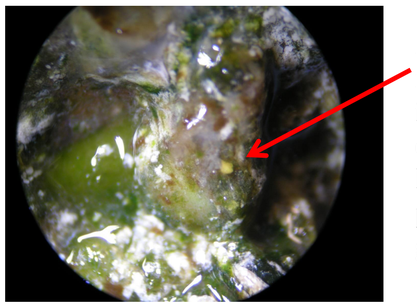
4 tanks: Control
4 tanks: Low plastic (0.099g/L)
4 tanks: High plastic (0.395 g/L)
4 tanks: Coral safe sunscreen (0.03g)

- 16 tanks with 1 gallon of salt water and 5 mLs of Stress Zyme (beneficial bacteria)
- Treatment tanks were randomized
- Corals were checked and measured every day and fed 3 times a week
- Kept on a light cycle of 12 hours on and 12 hours off

- Discoloration = white patches forming on polyps
- Death = no response to touch stimulus
- Slime = sign of stress

*pH, temperature, and salinity checked daily

Phase 1 Results

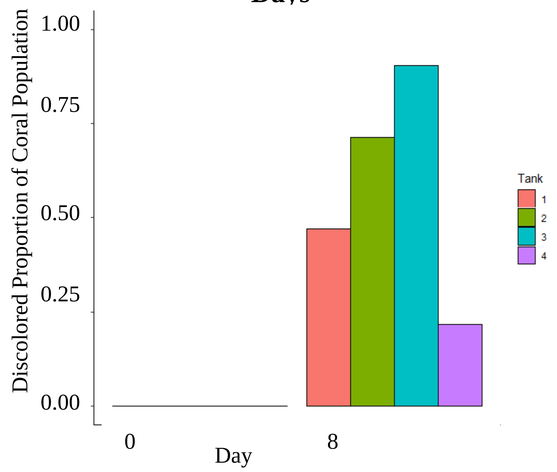


Plastic found inside coral in low plastic group

Use of dissecting scope to look inside corals

Phase 1 Results

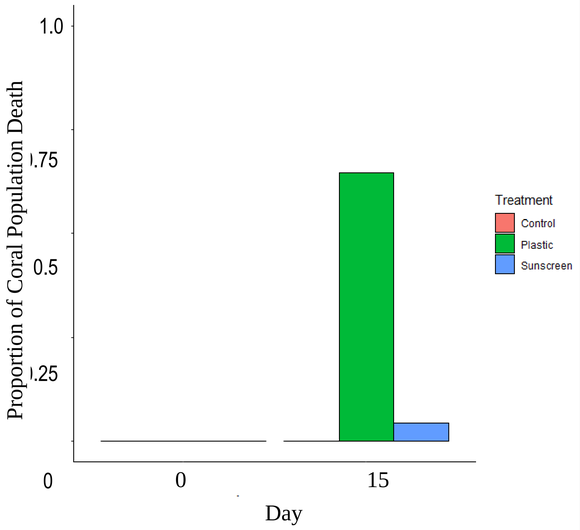
Proportion of Coral Discoloration After 8 Days



Tanks: 1 = low, 2 = high , 3 = sunscreen , 4 = control
X-squared = 22.991, df = 3, p-value = 4.056e-05

Phase 2 Results

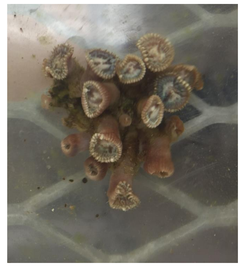
Proportion of Dead Corals Per Treatment After 15 Days



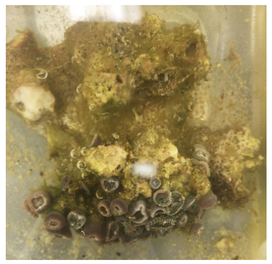
Comparing death for control vs sunscreen
X-squared = 0.033537, df = 1, p-value = 0.8547

Comparing death for control and sunscreen vs plastic exposure:
X-squared = 9.9655, df = 1, p-value = 0.001595

Phase 2 Results



Healthy Coral
Pink, fleshy color
Polyps opened
No slime or algae



Unhealthy Coral
Discoloration
Slime bubbles emitted
Algae growth
Plastic entanglement

*All statistics produced with R Studio

Future Actions

•Research on possible solutions
•Education for the public on the issue and ways they can help
•Ocean cleanups
•Coral safe sunscreen
•Plastic free alternatives

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Danovaro, R., Bongiorni, L., Corinaldesi, C., Giovannelli, D., Damiani, E., Astolfi, P., Greci, L., and A. Pusceddu (2008). Sunscreens cause coral bleaching by promoting viral infections. Environmental Health Perspectives **116**: 441-447

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