

IMMUNE GENE ABUNDANCE DOES NOT EXPLAIN SUSCEPTIBILITY TO SEA STAR WASTING DISEASE

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Advised by Steven Roberts

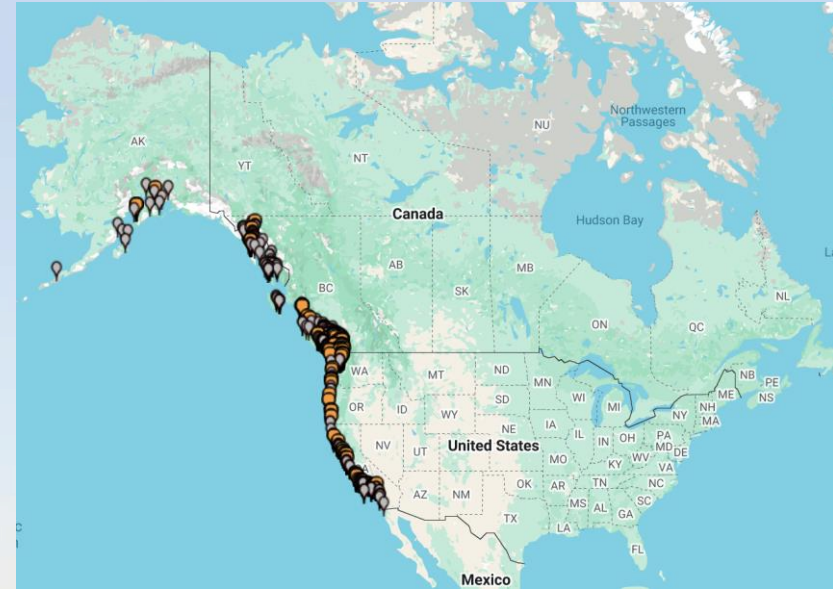
Echinoderm Immunity

- Echinoderms have an innate immune system (Smith, 2012).
- Critical system that allows them to identify and eliminate foreign pathogens.



Sea Star Wasting Disease

- Over 20 species of sea stars have been affected by SSWD from Alaska to Baja California, Mexico (Harvell et al., 2019; Hewson et al., 2014).
- Disease progression is characterized by dermal lesions, limb autotomy, eventual mortality.



M. Miner

Differences in Susceptibility to SSWD



Sunflower Star (*Pycnopodia helianthoides*)



Ochre Star (*Pisaster ochraceus*)



Leather Star (*Dermasterias imbricata*)

Ecosystem Effects



Objectives

Why are some species of sea stars more susceptible to SSWD than others?

Specifically, is susceptibility associated with immune-related gene abundance?

Methods

Annotated sea star genomes





Mapped GO terms to high level GO-Slim categories





Compared abundance of immune-related genes across species

Results:

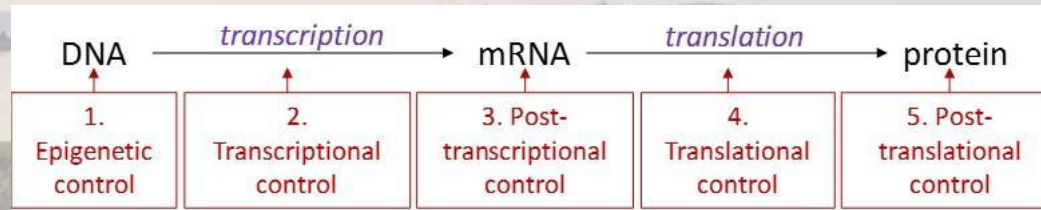
Species	Standardized Residuals		
	Defense Response	Immune System Process	Reproductive Process
	Dark Blue	Dark Blue	Brown
	Dark Blue	Dark Blue	Orange
	Brown	Brown	Dark Blue

Results:

Species	Standardized Residuals		
	Defense Response	Immune System Process	Reproductive Process
	-0.61	-0.67	1.59
	-3.80	-2.52	0.87

What does this mean?

- Immune gene abundance DOES NOT explain susceptibility.



- Regulation and expression of immune related genes likely plays a more important role in susceptibility.

Where do we go from here?



- Multiple opportunities for future research.
- Changes the way we think about susceptibility.
- Focus on regulation and expression of genes rather than abundance.

Questions?

- Thank you to Steven Roberts for his expertise and guidance throughout this project.

