Comparing Regional Population Genetic Effects in *Leptasterias* spp.

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Introduction

Leptasterias spp. is a species complex of six-rayed intertidal sea stars found along the northeast Pacific coast. The developmental mode of brooding, rather than freespawning, their young may enhance survival and developmental rate[1], and may also result in local adaptation of populations[2]. Local adaptation may lead to morphological and behavioral differences.

Previous studies on behavior in *Leptasterias* spp. have shown that levels of activity may vary by population and region[3]. Of the three regions studied, no significant difference in activity level was identified between Washington and northern California stars, yet a significant difference was identified between central California stars in comparison to Washington and northern California.

To test for a clade level genetic relationship to behavioral patterns, mitochondrial DNA barcoding was used to identify cryptic species in order to determine if there is a correlation between behavior and species identification.
Sequenced stars were compared to reference sequences from NCBI and the Cohen lab (related to ongoing studies[4] (Melroy et al. 2017; Melroy 2016; N. Jaffe, J. Perez, unpub. data).

Figure 1. (A) *Leptasterias* spp. (generally 2-5 cm tip to tip). (B) Oral view of developing embryos held in brooding location by a female *Leptasterias* spp. Photos: Cohen Lab members.

References

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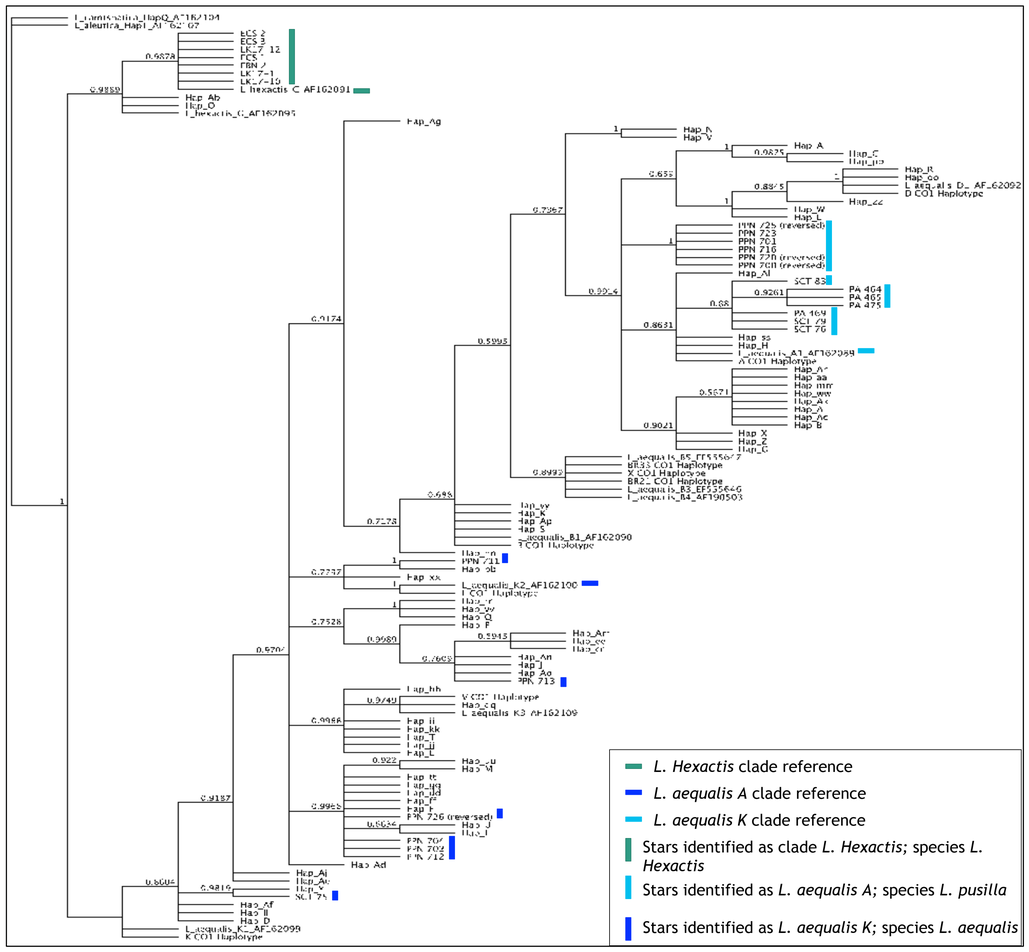
Research Question

Do different cryptic species or clades of *Leptasterias* spp. have different activity levels?

Results

In the three regions studied, stars were identified as being from three different clades. The three species-level clades identified are *L. hexactis*, *L. aequalis*, and *L. pusilla*. All stars from Washington (n = 7) were sequenced and identified as *L. hexactis*. Northern California stars were sequenced and identified as either *L. aequalis* (n = 1) or *L. pusilla* (n = 7). Central California stars were sequenced and identified as *L. aequalis* (n = 6) or *L. pusilla* (n = 6).



Methods

DNA from arm tip and tube feet tissue samples were extracted from stars found in intertidal sites from three regions; Washington, northern California, and central California. Tissue samples were processed in the Estuary and Ocean Science Center, SFSU Genetics Lab. The following genetic methods were conducted:

- DNA extraction with Nucleospin columns
- PCR amplification of CO1
- Gel electrophoretic visualization of PCR products
- DNA Sanger Sequencing of CO1
- Bayesian Phylogenetic Tree Analysis (MrBayes[6], MEGA[7])

Discussion

Regional differences in clade composition and species composition were observed between Washington stars and stars from California however, no difference in clade composition or species composition was observed between northern and central California.

Of the three regions studied in previous behavior experiments, only stars from central California showed a significant difference in activity level in comparison to the other two regions, which were similar to each other. These findings and the corresponding genetic analysis suggest that clade and species composition is not a sole determinant of activity levels in *Leptasterias* spp. Other factors of interest to study that may affect activity level include microhabitat, prey availability, and localized abiotic conditions.

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