Escape responses of four Chilean intertidal limpets to seastars

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Abstract

The Chilean intertidal Lottiidae limpet fauna consists of at least nine species, grouped into the monophyletic taxon *Scurria* and a single taxon preliminarily designated as `*Lottia*' *orbignyi*(Dall). Within the *Scurria* clade, the most basal species are *Scurria variabilis* (Sowerby), *S. viridula* (Lamarck), and *S.zebrina* (Lesson), and among the most crown groups are *S. ceciliana*(Orbigny) and *S. araucana* (Orbigny). This phylogenetic information, obtained by the analysis of molecular characters (16S mtDNA), provides a framework for a comparative study of behavioral characters. In this study, we analyze the escape responses of two basal limpet species (`*L.*' *orbignyi* and *S. viridula*) and two derived limpet species (*S. araucana* and *S. ceciliana*) in the presence of the limpet predatory seastar *Heliaster helianthus* (Lamarck) and the limpet non-predatory seastars *Stichaster striatus* Muller and Troschel and *Patiria chilensis*Lutken. Neither *P.chilensis* nor *Stichaster striatus* induced escape responses such as those observed with the predatory *H. helianthus*. Moreover, in the presence of *H. helianthus*, basal and derived limpet species differed significantly in the percentage of individuals responding, reaction time, and duration of the response. The basal species `*L.*' *orbignyi* and *Scurriaviridula* exhibited instantaneous and vigorous locomotor responses, whereas the derived species *S. araucana* and *S. ceciliana* displayed no locomotor responses. The same pattern was found in responses to *H. helianthus* homogenates. The results strongly suggest a correlation between phylogeny and anti-predator escape responses to the seastar *H. helianthus*. Alternative escape responses have evolved for basal and derived species within the Chilean clade.

Keywords

Reaction Time, Escape Response, Phylogentic Information, Locomotor Response, Basal Species