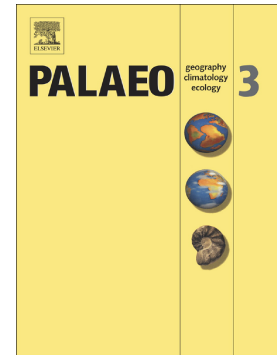


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Nadia D. Pierrehumbert, Warren D. Allmon



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## Morphology of crab predation scars on Recent and fossil turritellid gastropods

Nadia D. Pierrehumbert<sup>a,b</sup> and Warren D. Allmon<sup>a,c</sup>

<sup>a</sup> *Department of Earth and Atmospheric Sciences, Cornell University, Ithaca, New York 14853 USA*

<sup>b</sup> *Present address: Department of the Geophysical Sciences, The University of Chicago, Chicago, Illinois 60637 USA*

<sup>c</sup> *Paleontological Research Institution, 1259 Trumansburg Road, Ithaca, New York 14850 USA*

### ABSTRACT

When nonlethal attempted predation breaks the aperture of a gastropod shell, the break is preserved as a scar which is frequently visible in the fossil record. Such scars are very frequently observed on fossil and living Turritellidae, a family of high-spired marine gastropods, but little is known about which predators make such scars or how they do so. If the form of these scars on fossil shells could be better interpreted biologically, a large data set of predation scars might become available for analysis. We experimented with live turritellids (*Turritella banksi*) and four species of crabs from the family Xanthidae (*Panopeus* sp., *Eurypanopeus planus*, *Leptodius taboganus*, and *Xanthodius sternberghii*) in Panama in order to investigate factors contributing to the breakage morphology resulting from crab predation on turritellid shells. Qualitative examination of scar morphology resulting from attacks by different crab species shows that particular crab species can cause distinctively-shaped scars, although some shapes of scars can be created by more than one crab species. Multivariate analysis of these scars reveals that scar morphologies arising from different crab species fall on overlapping continua in morphospace. Incorporating the shapes of fossil scars into these analyses reveals that fossil scars are similar to many of those created in the aquaria, and that scar shape can be accurately predicted by predator species. In particular, scars caused by *Panopeus* can be very similar to some fossil scars. Although the particular crab species used in the experiments probably do not prey on turritellids in the wild, the data on causes of break scar morphology and crab-turritellid predation behavior allows information of predation stored in the scars on fossil turritellids to be used to explore the history of predation on this important group of gastropods.

### 1. Introduction

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