

Sample annotated bibliography entry:

Tull, D. S. and K. Böhning-Gaese. 1993. Patterns of drilling predation on gastropods of the family Turritellidae in the Gulf of California. *Paleobiology* **19**: 476-486.

The authors examined predation by predatory gastropods on two other species of gastropods, *Turritella leucostoma* and *T. gonostoma* by comparing drill holes in shells washed up on a beach in Mexico. Although shell thickness was positively related to shell length in both species, *T. leucostoma* had thinner shells and were preyed upon more frequently than *T. gonostoma*. Across both species, smaller shells were drilled more frequently than larger shells. Thus, the authors' within-species comparison revealed an effect of shell length (which was correlated with shell thickness), while their between-species comparison showed an effect of shell thickness independent of shell length.

I will use their paper as evidence that shell thickness may affect a shell's susceptibility to predation. This will provide support for my hypothesis that shell thickness differs between shells with and without evidence of predation. Because their study focused on gastropod prey, while we studied bivalves, I will be able to compare our results on the effects of shell thickness and size with the results from another group of mollusks. Finally, because they found a positive relationship between shell length and thickness, this agrees with our finding of a positive relationship between shell width and thickness and also justifies our use of shell width as a covariate in comparing thickness of shells with and without drill holes.

Some important features illustrated by this example:

- The citation is properly formatted, following the style used by the journal *Ecology*.
- The description of the article provides details that are relevant to my topic. This description is in my own words. It is not directly lifted from their article or abstract, nor is it a rearrangement of words and phrases taken from their article or abstract.*
- The description of how the article will be related to my work is very specific. It clearly explains *how* this article is relevant, rather than just asserting that the findings are relevant. It discusses the particular aspects of their study that I will relate to certain features of my study.
- The article is from the primary literature (i.e., it describes new research rather than providing an overview of previous research). The first page of the full-text article is provided; printing out the abstract from a database is not enough.

* see course website for guidelines for paraphrasing.

Patterns of drilling predation on gastropods of the family Turritellidae in the Gulf of California

Debra S. Tull and Katrin Böhning-Gaese

Abstract.—Predatory marine snails and their prey provide a unique look at many aspects of predation events, allowing behavioral inference and studies of coevolution. This study examines differential predation patterns, rates, and success of two co-occurring gastropod predator families which drill two co-occurring species of *Turritella* (Turritellidae: Gastropoda) in the Gulf of California. Both naticid and muricid predators, identified by the shapes of their respective boreholes, attacked the thinner-shelled *Turritella leucostoma* more frequently than the thicker-shelled *Turritella gonostoma*. Both species were drilled more frequently and more successfully by naticid, as compared to muricid, predators. Naticids drilled prey in the 40- to 70-mm size class most frequently. Prey over 100 mm in length were relatively safe from all drilling predators. Predator size (estimated by borehole diameter) in naticids was correlated with prey size in both species, but for a given-sized prey, predators on *T. gonostoma* were proportionally larger. There was no size correlation for muricid predators. Unsuccessful attempts (incomplete drilling) were started on the suture more often than were completed holes, for both predator families on both prey species. Naticids began drilling *T. leucostoma* on the suture significantly less than expected by chance. We looked for possible changes over evolutionary time by analyzing prey shells from Pleistocene and Recent storm deposits. We found no evidence of change in any aspect of implied predatory behavior over the past 100 k.y.

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Introduction

Predator-prey interactions are thought to play a major role in the organization of communities and the coevolution of species (Boucher 1985; Endler 1991). Predatory marine snails and their prey are ideal for addressing questions about coevolutionary processes because both the prey and the predatory event are well preserved as fossils (Boucot 1990; Kitchell et al. 1981). Many predatory snails kill their prey by drilling holes through their shells. The resulting borehole yields fairly detailed information about the size and identity of the predator involved, as well as information regarding patterns of successful and unsuccessful attempts (Palmer 1990; Kitchell et al. 1981). Differences in borehole shape allow the predator to be identified to the familial level by the shape of the drill hole (Carriker and Yochelson 1968). The most important families of drilling gastropod predators are the Naticidae and Muricidae. Naticid snails drill a characteristically tapered (parabolic) hole, while muricids drill holes

with nearly straight sides (fig. 1; Carriker 1981; Carriker and Yochelson 1968). Kitchell et al. (1981) found that both inner and outer diameter of tapered, naticid boreholes in bivalve prey correlated well with predator size. Palmer (1988, 1990) found the same correlation in muricid boreholes for both hatchlings and adults feeding on barnacles and limpets, respectively. Another advantage of this predator-prey system is that it allows the investigator to determine if the predator was successful in its attack (Palmer 1988). Unsuccessful attempts are those which do not completely penetrate the shell, while complete holes can be considered successful attacks.

We studied drilling predation on two species of the genus *Turritella* (Turritellidae), a group of soft-bottom, shallow-water, suspension-feeding snails. The two species co-occur on a regional level and have been found to occupy identical microhabitats (Allmon 1988). From the shapes of the drill holes we could conclude that both naticids and muricids were important predators of both prey species.