

The trade-off between investment in weapons and fertility is mediated through spermatogenesis in the leaf-footed cactus bug *Narnia femorata*

Katelyn Cavender¹, Tessa Ricker², Mackenzie Lyon¹, Emily Shelby¹, Christine Miller², and Patricia Moore¹

¹University of Georgia College of Agricultural and Environmental Sciences

²University of Florida College of Agricultural and Life Sciences

January 12, 2021

Abstract

Males have the ability to compete for fertilizations through both pre-copulatory and post-copulatory intrasexual competition. Pre-copulatory competition has selected for large weapons and other adaptations to maximize access to females and mating opportunities while post-copulatory competition has resulted in ejaculate adaptations to maximize fertilization success. Negative associations between these strategies support the hypothesis that there is a trade-off between success at pre- and post-copulatory mating success. Recently, this trade-off has been demonstrated with experimental manipulation. Male leaf-footed cactus bugs, *Narnia femorata*, that lose a weapon by autotomy during development invest instead in large testes. While evolutionary outcomes of the trade-offs between pre- and post-copulatory strategies have been identified, less work has been done to identify proximate mechanisms by which the trade-off might occur, perhaps because the systems in which the trade-offs have been investigated are not ones that have the molecular tools required for exploring mechanism. Here we applied knowledge from a related model species for which we have developmental knowledge and molecular tools, the milkweed bug *Oncopeltus fasciatus*, to investigate the proximate mechanism by which autotomized *N. femorata* males developed larger testes. Autotomized males had evidence of a higher rate of transit amplification divisions in the spermatogonia, which would result in greater sperm numbers. Identification of mechanisms underlying a trade-off can help our understanding of the direction and constraints on evolutionary trajectories and thus the evolutionary potential under multiple forms of selection.

Hosted file

Narnia Testes manuscript Dec23.pdf available at <https://authorea.com/users/388927/articles/503662-the-trade-off-between-investment-in-weapons-and-fertility-is-mediated-through-spermatogenesis-in-the-leaf-footed-cactus-bug-narnia-femorata>