

Foraging differences between sexes in (*Ambystoma tigrinum nebulosum*).

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Abstract

Many studies have looked at intraspecific competition between larva and adults, paedomorphic and metamorphic *Ambystoma tigrinum*. None, however, have looked at male vs. female competition. In this experiment, twelve females and twelve male tiger salamanders were observed foraging for caddisfly larva and snails. We used six females and six males for each trail. There were no significant differences in foraging efficiency between sexes, although body condition was significantly higher for females. Females may therefore be maximizing body size through other methods, or may forage more efficiently for prey types not used in this study.

Introduction

Trivers' 1972 paper argues that for females of many species, reproductive success is limited by the time and effort required to garner and transfer energy to offspring and to protect and care for them (Bateman, 1949; Trivers, 1972), whereas male reproductive success is limited by the number of matings with fertile partners. As female reproductive success is dependent on resources assimilated, we would predict that females are superior to males in finding and capturing prey.

In the *A. tigrinum* population, many studies have looked at competition between larva and adults. One of the experiments was between paedomorphic and metamorphic polymorphisms adults (Whiteman, Wissinger and Brown, 1996). Whiteman, Wissinger and Brown (1996) argue that metamorphs have a larger body mass and SVL than

peadomorphs because of their diet. The metamorphs diet primarily consisted of fairy shrimp whereas peadomorphic diets contained a variety of benthic and terrestrial invertebrates. Metamorphs had better fitness due to their ability to move to more productive ponds. The other studies deal with larval competition (Whiteman 1997, Johnson, Bierzychudek and Whiteman 2003). Johnson, Bierzychudek and Whiteman 2003 argue that larger tiger salamander larvae out compete smaller tiger larva for larger prey items, and the small tiger salamander larva out compete larger tigers salamanders for smaller prey items. This difference in competition is brought on by the need for the larger salamanders to have more metabolic energy then the smaller tiger salamanders because of their size. None of the above studies, however, have looked at male vs. female competition.

Whiteman (1997) argues that males should benefit from the phenotype that allows them the greatest access to females, while females should become the morph which allows them the greatest access to resources for offspring reproduction. My study will focus on metamorphs, which are simply a terrestrial form of the tiger salamander. A metamorphic tiger salamander loses its gills in its larval stage and comes back to an aquatic environment primarily to breed. Metamorphs can migrate from pond to pond either to mate or to flee from predators. The female tiger salamanders might migrate because of different food sources. And again, as female reproductive success is dependent on resources assimilated, we would predict that females are superior to males in finding and capturing prey. Our hypothesis is female tiger salamanders will out compete the males tigers for food.

Methods

Salamanders used in the first trial were captured on July 2, 2005 in pond K6 (Rocky Mountain Biological Station). Salamanders used in the second trial were captured on July 12 and 13, 2005 in ponds K1 and K6. Tiger salamanders were measured for length; body mass and sex was also determined. We did this before and after the forging experiments.

Forging behavior

Two trials were conducted with six females and six males for each trail. The salamanders were starved for 48 hours before the trails. Metamorphic salamanders were observed within a foraging chamber, consisting of a plastic box (approximately 31.2 x 40.2 x 60.2 cm) filled with water (Whiteman, Wissinger, Brown, 1996). Two prey types were added to the chamber: caddisfly larva (Limnephilidea and Phryganeidea), and snails (Planorbidae). Tiger salamanders were allowed to acclimate within the forging chambers for three minutes before each trail. Each chamber consisted of one male or one female metamorphic tiger salamander, as well as ten snails and ten caddisflies. The individuals chosen to observe were randomly selected. We then observed the metamorphic tiger salamander's feeding behavior for 30 minute trials. We noted how much of each prey the tiger salamander would consume in the 30 minute trail. We recorded the number of successful and unsuccessful capture attempts. We defined an unsuccessful attempt as a lung toward a prey item that did not result in its capture (Johnson, Bierzychudek and Whiteman 2003). Any prey eaten was replaced to maintain a constant prey density. Any

uneaten prey was removed from the chamber after the trial. The chambers were cleaned with soap and water between trials, rinsed, and filled with new water. Each salamander was observed only once (Johnson, Bierzychudek and Whiteman 2003). Foraging efficiency for each prey type was determined by dividing the number of successful capture attempts by the number of unsuccessful attempts. A nonparametric Mann U test was used to compare foraging efficiency of each prey type with sex. ANOVA was used to compare differences in body condition between the two sexes. Body condition was calculated by dividing mass by snout to vent length.

Results

No significant differences in foraging efficiency for either prey type were found between male and female tiger salamanders. Body condition after the experiment was significantly higher for females than for male tiger salamanders.

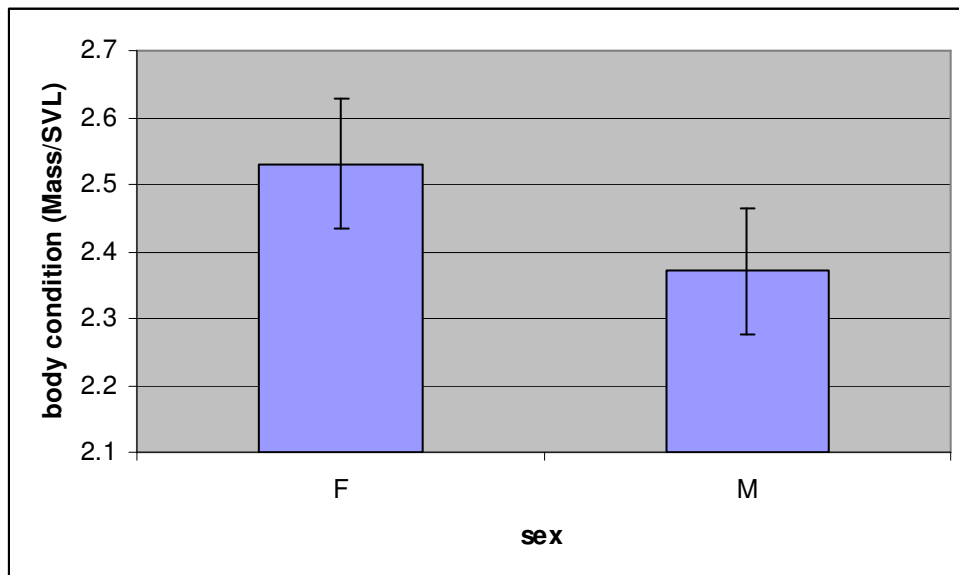


Figure1 Above is ANOVA of body condition after the experiment compared to sex (p-value =.0208).

Discussion

My research suggests that there are no differences in foraging efficiency between males and female tiger salamanders, although females did have significantly higher body condition than males. It is possible that females out compete males in ways other than through increased foraging efficiency. The females may be utilizing more productive ponds than the males, thus making foraging efficiency immaterial. It is also possible that females utilize energy more efficiently than males, leading to higher body condition. Future work should include comparing sexes with three or four prey types. It is possible that foraging differences are present with different types of prey. It is also possible that there are foraging differences between pedomorphic males and females that are not present in the metamorphs, as paedomorphs are more adapted to the aquatic habitat we mimicked in this study. It is also possible that differences in foraging success may be found in metamorphs, but primarily in the terrestrial habitats they frequent when not breeding. In conclusion, future work should clarify how competition between males and females interacts with reproductive success, as we have only laid the ground work with these studies.

Literature Cited

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