

## SEXUAL DIMORPHISM OF HEAD SIZE IN EASTERN FENCE LIZARDS

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### ABSTRACT

I examined sexual dimorphism in Eastern fence lizards (*Sceloporus undulatus*). I tested the hypothesis that males had larger heads than their female con-specifics, relative to individual body size. I measured head width, head length, and snout-vent length for separate samples of male and female lizards. I found that both head width and head length were significantly larger in males than in females when compared to snout-vent length. The cause of this relationship requires further investigation into male and female mating and feeding behaviors.

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### INTRODUCTION

*Sceloporus undulatus* is a widespread North American lizard species in which females usually attain a larger average and maximum size than males. Cooper and Vitt (1989) found that mature males of *S. undulatus* have larger heads than females of similar snout-vent length. I examined sexual dimorphism in body size and head size of fence lizards. I hypothesized that males would have overall larger heads than females when comparing a head-to-body ratio.

### METHODS

I obtained 83 adult male and 21 female *S. undulatus* from Dr. John Matter, Juniata College who had retained the specimens from a previous study. No juvenile lizards were used in this research. The lizard's gonads had been removed and examined for seasonal changes in reproductive tissue (Matter, 1987). Using these lizard specimens, I recorded the following morphological measurements: head length (anterior edge of the auditory opening to the tip of the snout), head width (at widest point), and snout-vent length (SVL) to 0.0001 mm using a dial caliper (Vitt and Cooper, 1985).

I compared head/SVL ratios of males to females using a Two Sample T-test (Ambrose and Ambrose, 1995). I used an alpha level of 0.05 and I considered differences to be significant if  $p < 0.05$ .

## RESULTS

Male lizards had significantly wider heads than females when comparing head width with SVL ( $t = 2.94$ ,  $df = 102$ ,  $p = 0.0020$ ). Males had significantly longer heads than females when comparing head length with SVL ( $t = 4.38$ ,  $df = 102$ ,  $p = 0.0000$ ). Females differed significantly from males in snout-vent length ( $t = -6.28$ ,  $df = 102$ ,  $p = 0.0000$ ), head width ( $t = -4.54$ ,  $df = 102$ ,  $p = 0.0000$ ), and head length ( $t = -3.73$ ,  $df = 102$ ,  $p = 0.0003$ ).

## DISCUSSION

Similar to many other lizard species, sexually mature males of *S. undulatus* have larger heads than females of similar snout-vent length (Cooper and Vitt, 1989). The reasons for these dimorphic characteristics are still debatable. Scientists have suggested various reasons for why sexual dimorphism occurs in lizards. One hypothesis is that sexual selection acts upon certain individuals to give them an advantage over others of the same sex in obtaining successful matings (Cooper and Vitt, 1989; Hews, 1990; Stamps, 1983). This viewpoint comes from an evolutionary perspective, which may help explain many sexual differences in various species. An alternative hypothesis to sexual selection is that sexual dimorphism may occur to reduce competition for food between the sexes of the same species (Cooper and Vitt, 1989; Stamps, 1983). This hypothesis is dependent on the extent to which males and females forage in the same areas.

Cooper and Vitt (1989) found that female *S. undulatus* body size increased at a greater rate than head size once they had attained sexual maturity. They believe this allows for increased growth of reproductive morphological characters that allow for greater reproductive success. Vitt and Cooper (1985) found the same hypothesis to be applicable to female broad-headed skinks (*Eumeces laticeps*). Female lizards of various species have shown an increase in clutch size with an increase in SVL (Cooper and Vitt, 1989).

Vitt and Cooper (1985) found significant differences between males and females in mean and maximum prey size and morphological characteristics related to feeding in *Eumeces laticeps*. An argument could be made that the same selection has occurred in *S. undulatus* and allows the lizards to partition their resources.

Another hypothesis that could help explain the sexual dimorphism in *S. undulatus* is that males have larger heads to compete for the right to mate with females. Stamps (1983) believes that intrasexual selection among males is more intense in territorial species than in non-territorial species. *S. undulatus* is known to be a territorial species where sexual dimorphism may increase a males chance of successfully defeating other males for the chance to reproduce.

In conclusion, sexual selection is frequently relied upon to explain sexual dimorphism in characteristics such as head and body size in lizards (Cooper and Vitt, 1989). Resource partitioning and intrasexual competition between males may be a result of sexual selection on *S. undulatus*. I do caution the attribution of any hypothesis unless further research implicates that morphological characters are determinants of either reproductive success or resource partitioning.

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