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## Lack of Sexual Size Dimorphism in *Sceloporus poinsettii* from Durango, Mexico

### Abstract.

We examined sexual size dimorphism in a population of *Sceloporus poinsettii* from Durango, Mexico. We found no evidence for sexual dimorphism in body size, head size, or femur length in this population. Our results, in combination with other studies on sexual dimorphism in *S. poinsettii*, suggest that there is within-species variation in the extent of sexual dimorphism.

Lizards in the genus *Sceloporus* have long been the subject of interest in studies of sexual size dimorphism (SSD; see Fitch, 1978 for an early review and discussion). Despite this interest, we still know relatively little about variation in SSD among species and among populations of the same species, especially in the species of *Sceloporus* from Mexico. Ramírez-Bautista et al. (in press) recently reviewed SSD of lizards in the *spinosus* group/*formosus* group clade of *Sceloporus* and found variation in the presence of SSD within the clade, within each species group, and even within species. Smith et al. (2003) found no variation in SSD between two populations of *S. ochoterenae*, as did Ramírez-Bautista et al. (2008) in two populations of *S. minor*, except for differences in sexual dimorphism in tibia length. These results suggest that we need a greater database on SSD in *Sceloporus* to more fully understand the extent of variation in sexual dimorphism among and within species.

Here we report on sexual dimorphism in SVL, head size (width and length), and femur length of a population of *Sceloporus poinsettii* from Durango, Mexico. Despite numerous studies on the ecology and biology of this species (see Webb, 2008 for review), we know very little about the extent of its sexual dimorphism. Ballinger (1973) reported that maximum size of males was larger than that of females in a population from Texas. Fitch (1978) found males were significantly larger than females in a mixed sample of *S. poinsettii* from Chihuahua, Coahuila, and Texas. Similarly, Gadsden et al. (2005) found that male *S. poinsettii* were larger than females in a population from Mapimí in Durango, Mexico. We are not aware of any studies on sexual dimorphism in head size or femur length in *S. poinsettii*.

### Materials and Methods

We captured lizards by hand on 6 August 1997 at a locality 7.5 km S jct. 40/49, S of Cuencamé, Durango on Hwy 40 (24° 49' 13.90" N, 103° 44' 17.43" W, 1761 m asl) and on 7 August 1997 at a locality 1.6 km NE Francisco I. Madera, Durango along Hwy 40 (24° 24' 17.65" N, 104° 17' 47.24" W, 1993 m asl). For analyses, we pooled individuals from both localities. We measured various morphological traits on each captured lizard to assess sexual dimorphism in these structures. We measured snout-vent length (SVL), head width (HW; at the widest point), head length (HL; from anterior edge of ear to tip of snout), and femur length (FL; from knee to middle of pelvic region) to the nearest 0.01 mm using calipers.

We conducted two sets of analyses. First, we analyzed data from all individuals. Second, we ran the analyses on a restricted subset of the data limited to the largest 10 individuals of each sex to account for any possible effects of greater numbers of smaller individuals (i.e., juveniles) in one sex or the other (see Andrews and Stamps, 1994). Sexual dimorphism in SVL and trunk size (SVL – HL) were analyzed using analysis of variance. Sexual dimorphism in HW, HL, HW/HL ratio and FL was analyzed using analysis of covariance with SVL as the covariate (all four variables were significantly influenced by SVL, except for HW/HL ratio in the restricted analysis so

an ANOVA was used in that case). Unless noted, the slopes in the ANCOVAs were homogeneous and interaction terms removed from the final model. Means are given  $\pm 1$  SE.

### Results

*Full analyses.*—Largest male was 118 mm SVL (range = 44 – 118 mm) and the largest female was 111 mm SVL (range = 43 – 111 mm). Male and female *S. poinsettii* did not differ in SVL (Table 1;  $F_{1,37} = 0.51$ ,  $P = 0.82$ ). Trunk length (SVL – HL) also did not differ between males and females (Table 1;  $F_{1,37} = 0.50$ ,  $P = 0.82$ ).

Head width did not differ between the sexes (Table 1;  $F_{1,36} = 0.12$ ,  $P = 0.72$ ), and increased with SVL ( $F_{1,36} = 941.6$ ,  $P < 0.0001$ ). Male and female *S. poinsettii* had similar mean head lengths (Table 1;  $F_{1,36} = 0.0014$ ,  $P = 0.97$ ), and that trait increased with SVL ( $F_{1,36} = 1299.3$ ,  $P < 0.0001$ ). The ratio HW/HL did not differ between males and females (Table 1;  $F_{1,36} = 0.11$ ,  $P = 0.74$ ), but decreased with SVL ( $F_{1,36} = 29.31$ ,  $P < 0.0001$ ). Femur length did not differ between males and females (Table 1;  $F_{1,36} = 0.037$ ,  $P = 0.85$ ), but increased with SVL ( $F_{1,36} = 887.1$ ,  $P < 0.0001$ ).

*Restricted analyses.*— Males in the restricted analysis ranged from 88 to 118 mm SVL, and females ranged from 90 to 111 mm SVL. The SVL of male and female *S. poinsettii* did not differ (Table 1;  $F_{1,18} = 0.50$ ,  $P = 0.49$ ). Trunk length (SVL – HL) of males and females also did not differ (Table 1;  $F_{1,18} = 0.59$ ,  $P = 0.45$ ).

Head width did not differ between the sexes (Table 1;  $F_{1,17} = 0.27$ ,  $P = 0.61$ ), and increased with SVL ( $F_{1,17} = 37.0$ ,  $P < 0.0001$ ). The mean head lengths of male and female *S. poinsettii* were similar (Table 1;  $F_{1,17} = 0.31$ ,  $P = 0.58$ ), and increased with SVL ( $F_{1,17} = 57.2$ ,  $P < 0.0001$ ). The ratio HW/HL did not differ between males and females (Table 1;  $F_{1,18} = 1.31$ ,  $P = 0.27$ ). Mean femur length was not different between the sexes (Table 1;  $F_{1,17} = 0.24$ ,  $P = 0.63$ ), and increased with SVL ( $F_{1,17} = 40.7$ ,  $P < 0.0001$ ).

Table 1. Means (SVL, Trunk Length, HW/HL ratio in restricted analysis) and least squares means (Head length, Head width, HW/HL ratio in full analysis, and femur length) of male and female *Sceloporus poinsettii* from Durango, Mexico. Means are given  $\pm 1$  S.E.

	Male	Female
<b>Full analysis (<math>N_{\text{male}} = 18</math>; <math>N_{\text{female}} = 21</math>)</b>		
SVL	84.9 $\pm$ 5.2 mm	83.3 $\pm$ 4.8 mm
Trunk length	65.6 $\pm$ 4.0 mm	64.4 $\pm$ 3.8 mm
Head length	19.1 $\pm$ 0.2 mm	19.1 $\pm$ 0.2 mm
Head width	18.0 $\pm$ 0.2 mm	17.9 $\pm$ 0.2 mm
HW/HL ratio	0.95 $\pm$ 0.01	0.95 $\pm$ 0.01
Femur length	22.9 $\pm$ 0.3 mm	23.0 $\pm$ 0.3 mm
<b>Restricted analysis (<math>N_{\text{male}} = N_{\text{female}} = 10</math>)</b>		
SVL	101.8 $\pm$ 3.2 mm	99.1 $\pm$ 2.0 mm
Trunk length	78.8 $\pm$ 2.8 mm	76.4 $\pm$ 1.6 mm
Head length	22.7 $\pm$ 0.3 mm	22.9 $\pm$ 0.3 mm
Head width	21.1 $\pm$ 0.3 mm	20.9 $\pm$ 0.3 mm
HW/HL ratio	0.93 $\pm$ 0.01	0.91 $\pm$ 0.01
Femur length	27.6 $\pm$ 0.4 mm	27.4 $\pm$ 0.4 mm

**Discussion**

There was no evidence of sexual size dimorphism (body size, head size, femur length) in the population of *Sceloporus poinsettii* we sampled in Durango, Mexico; except that the largest male was larger than the largest female. Our results contrast with previous observations of sexual size dimorphism in SVL in *S. poinsettii* (Fitch, 1978; Gadsden et al., 2005). However, Fitch (1978) placed *S. poinsettii* in a group that had no consistent patterns of sexual size dimorphism (his Group III, subgroup D). Taken together these results suggest that the extent of sexual dimorphism can vary among populations of *S. poinsettii*. Such a finding is consistent with the conclusion that sexual dimorphism is a plastic trait in *Sceloporus*, as has been suggested in a previous review (e.g., Ramírez-Bautista et al., in press). It is clear that additional data from more populations and species of *Sceloporus* are needed before we can gain a full understanding of the extent of variation in sexual size dimorphism and the potential phylogenetic and ecological correlates of such variation.

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This study conformed with the laws and regulations in place in Mexico at the time it was performed.

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