Seasonal polymorphism in male coloration of *Sceloporus aurantius*

Male coloration is an important diagnostic character in distinguishing among species in the *Sceloporus scalaris* group (Smith et al., 1997). Males of each species typically are characterized as having one of the following ventral colorations (Smith et al., 1997; Watkins-Colwell et al., 2006): (1) blue lateral abdominal semeions and no red or orange dorsolateral sides (*S. brownorum* Smith, Watkins-Colwell, Lemos-Espinal, and Chiszar, 1997; *S. scalaris* Wiegmann, 1828; *S. unicanthalis* Smith, 1937), (2) blue lateral abdominal semeions and red or orange dorsolateral sides (*S. aeneus* Wiegmann, 1828; *S. bicanthalis* Smith, 1937; *S. goldmani* Smith, 1937; *S. samcolemani* Smith and Hall, 1974; *S. slevini* Smith, 1937; *S. submiger* Poglayen and Smith, 1958), or (3) red or orange dorsolateral sides and no blue lateral abdominal semeions (*S. aurantius* Grummer and Bryson, 2014; *S. chaneyi* Liner and Dixon, 1992).

A recently published observation (Carbajal-Márquez and Quintero-Díaz, 2015) described ventral color polymorphism in male *S. aurantius*. Whereas previous research based on an examination of adult males collected during the months of April (*n* = 1), May (*n* = 1), July (*n* = 2), and August (*n* = 2) suggested that *S. aurantius* lack blue lateral abdominal semeions (Grummer and Bryson, 2014), Carbajal-Márquez and Quintero-Díaz (2015) found blue lateral abdominal semeions present in adult males at the type locality during the breeding season (February–May). A reexamination of the adult male paratypes reported in Grummer and Bryson (2014) reveals that the two specimens collected during the breeding season (MZFC 24818, MZFC 24831) also show faint traces of blue lateral abdominal semeions, only evident when the specimens are submerged in ethanol. One specimen (MZFC 24818), however, seems to have discolored during the preservation process. The remaining adult males, including the two from the Sierra del Laurel (USNM 346561, 346563) previously designated as paratypes of *S. brownorum* by Smith et al. (1997), appear to lack blue bars on the venter. This finding is substantiated by an earlier color description of one of these specimens (USNM 346561) in McCranie and Wilson (2001: 20), who noted that in life the lizard had only a cream venter with a slight “greenish” tinge.

Carbajal-Márquez and Quintero-Díaz (2015) also reported the discovery of only patternless males of *S. aurantius* during the breeding season. They stated that blue abdominal semeions were present in every adult male they observed, and that the dorsum of all adult males with blue semeions was patternless. Both typical chevron-patterned and patternless morphs are present in males and females of *S. aurantius* (Grummer and Bryson, 2014). Previous studies on polymorphic populations of *S. slevini* determined that pattern polymorphism does not appear to vary seasonally, nor do intermediate patterns exist (Anderson, 1972). The observations by Carbajal-Márquez and Quintero-Díaz (2015), coupled with photos of males in the type series of *S. aurantius*, suggest that this may not be the case for *S. aurantius*. Figure 1 illustrates pattern polymorphism found in *S. aurantius*. The pattern types of the two females (Fig. 1A, D) are strongly contrasting, similar to the pale patternless and brightly patterned morphs of *S. slevini* (Anderson, 1972). The male *S. aurantius* pictured in life during the breeding season in Grummer and Bryson (2014: fig. 6), shown here in Fig. 1E, also shows a distinct patternless dorsum. The two paratype males collected in July (Fig. 1B, C) display intermediate patterns. Both males also appear to show fading of the orange dorsolateral sides compared to the vibrantly colored male collected during the breeding season (Fig. 1E).

Based on the observations in Carbajal-Márquez and Quintero-Díaz (2015) and photos of males in the type series of Grummer and Bryson (2014), apparently the coloration of male *S. aurantius* shifts between the breeding and non-breeding seasons, or at least seasonally. As suggested by Carbajal-Márquez and Quintero-Díaz (2015), it seems prudent to amend the diagnosis of *S. aurantius* to reflect this polymorphism. During the summer, male *S. aurantius* can be distinguished from other regional *S. scalaris* group species based on the presence of orange dorsolateral sides and the absence of blue abdominal semeions; blue bars on the venter are present in all other species in the area. During the winter and spring, blue abdominal semeions may be present in male *S. aurantius*, but based on the photos in Carbajal-Márquez and Quintero-Díaz (2015) and a reexamination of the type series, these blue semeions appear to be relatively subdued, especially in preserved specimens maintained in ethanol. This lighter blue coloration strongly contrasts the vivid or dark blue semeions generally seen in male *S. brownorum*, *S. scalaris*, and *S. unicanthalis* (Smith et al., 1997), the other *S. scalaris* group species found in the region (Smith et al., 1997;
Vázquez-Díaz and Quintero-Díaz, 2005). The darker pigmentation in the abdominal semeions of these latter three species also is easily distinguished from the lighter ventral coloration after long-term storage in preservative (Smith et al., 1997: fig. 2, figs. 5, 6). These species also lack the orange dorsolateral sides found in *S. aurantius*, although occasionally an orange patch is present behind the front legs of *S. scalaris* and *S. unicanthalis*. The blue lateral semeions in *S. brownorum* also appear to be separated by more scales (usually eight or more in *S. brownorum* vs. five or less in *S. aurantius*; Smith et al., 1997; Carbajal-Márquez and Quintero-Díaz, 2015). Interestingly, the only species in the *S. scalaris* group lacking blue abdominal semeions now is *S. chaneyi*, and all the type specimens of this species (*n* = 17) were collected during the summer in July (Liner and Dixon, 1992).

Additional research clearly is needed to better understand color polymorphism in *S. aurantius* and other species in the *S. scalaris* group. Most of the taxonomic descriptions of these lizards primarily have been based on the examination of preserved materials (e.g., Smith et al., 1997), and specimen coloration appears to quickly change in preservative. The fading of certain colors, like orange and light blue, combined with seasonal collecting biases might have led researchers to oversimplify the male coloration in this group of lizards. Whereas pattern polymorphism in some species of *S. scalaris* group lizards may be related to crypsis (Anderson, 1972), the mechanistic drivers of adult male color polymorphism in *S. aurantius* and other species may be more nuanced and represents an area ripe for future behavioral studies.
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Uta palmeri Stejneger, 1890. Reproduction. Uta palmeri is endemic to Isla San Pedro Mártir (28.38176°N, 112.30632°W), Sonora, Mexico (Grismer, 2002). Based largely on the studies of Wilcox (1980) and Hews (1990), and from personal observations, Grismer (2002) presented a summary of the natural history of U. palmeri, in which he included reproductive information. In this note, I present the results of a histological examination of the reproductive organs of U. palmeri, based on a sample of museum specimens.

I borrowed 25 specimens of U. palmeri from the University of Colorado Museum of Natural History (UCM), Boulder, Colorado, United States. The sample consisted of 10 adult females (mean snout–vent length [SVL] = 65.7 mm ± 4.5 SD, range = 59–73 mm), 13 adult males (mean SVL = 71.1 mm ± 1.9 SD, range = 68–73 mm), and two subadult males (mean SVL = 63.0 mm ± 5.7 SD, range = 59–67 mm). The specimens were collected in January of 1964 (n = 2), July of 1967 (n = 12), and August of 1964 (n = 11).

The UCM museum numbers are as follows: 23955, 23959, 26274–26276, 26281–26284, 26290, 26297, 26300, 26302, 35231, 35233, 35235, 35237, 35243, 35244, 35246, 35249, 35253, 36266, 35276, and 35278.

I removed the left ovary from females and the left testis from males for histological examination. I embedded the tissues in paraffin, cut into 5 µm sections, mounted them on glass slides, and stained them with Harris’ hematoxylin followed by eosin counterstain (Presnell and Schreibman, 1997). I examined the slides to determine