



FIG. 1. A) *Athene cunicularia* with an *Amphisbaena vermicularis* in its talons, being chased by a Great Kiskadee (*Pitangus sulphuratus*) in Bahia, Brazil; B) view of the *A. cunicularia* with *A. vermicularis* showing the lizard's length after the owl fled to another part of the tree.

After a few seconds, a second bird, a Great Kiskadee (*Pitangus sulphuratus*) approached the owl and chased it from its initial perch to another perch in the same tree (Fig. 1A). The owl sat on this new perch for a few seconds, still holding the *A. cunicularia* in its talons (Fig. 1B), before flying out of view with the lizard, preventing us from observing the owl consuming the worm lizard. To our knowledge, this is the first record of an *A. cunicularia* feeding on a species of Amphisbaenidae.

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#### SQUAMATA — LIZARDS

**AMEIVA AMEIVA (Giant Ameiva). PREDATION.** *Ameiva ameiva* is native to central and South America but was introduced to Florida in the 1950s (Duellman and Schwartz 1958. Bull. Florida State Mus. 3:286–287) and is now an established non-native component for the state's lizard fauna (Meshaka 2011. Herpetol. Conserv. Biol. 6:69–70). In its native range, *A. ameiva* is preyed upon by a number of species, including snakes (Maffei et al. 2009. Herpetol. Notes 2:235–237; Ferreira Da Silva et al. 2016. Herpetol. Rev. 47:292), mammals (Leandro De Souza 2011. Herpetol. Rev. 42:426), raptors (Gaiotti et al. 2011. Herpetol. Rev. 42:426), and crabs (Lopes Segadilha et al. 2016. Herpetol. Rev. 47:292–293). However, little is known about the lizards' predators in its introduced range in Florida (Meshaka 2011, *op. cit.*). Here, we report an observation of predation of an adult *A. ameiva* by a Red-shouldered Hawk (*Buteo lineatus*).

On 11 July 2020, at ca. 1245 h we observed an immature Red-shouldered Hawk with a lizard in its talons, fly in front of our vehicle in Naples, Florida, USA (26.21339°N, 81.75010°W; WGS 84; 5 m elev.). The hawk appeared to briefly struggle with flight while carrying the large prey item which allowed us to confirm the lizard it as an adult *A. ameiva*. After a couple seconds the hawk left our field of vision and entered into a nearby Pine Flatwoods. To our knowledge this is the first record of the non-native *A. ameiva* being preyed by a native raptor in Florida, and the second case of predation by a hawk anywhere in the lizard's range. The only other report we are aware of was a *A. ameiva* removed from the stomach of a Gray Hawk (*Buteo nitidus*) in its native range in Brazil (Gaiotti et al. 2011, *op. cit.*).

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**ASPIDOSCELIS SACKII GIGAS (Sack's Reticulated Whiptail). COLOR PATTERN VARIATION.** *Cnemidophorus sacki* (= *C. sackii*)



*gigas* sensu Duellman and Zweifel 1962. Bull. Am. Mus. Nat. Hist. 123:155–210; *Aspidoscelis sacki* = *sackii gigas* sensu Reeder et al. 2002. Am. Mus. Novit. 3365:1–61) was described from the state of Morelos, Mexico, as *C. gigas* by Davis and Smith (1952. Herpetologica 8:97–100) based on a distinctive color pattern and later was relegated to a subspecies of Sack's Spotted Whiptail by Duellman and Zweifel (1962, *op. cit.*). *Aspidoscelis sackii gigas* is one of the largest forms of *Aspidoscelis*, reported to grow to 140 mm SVL (Duellman and Zweifel 1962, *op. cit.*) and males of *A. sackii sackii* grow to 153 mm SVL (Walker 1981a. J. Herpetol. 15:321–328). Published references to *A. sackii gigas* are few and mainly include general statements on color patterns, meristic variation, scutellation characters, and/or locality records typically based on specimens from the south-central Mexican states of Guerrero, Morelos, and Puebla (e.g., Duellman and Zweifel 1962, *op. cit.*). The only exceptions known to us pertaining to the biology of the subspecies is a note on reproduction in *A. sackii gigas* (as *A. sacki*, by Hernández-Gallegos et al. 2011. Herpetol. Rev. 42:428) and a brief reference to its evolutionary history (as *A. sackii*, by Barley et al. 2019. Mol. Phylogenet. Evol. 132:284–295).

We undertook this study based on observations made in the summer of 2012 on live adults of *A. sackii gigas* (Fig. 1–3) from El Transformador, Municipality of Pilcaya, Guerrero, Mexico (18.665°N, 99.4808°W; WGS 84; 1117 m elev.) and from nearby Tonatico, Municipality of Tonatico, México (18.75044°N, 99.62025°W; WGS 84; 1597 m elev.). The objectives were to describe ontogenetically derived adult dorsal and ventral color patterns and to interpret the adaptive significance thereof. We used established terminology (see Walker 1981b. Copeia 1981:826–849; Walker 1981c. Copeia 1981:850–868) in describing the dorsal pattern posterior to the forelimbs in the three adults of *A. sackii gigas*.

Juveniles of *A. sackii gigas* have a pattern of cream to cream-yellow longitudinal stripes separated by longitudinal fields of brown-black to black ground color (Duellman and Zweifel 1962, *op. cit.*). Variations on this theme characterize members of the *C. sexlineatus* (= *A. sexlineatus* sensu Lowe et al. 1970. Syst. Zool. 19:128–141) species group (sensu Reeder et al. 2002, *op. cit.*). The ventral pattern of juveniles of *A. sackii gigas* consists of either unmarked cream-white or off-white hues. Complex ontogenetic changes, which result in dramatic changes in the dorsal and ventral patterns of many members of the *A. sexlineatus* species group, are well underway in lizards of both sexes of *A. sackii gigas* of ca. 90–100 mm SVL (Duellman and Zweifel 1962, *op. cit.*). However, these authors presented only brief remarks pertaining to the dorsal pattern of *A. sackii gigas*: “Adults with a tan or greenish tan dorsum, with dark brown or black reticulations and irregular spots, not forming distinct cross bars.” We describe the adult dorsal pattern of the subspecies in life in greater detail. Adults from El Transformador, Guerrero, retained only vague indications of the former positions of the alternating longitudinal pale-hued stripes and dark-hued fields, and they were only detectable by an experienced observer (Fig. 1A–C). In these individuals the pattern on the neck and body from the occipital scales to the forelimbs ranged from a complex mixture of dark brown ground color and lichenoid to lineate green-gold markings (Fig. 1A) to a more uniformly brown-tan hue which obscured the original dark ground color (Fig. 1B–C). Each of the three adults also had an irregular darker band of ground color along the sides, interrupted by either gray-tan to tan reticulations or vertical bars. This band on each side of adults was represented in juveniles by the upper lateral field bordered below and above



FIG. 1. Variation in dorsal patterns in *Aspidoscelis sackii gigas* obtained in July 2012 at Transformador, Municipality of Pilcaya, Guerrero (note reduced to obscured contrast between pattern elements and black ground color especially from forelimbs anteriorly to occipital scales): A) mature male; B) mature female; C) smaller adult male.



FIG. 2. Variation in ventral patterns in *Aspidoscelis sackii gigas* obtained in July 2012 at Transformador, Guerrero: A) mature male; B) mature female; C) smaller adult male.

by the lateral and dorsolateral stripes, respectively. Remnants of these pattern components are only vaguely and variously discernable in adults (Fig. 1A–C). The dorsal pattern consists of brown to black areas of ground color (i.e., modifications of the juvenile pattern of dark-hued fields between the pale-hued stripes), appropriately referred to as reticulations by Duellman and Zweifel (1962, *op. cit.*), surrounding tan to green-gold-tan reticulations, inappropriately referred to as dorsum rather than pale dorsal pattern components by Duellman and Zweifel (1962, *op. cit.*). However, the tan to green-tan reticulations are never coalesced into distinct series of cross bars as characterizes *A. sackii sackii* to the east of the distribution of *A. sackii gigas* (Duellman and Zweifel 1962, *op. cit.*). As indicated in Fig. 3, there was sharper contrast between the pale and dark dorsal pattern components in individuals of *A. sackii gigas* from Tonatico than from those from El Transformador.

No terminology better describes the visual illusion of the dorsal pattern of *A. sackii gigas* than to regard it as a perfect camouflage configuration. Walker (1981a, *op. cit.*) reported that *A. sackii* (= subspecies *sackii*) preferred microhabitats



FIG. 3. Dorsal pattern in a mature male of *Aspidoscelis sackii gigas* obtained in July 2012 at Tonatico, México (note sharp contrast between dorsal pattern elements and black ground color).

with shrubs and trees in the remote Tomellin Canyon of the southeastern Mexican state of Puebla and the north-central Mexican state of Oaxaca, whereas its much smaller syntopic congener *A. parvisocius* (Mexican Pygmy Whiptail) preferred more open-structured microhabitats. Although we observed tropical deciduous forest interspersed with agricultural crops at Tonatico, compared with more open tropical deciduous forest interspersed with agricultural crops and grassland at El Transformador, additional study will be required to determine either how or whether giant-sized *A. sackii gigas* and moderately large *A. costatus costatus* partition microhabitats at the two sites. Based on the findings in Asplund (1974. *Copeia* 1974:695–703) that large-bodied species of whiptail lizards typically inhabit shrubby habitats, it is likely that the dorsal pattern of adult *A. sackii gigas* is an adaptation that results in blending into the dappled sunlight of shrubby vegetation, with *A. costatus costatus* using more open-structured microhabitats.

Ventrally, the color pattern of *A. sackii gigas* is among the most stunningly colorful that we have observed in the genus (Fig. 2A–C), though it was mundanely described as follows by Duellman and Zweifel (1962, *op. cit.*): “Bluish white bellies of many adult males heavily mottled with black posteriorly; chin pale pink.” We provide a more detailed description of the adult ventral pattern of the subspecies using lizards from El Transformador. The throat region and part of the gular fold of the largest adult males becomes orange-red (much more subdued in adult females and smaller adult males which remain unmarked by dark-hued spots or markings; Fig. 2A–C). The scales posterior to the gular fold and thoracic region are mostly orange-red with off-white posterior edges; some lateral thoracic scales also have a touch of gray-blue. An abrupt change occurs in the colors of the scales in the abdominal region; they are predominantly dark gray-blue to gray-black with some scales having pale blue. From a ventral perspective the median aspect of the tail is off-white and the more lateral aspects are gray-blue.

We can provide insight into how strong sexual dimorphism in the ventral color pattern, as noted in *A. sackii gigas*, can simultaneously function as an attractant in intraspecific mating and deterrent to interspecific mating when it appears to be hidden beneath the lizard. Based on research on the sexually dimorphic *A. gularis* (Texas Spotted Whiptail) in Bentsen-Rio

Grande Valley State Park, Hidalgo County, Texas, USA (JEC, unpubl. data), it has been observed that male *A. gularis* displayed both the throat and thoracic regions by raising the body with the forelimbs during courtship with conspecific females, as well as during encounters with diploid parthenogenetic *A. laredoensis* (Laredo Striped Whiptail) with which it occasionally hybridizes (Cole et al. 2020. *Am. Mus. Novit.* 3947:1–13). We suggest that males of *A. sackii gigas* will be found to offer similar displays in potential intraspecific mating sequences, as well as in interspecific encounters with *A. costatus costatus* at Tonatico, Mexico, and El Transformador, Guerrero.

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**ASPIDOSCELIS TIGRIS SEPTENTRIONALIS** (Plateau Tiger Whiptail). **AVERAGE SNOUT-VENT LENGTH.** *Aspidoscelis tigris septentrionalis* is distributed in the parts of Arizona, Colorado, New Mexico, and Utah that constitute the Colorado Plateau (Dessauer et al. 2000. *Bull. Am. Mus. Nat. Hist.* 246:1–148). This whiptail lizard has been intensively studied with reference to reproductive biology (McCoy and Hoddenbach 1966. *Science* 154:1671–1672; Taylor et al. 1992. *J. Herpetol.* 26:443–447) and variation in snout-vent length (SVL), meristic variables, and color pattern (Taylor and Buschman 1993. *Herpetologica* 49:4251; Dessauer et al. 2000, *op. cit.*; Walker et al. 2015. *Herpetol. Conserv. and Biol.* 10:935–947).

A report by Heyborne et al. (2019. *Herpetol. Rev.* 50:569–570) of a supernumerary caudal anomaly, based on an image of an uncaptured individual of *A. t. septentrionalis* from the parking area of lower Calf Creek Falls, Grand Staircase-Escalante National Monument, Utah, USA (37.79372°N, 111.41494°W; WGS 84; 1600 m elev.), incidentally indicated that the average SVL of the subspecies is 105 mm referenced as based on Heyborne et al. (unpubl. data). This size for the average SVL of Plateau Tiger Whiptails (i.e., average of measurements of adults ventrally from tip of snout to transverse cloacal slit) is significantly larger than previously found in 11 samples of *A. t. septentrionalis* (sexes pooled) comprising 335 specimens of 79 mm SVL or larger from three sites in Arizona, three in Colorado, one in New Mexico, and four in Utah. Mean SVL as indicated by individual samples ranged from 85.7–95.2 mm (Taylor 1983. Ph.D. Dissertation, University of Colorado, Boulder, Colorado, table 4), and locations of sampling sites are shown in Taylor et al. (1992. *op. cit.*, fig. 1) and Taylor and Buschman (1993, *op. cit.*, fig. 1). Several specimens (Taylor et al. 1992, *op. cit.*, fig. 2) are larger than the maximum SVL of 96 mm for specimens of the subspecies reported by Walker et al. (2015. *Herpetol. Conserv. Biol.* 10:935–947).

Clarification of the average SVL of adults in *A. t. septentrionalis* is important: for example, assessment of the role of character displacement in body size of sympatric congeners is often based on published average values for whiptail lizards. Moreover, divergence in body size is an important subject for ecologists addressing questions on the diversity of species in communities, effects on population size and habitat use, similarity between potentially competing species (e.g., Brown and Wilson 1956.