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NOTES ON GEOGRAPHIC DISTRIBUTION

# *Anolis soinii* Poe and Yañez-Miranda, 2008 (Squamata: Iguanidae: Polychrotinae): Distribution extension, first records for Ecuador and notes on geographic variation

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**ABSTRACT:** The anole lizard *Anolis soinii* was described from a single locality in northern Peru in 2008. We report the first records of *A. soinii* from southern Ecuador, Provincia Zamora-Chinchipe: Valladolid-Yangana road; Romerillos Alto; Estación Científica San Francisco; Zamora-Loja road; and Refugio de Vida Silvestre El Zarza. The Valladolid-Yangana road, the nearest record, is approximately 196 km NW from the only known locality of *A. soinii* (Venceremos, Departamento San Martín, Peru). We also present information on lepidosis and coloration of the new specimens.

Thirty-five species of *Anolis* are documented from Ecuador (Torres-Carvajal 2009; Ayala-Varela and Torres-Carvajal 2010; Ayala-Varela and Velasco 2010; Torres-Carvajal *et al.* 2010). *Anolis soinii* Poe and Yañez-Miranda 2008 was described based on specimens from a single locality in Peru, and it remains known only from its type locality. This species was assigned to the *punctatus* species group (*sensu* Williams 1976) based on its Alpha-type caudal vertebrae (*i.e.*, lacking transverse processes on posterior caudal vertebrae), moderately sized dorsal head scales, moderate to large body size, and greatly expanded toepads (Poe and Yañez-Miranda 2008). The *punctatus* species group occurs in humid tropical forests of South America on both sides of the Andes (Savage 2002), with nine species reported for Ecuador (*Anolis anchicayae, A. chloris, A. chocorum, A. fasciatus, A. festae, A. nigrolineatus, A. peraccae, A. punctatus,* and *A. transversalis*), although *A. nigrolineatus* might be a junior synonym of *A. festae* (Williams 1982; Poe *et al.* 2009). Based on phylogenetic analyses of morphological characters Poe *et al.* (2008) found *A. soinii* (labeled as sp. *A* in their Figure 5) to be the sister species of *A. transversalis*.

Herein we report the first records of *A. soinii* for Ecuador (Figure 1) based on 15 specimens (QCAZ 9858–9864, 9866–9873) collected on 28 September, 2009 on the road between Valladolid and Yangana (04°32'33.4" S, 79°07'44.7" W, 1,723 m), parroquia Valladolid, cantón Palanda, Provincia Zamora-Chinchipe; three specimens (FHGO 2812–2814) from Romerillos Alto (04°14'53.8" S, 78°56'01.1" W, 1,800 m), parroquia Timbara, cantón Zamora, Provincia Zamora-Chinchipe, collected between February 21–27, 2000; one specimen (QCAZ 6794) from Estación Científica San Francisco (03°58' S, 79°04' W, 1,970 m), parroquia Sabanilla, cantón Zamora, Provincia Zamora-Chinchipe, collected on 28 September, 2005; eight specimens (QCAZ 10161–10168) collected on 17 December, 2009 on the road between Zamora and Loja (03°57'39.7" S, 79°03'02.7" W, 1,674 m), parroquia Sabanilla, cantón Zamora, Provincia Zamora-Chinchipe; and three specimens (EPN 13297–13299) from the Refugio de Vida Silvestre El Zarza (03°50'35.6" S, 78°31'53.6" W, 1,485 m), parroquia Los Encuentros, cantón Yanzatza, Provincia Zamora-Chinchipe, collected on 17 July, 2010. The first locality listed above lies approximately 196 km northwest from the type locality of *A. soinii* (Venceremos, Departamento de San Martín, Peru, Figure 1). Romerillos Alto, the second locality listed, lies approximately 204 km northwest of Venceremos. More remote localities (Estación Científica San Francisco and road from Zamora to Loja) lie approximately 238 km northwest of Venceremos. The

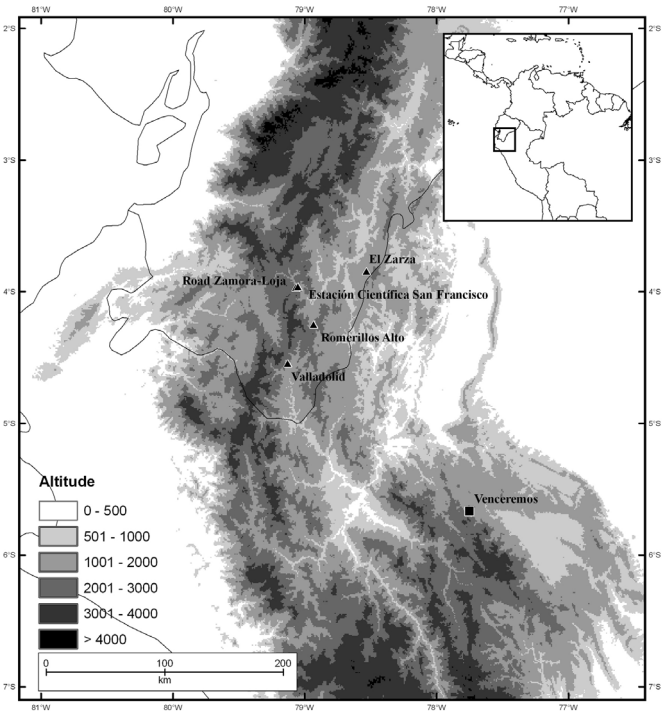


**FIGURE 1.** Distribution of *Anolis soinii* in South America.

northernmost locality, the Refugio de Vida Silvestre El Zarza, lies approximately 219 km north of Venceremos.

Geographic variation in meristic and morphometric characters of *A. soinii* is presented in Table 1. Even though scale counts are similar, Ecuadorian specimens of *Anolis soinii* are smaller than the specimens from Peru (maximum SVL 72 mm and 82 mm, respectively).

Specimens examined for comparisons are housed in the herpetological collections of the Escuela Politécnica Nacional, Quito (EPN), Fundación Herpetológica Gustavo-Orcés, Quito (FHGO), and Museo de Zoología, Pontificia Universidad Católica del Ecuador, Quito (QCAZ). Specimens were collected under collection permits # 008-09 IC-FAU-DNB/MA and # 026-IC-FAU-DBAP-VS-DRLZCH-MA issued by Ministerio del Ambiente and were deposited at Museo de Zoología (QCAZ), Pontificia Universidad Católica del Ecuador and at Escuela Politécnica Nacional, Quito (EPN), respectively. External character terminology follows standards established by Williams *et al.* (1995) and Poe and Yañez-Miranda (2008). Lamellar number was counted only on phalanges III and IV of the fourth toe (second and third phalanges of Williams [*e.g.,* Williams *et al.* 1995]). Measurements were made with digital calipers on preserved specimens and are given in millimeters (mm), usually to the nearest 0.1 mm. Snout-vent length (SVL) was measured from tip of snout to anterior edge of cloaca. Femoral length was measured from midline of venter to knee, with limb bent at a 90-degree angle.

The color pattern of the Ecuadorian specimens is similar to that of Peruvian specimens, except for some females. All Peruvian females have a vertebral stripe, while Ecuadorian females either have a vertebral stripe (9 specimens, *e.g.* Figure 2C) or a longitudinal middorsal series of blotches (2 specimens, *e.g.* Figure 2D) or chevrons (1 specimen). Two female blotched patterns can be described in Ecuadorian specimens. Pattern 1 (Figure 2D, color in life) displays a dark green dorsum, nape with two white blotches, body with 8 white middorsal blotches, tail with three cream blotches proximally, followed by cream and brown bands, body flanks brownish green with greenish yellow dots forming alternating bands that extend posteroventrally, and limbs brown-green with irregular cream bands, each band with white dots. Pattern 2 (juvenile QCAZ 9872, color in preservative) has a grayish-brown dorsum, nape with two dirty white blotches, body with seven dirty white middorsal chevrons, and tail with five dirty white blotches followed by cream and grayish brown bands.

The dewlap color in males of Ecuadorian specimens is similar to that described by Poe *et al.* (2008). When stressed, an Ecuadorian male turned to the following color pattern (Figure 2B): dewlap skin pale salmon with dark grey irregular spotting; within each row of two to five dewlap scales, central two rows pale yellowish green and lateral rows turquoise; distomarginals, anterior and posterior marginals pale cream with some pale turquoise scales; apicogorgetals yellowish cream and turquoise; apicosternals pale green and turquoise.

Specimens from Ecuador were collected sleeping at night on hanging ferns and leaves 0.7–4.5 m above ground (QCAZ 9858–64, 9866–73, FHGO 2812–14), and during the day on the trunk of a small tree 1.5 m above ground (QCAZ 6794). Specimens were collected in secondary forest and ravines near the edges of roads. The smallest specimen (QCAZ 9858) was collected on 28 September 2009 (38.5 mm SVL, 91.6 mm tail length).

*Anolis soinii* occurs in sympatry with two species of anoles (*Anolis podocarpus* and an undescribed species) in Parque Nacional Podocarpus, southern Ecuador. The records herein presented provide an important contribution to the knowledge of the geographic distribution and morphology variation of *Anolis soinii*, showing that this species is more widespread than previously thought. This new finding is also relevant for developing conservation strategies for this species in the future. Some individuals of this species have been collected within protected areas in southern Ecuador, such as Parque Nacional Podocarpus and Refugio de Vida Silvestre El Zarza, which suggests that at least some populations of *A. soinii* are well protected.

*Anolis soinii* is morphologically similar to *A. huilae* from the eastern Andes of Colombia. However no similar green anoles have been found in the intervening range of *A. soinii* and *A. huilae* in northern Ecuador (approximately 650–750 kilometers) despite searches focused on anoles, although these searches have been limited in number. Perhaps future survey work will discover *A. soinii* or *A. huilae* in northeastern Andean Ecuador, or if these species may be disjunct.

**Table 1.** Geographic variation between Ecuadorian and Peruvian populations of *Anolis soinii*. Comparisons of scale counts and measurements (mm) given as: range, (sample size), mean. FL = femoral length, SVL = snout-vent length.

| | ECUADOR | PERU (Poe and Yañez-Miranda 2008) |
|---|---|---|
| Scales between second canthals | 8–12 (25) 10.4 | 9–14 (9) 11.4 |
| Scales bordering the rostral | 5–10 (25) 7.6 | 6–10 (9) 8.1 |
| Scales between supraorbital semicircles | 0–1 (25) 0 | 0–2 (9) 0.22 |
| Scales between interparietal and supraorbital semicircles | 0–4 (25) 1.7 | 0–2 (9) |
| Loreal rows | 4–7 (24) 5.3 | 5–7 (9) |
| Supralabials to center of eye | 5–8 (25) 6.2 | 6–8 (9) 6.7 |
| Postmentals | 4–6 (25) 5.0 | 4–6 (9) 4.8 |
| Sublabials in contact with infralabials | 1–5 (15) 2.5 | 1–3 (9) |
| Enlarged middorsal rows | 0 (25) | 0–3 (9) |
| Lamellar number | 18–21 (24) 19.4 | 17–21 (9) 20.0 |
| Middorsals in 10% SVL | 20–25 (20) 22.2 | 21–24 (9) 22.8 |
| FL/SVL | 0.25–0.28 (19) 0.27 | 0.28–0.30 (9) 0.29 |
| Maximum SVL (male;female) | 72;71 | 82;78 |

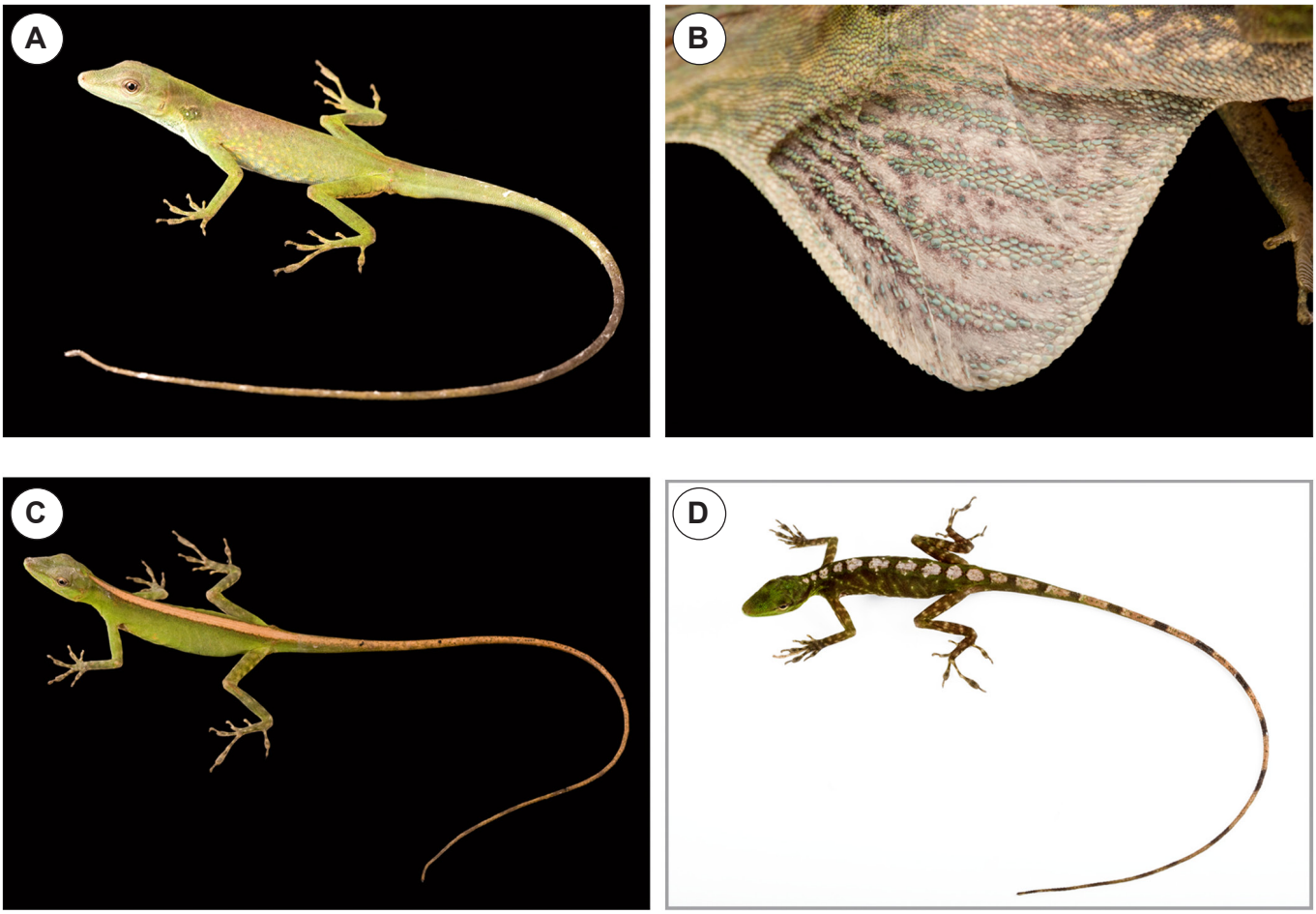


**Figure 2.** Specimens of *Anolis soinii* from Ecuador. A, B (male, QCAZ 9870, SVL = 68.18), C (female, QCAZ 9869, SVL = 65.92), D (female, QCAZ 9866, SVL = 61.95). Photographs by Santiago R. Ron.

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## Literature Cited

Ayala-Varela, F.P. and O. Torres-Carvajal. 2010. A new species of dactyloid anole (Iguanidae, Polychrotinae, *Anolis*) from the southeastern slopes of the Andes of Ecuador. *ZooKeys* 53: 59-73.

Ayala-Varela, F. and J.A. Velasco. 2010. A new species of dactyloid anole (Squamata: Iguanidae) from the western Andes of Ecuador. *Zootaxa* 2577: 46-56.

Poe, S. and C. Yañez-Miranda. 2008. Another new species of green *Anolis* (Squamata: Iguania) from the Eastern Andes of Peru. *Journal of Herpetology* 42 (3): 564-571.

Poe, S., C. Yañez-Miranda and E. Lehr. 2008. Notes on variation in *Anolis boettgeri* Boulenger 1911, assessment of the status of *Anolis albimaculatus* Henle and Ehrl 1991, and description of a new species of *Anolis* (Squamata: Iguania) similar to *Anolis boettgeri*. *Journal of Herpetology* 42 (2): 251-259.

Poe, S., J. Velasco, K. Miyata and E.E. Williams. 2009. Descriptions of two nomen nudum species of *Anolis* lizard from northwestern South America. *Breviora* 516: 1-16.

Savage J.M. 2002. *The amphibians and reptiles of Costa Rica: A herpetofauna between two continents, between two seas*. Chicago: The University of Chicago Press. 934 p.

Torres-Carvajal, O. 2009. *Reptiles de Ecuador: Lista de especies y distribución. Amphisbaenia y Sauria. Version 1.1. 25. [Updated on September 10 2009]*. Electronic Database accessible at http://www.puce.edu.ec/zoologia/zoologia/reptiliawebec/reptilesecuador/index.html. Museo de Zoología, Pontificia Universidad Católica del Ecuador, Quito, Ecuador. Captured on October 31, 2010.

Torres-Carvajal, O., F. Ayala-Varela and A. Carvajal-Campos. 2010. Reptilia, Squamata, Iguanidae, *Anolis heterodermus* Duméril, 1851: Distribution extension, first record for Ecuador and notes on color variation. *Check List* 6: 189-190.

Williams, E.E. 1976. South American anoles: the species groups. *Papéis Avulsos de Zoologia* 29: 259-268.

Williams, E.E. 1982. Three new species of the *Anolis punctatus* complex from Amazonian and inter-Andean Colombia, with comments on the eastern members of the *punctatus* species group. *Breviora* 467: 1-38.

Williams, E.E., H. Rand, A.S. Rand and R.J. O'Hara. 1995. A computer approach to the comparison and identification of species in difficult taxonomic groups. *Breviora* 502: 1-47.

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