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 toe pads (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 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 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.](image-url)
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 sympathy with two species of anoles (*Anolis podocarpus* and an undescribed species) in Parque Nacional Podocarpus, southern Ecuador. The records here 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.

| Character                                      | Ecuador       | Peru          |
|-----------------------------------------------|---------------|---------------|
| 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 supomordial 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         |
ACKNOWLEDGMENTS: We thank María Elena Barragán (FHGO) and Omar Torres-Carvajal (QCAZ) for the loan of museum specimens, as well as Rosario Castañeda and Omar Torres-Carvajal for their critical and valuable comments throughout the development of this manuscript. Fernando Nogales-Sornosa, Diego Almeida-Reinoso and Florian Werner provided ecological information. We also thank Silvia Aldís for help in the field, Santiago R. Ron for providing photographs, and Paulina Santana for editing them. This work was funded by Secretaría Nacional de Educación Superior,Ciencia, Tecnología e Innovación (SENESCYT), project PIC-08-0000470 and by National Science Foundation grant DEB-0844624 to Steven Poe. A. Almendariz thanks the Kinross company, which through socio-environmental Consultant Entrix Inc., hired EPN for faunal assessments at various points of the High Machinaza (Provincia Zamora-Chinchipe).

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Funding: This work was funded by Secretaría Nacional de Educación Superior, Ciencia, Tecnología e Innovación (SENESCYT), project PIC-08-0000470 and by National Science Foundation grant DEB-0844624 to Steven Poe. A. Almendariz thanks the Kinross company, which through socio-environmental Consultant Entrix Inc., hired EPN for faunal assessments at various points of the High Machinaza (Provincia Zamora-Chinchipe).