



Redescription of *Anolis rubribarbaris* (Köhler, McCranie, & Wilson 1999), a poorly-known Mesoamerican cloud forest anole (Squamata: Polychrotidae)

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Abstract

Anolis rubribarbaris (Köhler, McCranie, & Wilson 1999) was described based on a single adult male specimen collected in 1994, which lacked color notes or everted hemipenes. We recently collected three additional specimens of *A. rubribarbaris*, one male and two females, from near the type locality in Parque Nacional Montaña de Santa Bárbara. We present a redescription of *A. rubribarbaris* based on this new material, which includes the first description of the hemipenis, the first description of a female, and the first description of the color in life of both sexes.

Key words: Honduras, Iguania, *Norops*, Nuclear Central America, Parque Nacional Montaña de Santa Bárbara, Sauria

Resumen

Anolis rubribarbaris (Köhler, McCranie, & Wilson 1999) fue descrito basándose en un único espécimen macho adulto colectado en 1994, y que carece de datos de color y los hemipenes no están evertidos. Recientemente colectamos tres especímenes adicionales de *A. rubribarbaris*, un macho y dos hembras, en las cercanías de la localidad tipo en el Parque Nacional Montaña de Santa Bárbara. Presentamos una redescipción de *A. rubribarbaris* con base en este material, el cual incluye la primera descripción de los hemipenes, la primera descripción de una hembra y la primera descripción de color en vivo de ambos sexos.

Introduction

Honduras is well known for its high degree of herpetofaunal diversity (McCranie and Wilson 2002; Wilson and McCranie 2004), particularly among polychrotid lizards of the genus *Anolis* (sensu Poe 2004). There are at least 36 species of anoles found in Honduras, of which at least 17 are endemic to the country. Some of these endemic species are known only from a limited number of individuals, and, in some cases, the holotype specimen itself is the only material known to represent the taxon.

One case of an endemic anole known only from a single specimen is *Anolis rubribarbaris* (Köhler, McCranie, & Wilson 1999), described based on a single male specimen collected by a Florida Museum of

Natural History malacological expedition to Parque Nacional Montaña de Santa Bárbara during 1994. The holotype came from about 4 km south of the community of San Luís de los Planes, Depto. Santa Bárbara, at 1700 m on the northern slope of Montaña de Santa Bárbara. No photographs were taken of this specimen while it was alive, no information about the coloration in life of this the specimen was recorded (save for noting the dewlap color), nor were the hemipenes everted. Females of *A. rubribarbaris* remained unknown. Nonetheless, Köhler *et al.* (1999) recognized this specimen as representing a species similar to but distinct from other anoles of the *A. crassulus* species group, and referred *A. rubribarbaris* to the *crassulus*-like series of that group.

On 28 January 2008, we collected the second, third, and fourth reported specimens of *Anolis rubribarbaris*, one male and two females, from disturbed cloud forest on the eastern slope of Montaña de Santa Bárbara (Fig. 1). In light of the limited information available regarding *Anolis rubribarbaris* and the expanded understanding of this taxon presented by the morphological data and color notes in life taken from the newly collected material, which includes the first data from females and on the hemipenis of this species, we present the following redescription of *A. rubribarbaris*.

Method and materials

A composite definition of *A. rubribarbaris* is presented, summarizing data taken from the three new specimens and, in the case of the holotype, from Köhler *et al.* (1999). Morphological terminology and format for the redescription follows that of the original description of *Anolis rubribarbaris* (Köhler *et al.*, 1999). Fine-scale measurements were made using a stereomicroscope with an optical micrometer, with measurements rounded to the nearest 0.1 mm; all other measurements were made with dial calipers to the nearest 0.1 mm. Head length was measured from the tip of the snout to the anterior margin of the ear opening; head width was measured between oral ricti; snout length was measured from the tip of the snout to the anterior margin of the orbit. Loreal scale rows were counted to include up to a single row possessing only one scale. Tail height and width were measured at the level where the heel of the extended hind leg meets the tail. The following codes were used for relative leg length (anteriormost point reached by longest digit of adpressed hindlimb): 0 = axilla; 1 = between axilla and ear opening; 2 = ear opening; 3 = between ear opening and eye; 4 = posterior margin of orbit; 5 = center of eye; 6 = anterior margin of orbit; 7 = between eye and nostril; 8 = tip of snout; 9 = extending past tip of snout. Dorsal and ventral scales were counted along the midline; subdigital lamellae were counted on phalanges II to IV on the fourth toe. Specimens were deposited in the Florida Museum of Natural History (UF). Photographs used in Figures 1–3 were taken by the first author.

Systematics

Anolis rubribarbaris (Köhler, McCranie, & Wilson 1999)

Figs. 2–3

Norops rubribarbaris Köhler *et al.* 1999: 280.

Holotype. UF 90206, an adult male from 4 km S of San Luís de los Planes, 1700 m elevation, northern slope of Montaña de Santa Bárbara, Parque Nacional Montaña de Santa Bárbara, Depto. Santa Bárbara, Honduras, collected 3 March 1994 by Fred G. Thompson, original field number FGT 5659.

Referred specimens. UF 152660 (Figs. 2a, 2b), a small adult male, and UF 152661–62 (Fig. 3), adult females, all from disturbed cloud forest ca. 1–2 km W of El Cedral (14°54.49'N, 88°05.38'W), 1720–1740 m, E slope of Montaña de Santa Bárbara, Parque Nacional Montaña de Santa Bárbara, Depto. Santa Bárbara,

Honduras, collected 28 January 2008 by Leonel Erazo Chávez, Ileana R. Luque-Montes, Josiah H. Townsend, and Larry David Wilson.

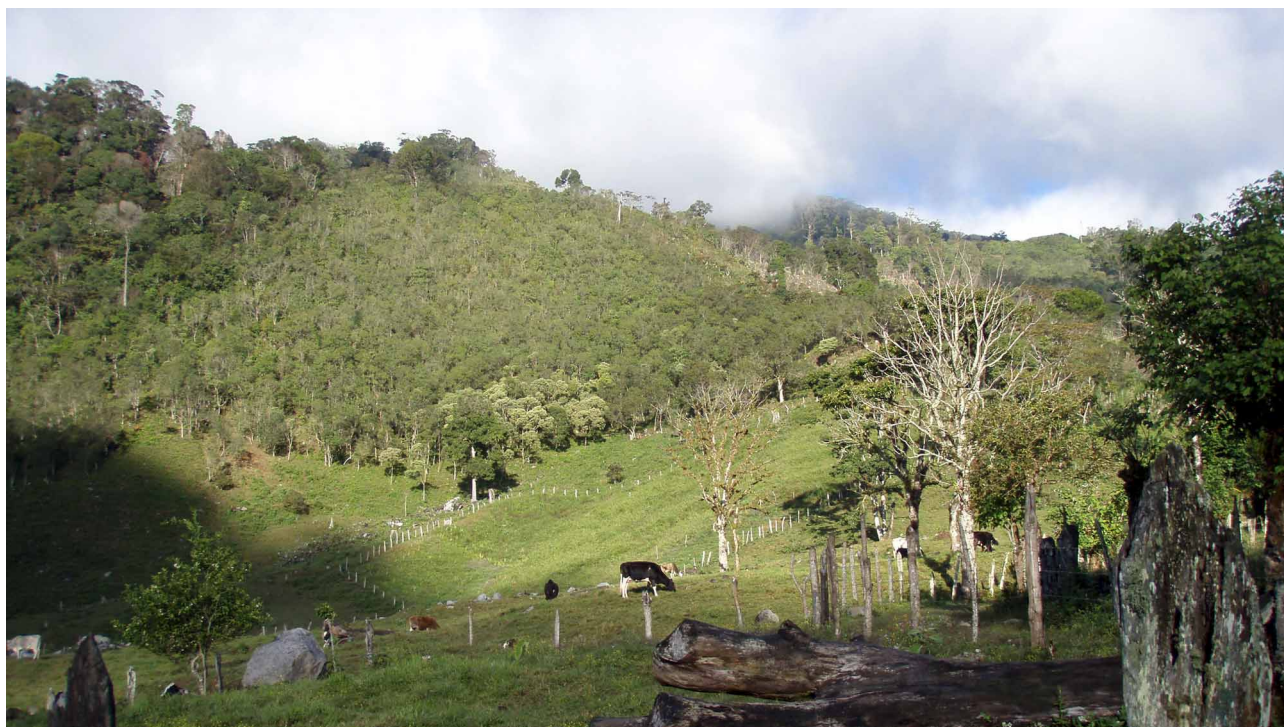


FIGURE 1. Parque Nacional Montaña de Santa Bárbara, Depto. Santa Bárbara, Honduras, seen from the community of El Cedral, 1570 m elevation, photographed 28 January 2008. The *Anolis rubribarbaris* discussed in this paper were collected from forest on the far hillside, partially obscured by clouds in this picture.

Diagnosis. *Anolis rubribarbaris* differs from all other Mesoamerican anoles, except those in the *crassulus* group, by having the following combination of characteristics: red dewlap, moderately to strongly enlarged medial dorsal scales, strongly keeled ventral scales, no more than one scale separating the supraorbital semicircles, four to five rows of loreals, suboculars and supralabials in contact, no axillary pocket, and heterogeneous flank squamation. Of the members of the *crassulus* group, *A. rubribarbaris* differs from *A. amplisquamosus* in having a red dewlap and enlarged middorsal scales grading into the dorsolateral scales (dewlap bright orange and middorsal scales abruptly larger than adjacent dorsolateral scales in *A. amplisquamosus*), from *A. heteropholidotus*, *A. muralla*, *A. sminthus*, and *A. wermuthi* in having strongly keeled ventral scales (ventral scales smooth or weakly keeled in *A. heteropholidotus*, *A. sminthus*, and *A. wermuthi* and smooth in *A. muralla*), and from *A. anisolepis*, *A. crassulus*, and *A. haguei* by having 8–11 rows of enlarged dorsal scales (usually 12–15 and as high as 23 in *A. anisolepis*, *A. crassulus* and *A. haguei*). This species can be distinguished from *A. sp.* (Townsend and Wilson, In press), and further differentiated from *A. wermuthi*, by having a hemipenis with an undivided asulcate processus (asulcate processus divided in *A. sp.* and *A. wermuthi*).

Definition. A medium sized (snout-vent length [SVL] 38.1–47.5 mm in two males, 40.2–51.6 mm in two females; tail length [TL] 84–120.5 mm in two males, 87–113 mm in two females; SVL/TL 2.16–2.54 in two males, 2.19–2.21 in two females) member of the *Anolis crassulus* species group with a laterally compressed tail (1.11–1.56 times as high as wide), head length/head width 1.36–1.66, head length/SVL 0.28–0.29, relative leg length 3–5, tibia length/SVL 0.23–0.26. Scales on snout keeled; 4–7 scales between internasals; canthal ridges well-defined, composed of 3–4 canthal scales, with 4–6 scales between second canthals; 20–25 weakly keeled to keeled loreal scales present in a maximum of 4–5 oblique rows; 6–6 supralabials to below center of eye; suboculars contacting supralabials; supraorbital semicircles well-developed, with 0–1 scales separating

supraorbital semicircles at narrowest point; interparietal scale well-developed, larger than surrounding scales, separated from supraorbital semicircles by 2–3 scales at the most proximate point; mental wider than long, partially divided by a medial suture; 4–6 postmentals, outermost pair the largest; 6–6/7 infralabials to below center of eye; keeled granular scales on chin and throat; males have a medium to large dewlap, and females have a small dewlap similarly colored to that of the male; greatest depth of extended male dewlap 5.5–7.9 mm; male dewlap length/SVL 0.358–0.36, female dewlap length/SVL 0.103–0.114; male dewlap extending 5.78–8.42% of SVL beyond level of axilla, bearing 30–50 large gorgetal scales in 5–10 oblique rows; skin between gorgetals lacking scales; female dewlap does not extend beyond level of axilla, bearing 30–50 large gorgetal scales in 5–10 oblique rows; skin between gorgetals lacking scales; dorsal scales keeled, with 8–11 middorsal rows irregularly enlarged; 25–30 dorsal scales in one head length; lateral scales heterogeneous, with slightly enlarged keeled scales scattered among smaller granular scales; ventral scales keeled, imbricate, largest at midbody; 25–29 ventral scales in one head length; caudal scales strongly keeled; enlarged postanal scales present; axillary pocket absent; limb scales keeled, imbricate, largest on anterior surface of upper limbs; 24–27 lamellae under phalanges II to IV of fourth toe; 8–9 lamellae under distal phalanx of fourth toe.

Hemipenis. The everted hemipenis of UF 152660, a subadult male, is a somewhat stout organ; asulcus processus undivided; sulcus spermaticus bounded by moderately well-developed sulcal lips, terminates at the base of the apex; truncus bearing some shallow folds, otherwise lacking surface structures; apical region appearing relatively smooth, slightly calyculate.

Color in life. Coloration in life of UF 152660 (Fig. 2a) was recorded as follows: dorsum rust brown on enlarged middorsal scale rows, smudged middorsally with dark gray; lateral region of body yellow-brown; anterior limbs yellow-brown; posterior limbs yellow-brown with narrow brown crossbars on lower limb; dorsum of head rust brown mottled with dark gray; tail yellow-brown with dark gray crossbars; venter peach-cream; dewlap red with slight orange tinge (Fig. 2b); iris rust brown. Coloration in life of UF 152661 was recorded as follows: dorsum uniform rust brown, lateral regions same; anterior limbs yellow-tan; posterior limbs rust brown; dorsum of head rust brown with dark gray smudging; tail rust brown; x-shaped dark brown mark at base of tail; venter pale peach with scattered black punctuations; small dewlap orangish red; iris rust brown. Coloration in life of UF 152662 (Fig. 3) was recorded as follows: enlarged middorsal scale rows gray brown with four dark brown chevrons; lateral regions yellow-gray with scattered black punctuations; anterior limbs yellow-tan; posterior limbs yellow-tan with brown crossbands on lower limb; dorsum of head gray-brown; tail brown with slightly dark crossbands; venter yellowish cream; small dewlap orangish red; iris rust brown.

Distribution and natural history. All known localities for *Anolis rubribarbaris* are in the Lower Montane Wet Forest formation, as defined by Holdridge (1967), in a relatively narrow elevational band between 1700 and 1740 m on the northern and eastern slopes of Montaña de Santa Bárbara. According to the original field notes, the holotype (UF 90206) was collected on limestone boulders along a dry stream bed at 1700 m elevation, presumably during the daytime. UF 152660, a male, was collected at 2015 h while it slept on an orchid leaf growing approximately 3 m high on the trunk of a large tree at 1720 m elevation along a trail through disturbed cloud forest. UF 152661, a female, was asleep on an adjacent leaf of the same orchid directly under UF 152660. The large female, UF 152662, was collected further along the same trail in a patch of lightly disturbed cloud forest at 1740 m elevation, while asleep on a bracken fern (*Pteridium* sp.) approximately 1 m above the ground at 2045 h. Undisturbed cloud forest occurs at all points above these collection localities on Montaña de Santa Bárbara, reaching a maximum elevation of 2744 m; however, herpetological survey work in the forests above 2000 m has not produced any additional material of *A. rubribarbaris*.

Conservation status. Based on the extent of the remaining forest in Parque Nacional Montaña de Santa Bárbara and the known distribution of *Anolis rubribarbaris*, this species would qualify as Endangered (EN B2ab[iii]) based on IUCN Red List Criteria (IUCN, 2001). This ranking assumes the distribution of *A. rubribarbaris* is not in fact limited to the 1700–1740 m elevational band described above and extends into the intact

forest above this elevation. This species was considered to have a high degree of vulnerability to environmental degradation (EVS=16) by Wilson and McCranie (2004), due to its occurrence in only a single forest formation, its status as a Honduran endemic, and low level of threat due to human persecution.

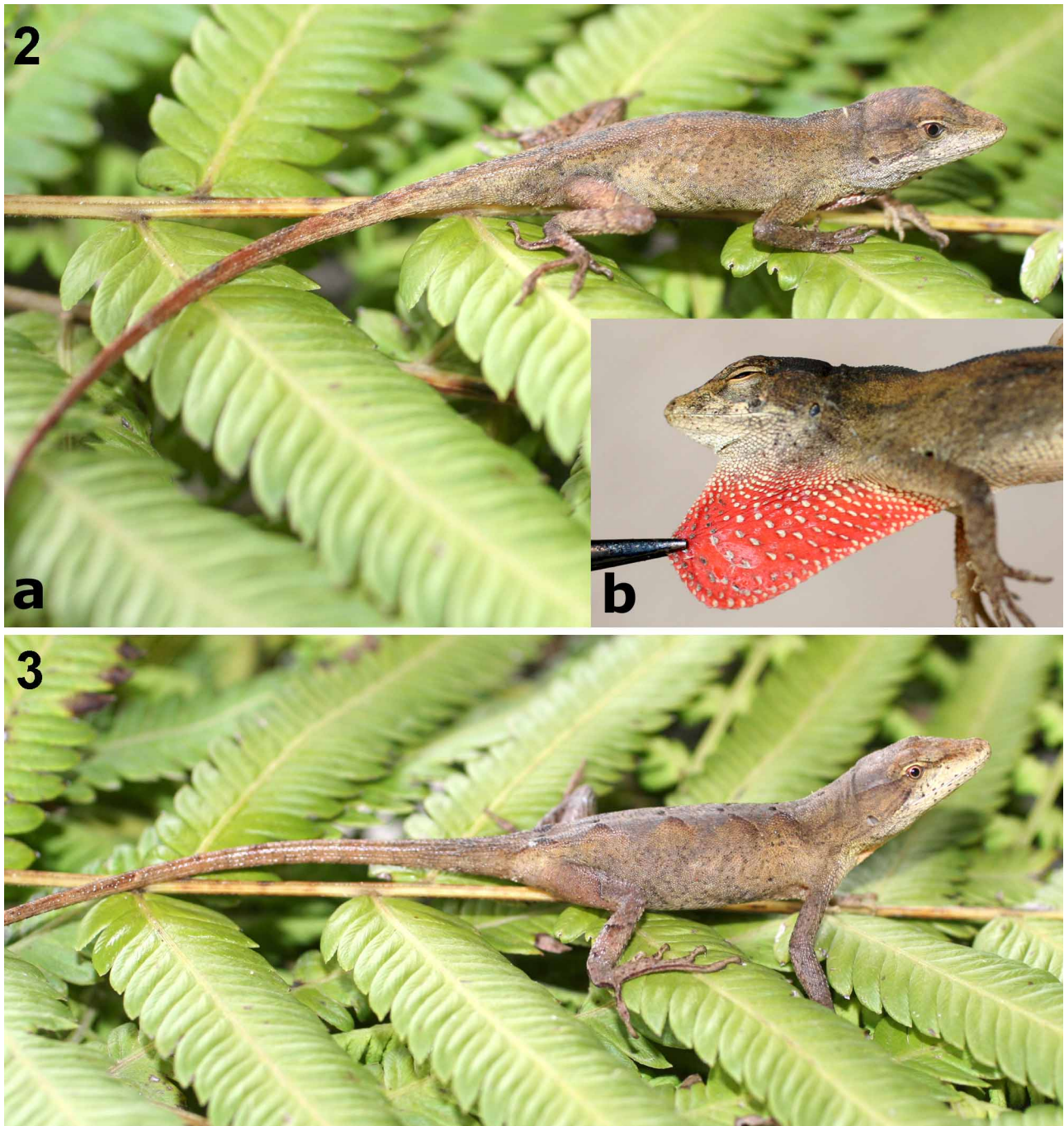


FIGURE: 2a) Subadult male *Anolis rubribarbaris* from above El Cedral, 1720 m elevation, Parque Nacional Santa Bárbara, Honduras; **2b)** dewlap of subadult male *A. rubribarbaris* shown in Fig. 2a (UF 152660); **3)** adult female *Anolis rubribarbaris* from above El Cedral, 1740 m elevation, Parque Nacional Santa Bárbara, Honduras (UF 152662).

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References

- Holdridge, L.R. (1967) *Life Zone Ecology*. Revised edition. Tropical Science Center, San José, Costa Rica. 206 p.
- IUCN (2001) *IUCN Red List Categories and Criteria: Version 3.1*. IUCN Species Survival Commission, IUCN, Gland, Switzerland and Cambridge, United Kingdom. ii + 30 pp.
- Köhler, G., McCranie, J.R. & Wilson, L.D. (1999) Two new species of anoles of the *Norops crassulus* group from Honduras (Reptilia: Sauria: Polychrotidae). *Amphibia-Reptilia*, 20, 279–298.
- McCranie, J.R. & Wilson, L.D. (2002) *The Amphibians of Honduras*. Society for the Study of Amphibians and Reptiles, Contributions in Herpetology 19, i–x, 1–625.
- Poe, S. (2004) Phylogeny of anoles. *Herpetological Monographs*, 18, 37–89.
- Townsend, J.H. & Wilson, L.D. (In press) New species of cloud forest *Anolis* (Reptilia: Squamata: Polychrotidae) in the *crassulus* group from Parque Nacional Montaña de Yoro, Honduras. *Copeia*.
- Wilson, L. D. & McCranie, J. R. (2004) The conservation status of the herpetofauna of Honduras. *Amphibian and Reptile Conservation*, 3, 6–33.