

A NEW SPECIES ALLIED TO *HYLA CIRCUMDATA* (ANURA: HYLIDAE) FROM SERRA DA MANTIQUEIRA, SOUTHEASTERN BRAZIL

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ABSTRACT: *Hyla circumdata* (Cope, 1870) occurs in subtropical and tropical rain forests, distributed over mountain ranges of the Brazilian Plateau, mainly in the Serra do Mar and Serra da Mantiqueira ranges. Samples of the northern sector of Serra da Mantiqueira revealed distinctive characters when compared to samples from the southern sectors of Serra da Mantiqueira and Serra do Mar, which suggest that the former is a new species. The new species is characterized mainly by large size (snout–vent length 57.5–70.0 mm in males; 55.3–67.2 mm in females), absence of vocal slits in adult males, and a large tympanum.

Key words: Anura; Hylidae; *Hyla circumdata* species group; New species; Serra da Mantiqueira; Southeastern Brazil

HYLA CIRCUMDATA (Cope, 1870) occurs in stream habitats in Atlantic Forests and is distributed over mountain ranges of the southern and southeastern Brazilian highlands (Caramaschi et al., 2001; Frost, 2002). Among the principal ranges of the Brazilian Plateau is Serra da Mantiqueira, which starts in the State of São Paulo and goes northeastwards to the State of Espírito Santo. It is divided in sectors south and north by Paraíba do Sul river valley (Alvarenga et al., 1997). Morphological comparisons among population samples of *H. circumdata* from the northern sector of Serra da Mantiqueira with that from the southern sector, and from the Serra do Mar range, revealed distinctive characters among them, which suggest that the former is a new species, described herein.

MATERIALS AND METHODS

Museum acronyms of specimens used in the descriptions or examined for comparisons follow Leviton et al. (1985), augmented by MZUFV (Museu de História Natural “João Moojen de Oliveira”, Universidade Federal de Viçosa, Minas Gerais, Brazil). For additional specimens examined see Caramaschi et al. (2001).

Fifteen morphometric characters were used in the account (Fig. 1), and were recorded in millimeters. Nine measurements follow Duellman (1970): SVL (snout–vent length); HL (head length); HW (head width); ED (eye

diameter); UEW (upper eyelid width); IOD (interorbital distance); IND (internarial distance); TD (tympanum diameter); and TL (tibia length). Thigh length (THL) follows Heyer et al. (1990). The five other remaining measurements are: END (eye–nostril distance: straight line distance from anterior corner of orbital opening to posterior margin of external naris); NSD (nostril to tip of snout distance: straight line distance from anterior corner of nostril to tip of snout); FL (foot length: distance from heel to tip of fourth toe); 3FD (third finger disk diameter: greatest horizontal distance between outer edges of third finger disk); and 4TD (fourth toe disk diameter: greatest horizontal distance between outer edges of fourth toe disk). An ocular micrometer in a Zeiss stereomicroscope was used for all variables, except for SVL, HL, HW, THL, TL, and FL, which were measured with a vernier caliper. Principal component analysis (Marcus, 1990) was used in order to summarize the degree of morphometric differences between males and females. Eigenvectors and associated eigenvalues were obtained from a variance-covariance matrix. The software JACKknifed Interactive Eigenanalysis for Windows, ver. 1.13, was used for this purpose. I used *t*-tests to compare mean values from measurement variables of males and females. Drawings were made using a Zeiss stereomicroscope with a drawing tube. Webbing formula notation follows Savage and Heyer (1967), as modified by Myers and Duellman (1982).

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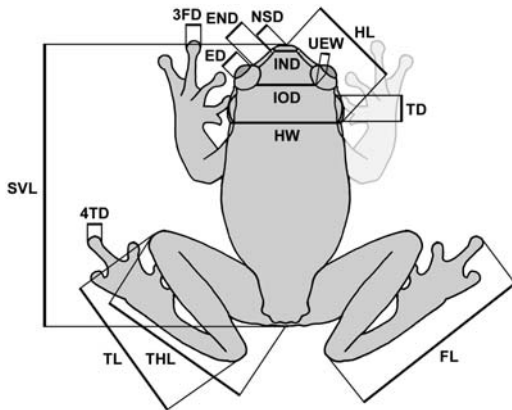


FIG. 1.—Dorsal outline of a diagrammatic tree frog with measurement variables used in the account. SVL, snout-vent length; HL, head length; HW, head width; IOD, interorbital distance; IND, internarial distance; ED, eye diameter; END, eye-nostril distance; NSD, nostril to tip of snout distance; UEW, upper eyelid width; TD, tympanum diameter; THL, thigh length; TL, tibia length; FL, foot length; 3FD, third finger disk diameter; 4TD, fourth toe disk diameter.

SPECIES ACCOUNT

Hyla caramaschii sp. nov.

Hyla circumdata (Cope, 1870): Frost, 1985 (part), 2002 (part); Lutz, 1973 (part).

Holotype.—MNRJ 23701, adult male, collected on 15–16 January 1983, from Municipality of Santa Teresa (19° 56' S, 40° 36' W; 655 m altitude), State of Espírito Santo, Brazil, by S. P. Carvalho e Silva, A. M. Carvalho e Silva, E. Izecksohn, and A. L. Izecksohn (Figs. 2, 3).

Paratopotypes.—MNRJ 23709–13; EI 9038, 9041, 9044, 9046–47, 9064, 9066, 9073, adult males; MNRJ 23702–08; EI 9037, 9039–40, 9042–43, 9045, 9048–50, 9065, 9067–72, 9074–88, adult females. All collected with the holotype.

Referred specimens.—Brazil: Espírito Santo: Domingos Martins (EI 9094); Fundão (MNRJ 29975). Minas Gerais: Araponga, Serra do Brigadeiro (MNRJ 23465–66; MZUFV 1632; 2748–49; 3301; 3653–56; 3680–81); Simonésia (MNRJ 21375–82; 21386–87; 23690).

Diagnosis.—Species characterized by the following combination of traits: (1) large size (SVL 57.5–70.0 mm in males; 55.3–67.2 mm in females); (2) absence of vocal slits in adult males; (3) head wider than longer in males, its width 2.7–2.8 times smaller than SVL; (4) tympanum large (TD/SVL 0.07–0.10); (5)



FIG. 2.—Holotype of *Hyla caramaschii* sp. nov., MNRJ 21356, adult male, SVL 65.0 mm.

dorsum medium to blackish brown, with transverse dark brown bars; (6) flanks, anterior, and posterior surfaces of thighs with dark transverse brown stripes.

The absence of vocal slits in adult males of *Hyla caramaschii* distinguish them from all but one member of the species group, with which they often occur (the exception is *H. izecksohni*). *Hyla caramaschii* is larger than *H. astartea*, *H. ibitipoca*, *H. izecksohni*, *H. nanuzae*, *H. sazimai*, and *H. ravida* (SVL 30.1–50.9 mm in adult specimens). Dorsum blackish brown or with transverse dark brown stripes in *H. caramaschii*, while in *H. ibitipoca* and *H. sazimai* it is cream color, the latter with reticulated thin brown stripes and random brown dots over it; also, *H. gouveai*, *H. carvalhoi*, and *H. astartea* have immaculate dorsa (the latter with dorsal surfaces golden-brown), and *H. nanuzae* lacks distinct transverse brown bars over it. Anterior and posterior surfaces of thighs have transverse brown stripes in *H. caramaschii*, they are immaculate in *H. nanuzae*, and with thin and fragmented stripes in *H. carvalhoi*. The large tympanum distinguishes *H. caramaschii* (TD/SVL, males 0.08–0.10; females 0.07–0.09) from *H. astartea* (TD/SVL 0.04–0.06), *H. gouveai* (TD/SVL, males 0.06–0.07; females 0.06–0.08), *H. hylax* (TD/SVL, males 0.05–0.07; females 0.05–0.06), *H. ibitipoca* (TD/SVL 0.06–0.07), and *H. ravida* (TD/SVL 0.06–0.08); also, from adult males of *H. carvalhoi*

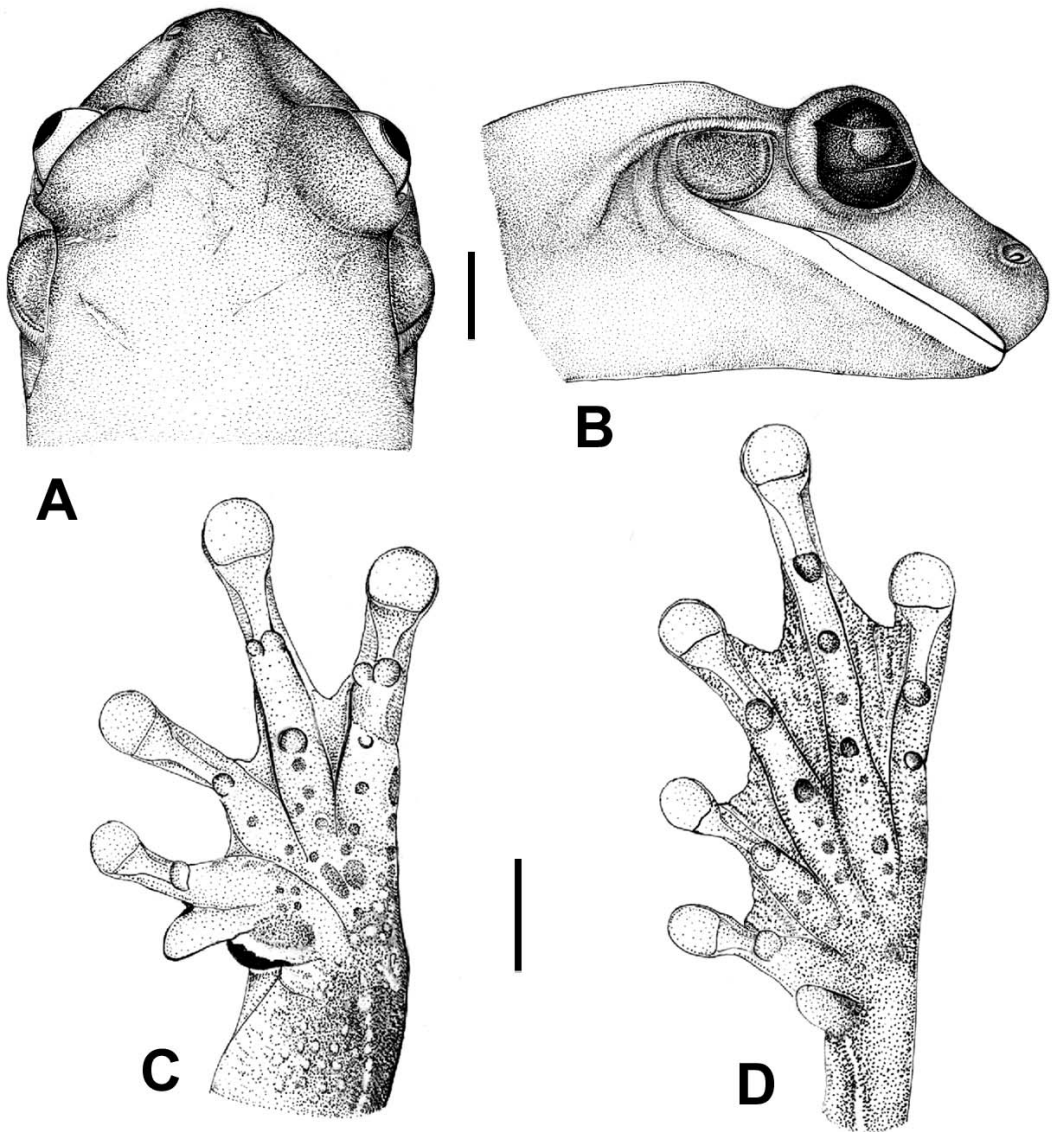


FIG. 3.—*Hyla caramaschii* sp. nov., MNRJ 21356, holotype, adult male. (A) Dorsal and (B) lateral views of head; (C) hand, and (D) foot. Vertical line equals 5 mm.

(TD/SVL 0.05–0.06), *H. circumdata* (TD/SVL 0.06–0.09), *H. nanuzae*, and *H. sazimai* (combined species TD/SVL 0.06–0.07). The narrower head distinguishes males of *H. caramaschii* (SVL/HW 2.7–2.9) from males of *H. ravida* (SVL/HW 2.5–2.7). Males of *H. caramaschii* have distal tubercles of fourth finger bifid or divided, while rounded in *H. luctuosa*.

Description of adult specimens.—Descriptive statistics are presented in Table 1. Large species (SVL in males 57.5–70.0 mm; females 55.3–67.1 mm). Male head wider than long; female head length smaller (70.2%), larger (25.5%), or equal (4.2%) to head width. Head width 2.6–3.0 times smaller than snout–vent length. Internarial distance smaller than eye–nostril distance and eye diameter, the latter

TABLE 1.—Descriptive statistics of adult males and females of *Hyla caramaschii* sp. nov. from Santa Teresa, State of Espírito Santo, Brazil. n = number of specimens; \bar{X} = mean; Min = minimum; Max = maximum; SD = standard deviation.

	Males ($n = 14$)				Females ($n = 37$)			
	\bar{X}	Min	Max	SD	\bar{X}	Min	Max	SD
SVL	62.85	57.5	70.0	3.80	60.26	55.3	67.2	3.55
HL	22.05	20.5	24.0	1.11	20.92	19.1	23.6	1.17
HW	22.47	20.5	24.7	1.25	20.65	18.5	23.0	1.24
ED	6.62	6.0	7.5	0.45	6.51	5.6	7.6	0.48
END	5.95	5.3	6.4	0.35	5.62	5.0	6.8	0.40
TD	5.46	4.6	6.2	0.46	5.01	4.2	6.0	0.44
UEW	5.34	4.8	6.0	0.40	5.17	4.0	6.4	0.54
IOD	6.86	6.0	7.6	0.44	6.27	4.8	7.6	0.55
IND	3.85	3.5	4.3	0.25	3.49	3.0	3.8	0.22
NSD	3.30	2.9	3.9	0.32	2.89	2.4	3.4	0.22
THL	32.79	30.0	35.7	1.72	31.08	28.0	40.0	2.28
TL	32.56	30.0	35.3	1.58	31.08	28.8	35.0	1.59
FL	44.73	42.0	48.5	2.08	42.10	38.6	46.6	2.28
3FD	3.10	2.6	3.7	0.30	2.80	2.2	3.4	0.26
4TD	2.97	2.6	3.4	0.25	2.61	2.0	3.2	0.27
SVL/HW	2.80	2.68	2.89	0.07	2.92	2.72	3.09	0.08
ED/TD	1.22	1.03	1.36	0.10	1.30	1.09	1.58	0.11
TD/SVL	0.09	0.08	0.10	0.01	0.08	0.07	0.09	0.00
ED/SVL	0.11	0.10	0.11	0.01	0.11	0.10	0.12	0.01
THL/SVL	0.52	0.50	0.55	0.02	0.52	0.47	0.72	0.04
TL/SVL	0.52	0.48	0.55	0.02	0.52	0.47	0.55	0.02
THL + TL	65.35	60.0	71.0	3.26	62.16	56.8	70.3	3.53

larger than eye–nostril distance. Snout rounded or slightly truncate in dorsal and lateral outlines (Fig. 3A,B). Canthus rostralis distinct. Loreal region oblique. Tympanum large, nearly circular, its width 1.0–1.4 (males) and 1.1–1.6 (females) times smaller than eye diameter. Supratympanic fold strongly visible in males, partially covering the tympanum, and weakly visible in females. Nostrils directed laterally and slightly forward. Internarial region straight, not furrowed. Vomerine teeth present in two angular patches between choanae. Vocal slits absent in males and females. Tongue ovoid, rounded or cordiform. Forearm hypertrophied, with a weak, smooth dermal fringe. Third finger disk diameter nearly equal to fourth toe disk (Fig. 3C,D). Subarticular tubercles rounded; distal tubercle of fourth finger bifid or divided in males, and bifid/divided (84.8%) or rounded (15.2%) in females; supernumerary tubercles present; palmar tubercle weakly developed, divided; prepollex large in males, curved, single (not bifid), and with protruding prepollical spine; modal webbing formula, I 2 3/4–2 3/4 II 2–3

III 2 1/2–2⁺ IV. Thigh and tibia approximately of the same length, sum of them larger than snout–vent length. Tarsus with weak, smooth dermal fringe on outer surface; no calcar. Subarticular tubercles rounded; supernumerary tubercles distinct; modal webbing formula, I 1 1/2–2 II 1⁺–2⁺ III 1⁺–2 1/2 IV 2⁺–1⁺ V. Belly and ventral surfaces of thighs glandular; chest, throat, and ventral surfaces of arms smooth.

Color in life.—The following description is based on the adult male MNRJ 23690, from Simonésia, State of Minas Gerais, Brazil (20° 07'S, 42° 00'W; 600 m altitude). Dorsal surfaces dark brown to blackish brown, with transverse dark brown bars on dorsum, flanks, arms, thighs, shanks, tarsus, and feet. Belly and ventral surfaces of thighs vivid yellow; chest and throat pale yellow; anterior and posterior surfaces of thighs and shanks purple with transverse dark purple bars; areas between thighs and flanks purple; ventral surfaces of arms, hands, shanks, tarsus, and feet, purple.

Color in preservative.—Dorsal surfaces medium to blackish brown, with transverse dark brown bars on dorsum, flanks, arms, thighs, shanks, tarsus, and feet. A weak brown vertebral stripe might be present from the tip of snout to the middle of dorsum. Some specimens with distinct white blotches on dorsum, elbow, knee, and above cloacae. Canthus rostralis delimited by a subcanthal dark brown stripe. Flanks pale cream with transverse dark brown bars; anterior and posterior surfaces of thighs medium brown; ventral surfaces pale cream.

Measurements of holotype (in mm).—SVL 65.0, HL 23.2, HW 23.6, ED 6.8, END 6.2, TD 6.2, UEW 4.8, IOD 7.2, IND 4.2, NSD 3.6, THL 35.3, TL 34.5, FL 45.8, 3FD 3.6, 4TD 3.1.

Sexual dimorphism.—Adult males of *Hyla caramaschii* have hypertrophied forearms and enlarged prepollices, whereas adult females lack these features. I used the principal component analysis to summarize the degree of morphometric differences between males and females. Only adult specimens were sampled. The vector–correlation coefficient, which measures the similarity of size vectors for pair-wise comparisons of samples (Reis et al., 1988), was high (0.99). The first within-group principal component is a consistent measure of general

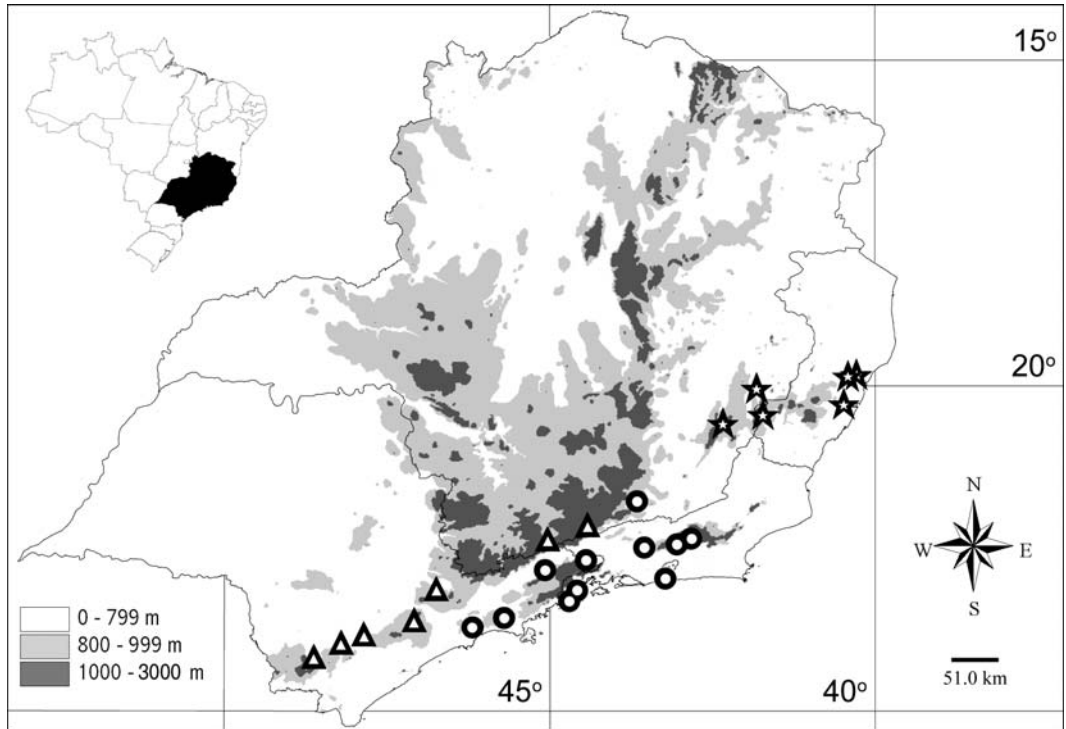


FIG. 4.—Geographic distribution of *Hyla caramaschii* sp. nov. (stars), *H. circumdata* (circles), and *H. luctuosa* (triangles) on topographic map. The geographic distribution of *H. circumdata* and *H. luctuosa* follows Napoli (2000).

size, with positive coefficients for all characters (Strauss and Fuiman, 1985), and accounts for 59.29% of total variance; the second axis is a consistent measure of shape, which alternates positive and negative coefficient values (Humphries et al., 1981), and accounts for 15.41% of total variance. The projection of the individual scores of both sexes resulted in a strong discrimination between them, mainly along the second axis, denoting differences in shape between males and females. The variables that most contributed to the discrimination were eye diameter and head width. The statistical comparisons for these two variables denoted that there was no statistical difference between males and females for eye diameter ($t = 0.1$; $df = 65$; $P < 0.92$), whereas males have wider heads than females ($t = 2.64$; $df = 65$; $P < 0.01$). In general, females had larger tympanum diameters than males ($t = 2.64$; $df = 65$; $P < 0.01$).

Natural history.—Adult males (type series) from Santa Teresa, Espírito Santo, were captured calling near a forest stream (E. Izecksohn, personal communication) with gravid females.

The adult male MNRJ 29975 from Parque Municipal Pico do Goiapaba-Açu (19° 54.9' S, 40° 28.3' W, 720–850 m altitude), Municipality of Fundão, Espírito Santo, was captured near a mountain forest stream (J. L. Gasparini, personal communication). The adult male MNRJ 23690 from Simonésia, Minas Gerais (not calling) was collected by me near a forest stream and a temporary pond formed by rainwater, alone on a branch that was standing upright 1.8 m from the ground. The call of *H. caramaschii* from Santa Teresa, State of Espírito Santo, was recorded by J. L. Gasparini (inappropriate for bioacoustics analysis) and resembles the call of *H. circumdata* from Teresópolis, State of Rio de Janeiro (recorded by me; unpublished). The tadpole is unknown.

Geographic distribution.—*Hyla caramaschii* and allied species (*H. circumdata* and *H. luctuosa*) inhabit a complex region consisting of a relatively high plateau (Planalto Atlântico) at around 700–1000 m altitude with numerous depressions and rift valleys, and a number of mountain ranges including Serra do Mar and Serra da Mantiqueira (Fig. 4).

Hyla caramaschii is restricted to the northern sector of Serra da Mantiqueira range, which rises to ca. 2770 m altitude, separated from mountains of a plateau named “Planalto Centro-Sul de Minas” by a relatively low-lying rift valley known as “Depressão do Rio Doce”, and from the southern sector of Serra da Mantiqueira range by another rift valley known as “Depressão do Rio Paraíba do Sul”. The latter valley extends through about 23° S and separates Serra do Mar mountain range, closer to the coast, from the southern sector of Serra da Mantiqueira range. As *H. caramaschii*, *H. circumdata*, and *H. luctuosa* are confined ecologically to stream habitats, covered by Tropical Atlantic forests distributed over mountain ranges, and do not cross open habitats, the referred valleys act as altimetric and ecologic barriers to the dispersion of these populations, and probably contributed as an isolation mechanism to the speciation of *H. caramaschii*. The species of the *H. circumdata* group inhabit similar ecological areas to *H. caramaschii* in southeastern Brazil (Napoli, 2000), and the pattern of distribution of these species suggests that it is correlated with uplifting of coastal mountains throughout the Cenozoic.

Etymology.—The name is a noun in the genitive case honoring Ulisses Caramaschi, for his extensive contribution to the knowledge of Brazilian herpetology.

RESUMO

Hyla circumdata (Cope, 1870) se distribui em áreas de floresta tropical, principalmente nos complexos da Serra do Mar e da Mantiqueira. Amostras populacionais do setor setentrional da Serra da Mantiqueira revelaram caracteres distintivos quando comparadas a amostras do setor sul da Serra da Mantiqueira e da Serra do Mar, indicando que as primeiras constituem uma nova espécie, descrita neste trabalho. A nova espécie é caracterizada principalmente pelo tamanho grande (comprimento rostro-cloacal 57.5–70.0 mm em machos; 55.3–67.2 mm em fêmeas), ausência de fendas vocais em machos adultos e tímpano grande.

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A NEW SPECIES OF *SCINAX* (ANURA: HYLIDAE) FROM MISIONES, ARGENTINA

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ABSTRACT: A new species of the *Scinax catharinae* group is described from Misiones, northeastern Argentina. It is characterized by the dark yellow flash colors in hidden areas of thigh and shank; robust but not hypetrophied forearm; and lack of a thick glandular patch in the inguinal region. It is closely related to *Scinax berthae*, from which it can be distinguished by having a more robust forearm and less toe webbing. In addition, relative to *S. berthae*, males of the new species are slightly larger and the few known females are notably larger.

Key words: Anura; Argentina; Hylidae; New species; *Scinax*; *Scinax aromothyella*; *Scinax catharinae*; *Scinax berthae*

THE TREE frog genus *Scinax* includes 85 recognized species that occur from Mexico to east-central Argentina (updated from Frost, 2002). Nine species have been recorded from Argentina, including *S. acuminatus* (Cope, 1862); *S. berthae* (Barrio, 1962); *S. castroviejoi* De la Riva 1993 (but see De la Riva, Haddad, and Lasahara, 2000); *S. fuscmarginatus* (A. Lutz, 1925); *S. fuscovarius* (A. Lutz, 1925); *S. granulatus* (Peters, 1871); *S. nasicus* (Cope, 1862); *S. squalirostris* (A. Lutz, 1925); and *S. perereca* Pombal, Haddad, and Lasahara, 1995. Of these, all but *S. berthae* belong to the *ruber* clade, as defined by Faivovich (2002), whereas *S.*

berthae is included in the *S. catharinae* species group of the *catharinae* clade. In this paper, I describe a new species of *Scinax* collected during fieldwork in Misiones, Argentina. The new species is the second Argentine frog that belongs to the *S. catharinae* species group.

Webbing formula follows Savage and Heyer (1967) as modified by Myers and Duellman (1982). Measurements (in millimeters) follow Duellman (1970). Abbreviations used throughout the text are SVL (snout–vent length), HL (head length), HW (head width), IND (internarial distance), ED (eye diameter), EN (eye–nostril distance), TD (tympanum diameter), TL (tibia length), and FL (foot length). Reported geographic coordinates were taken with a global positioning system

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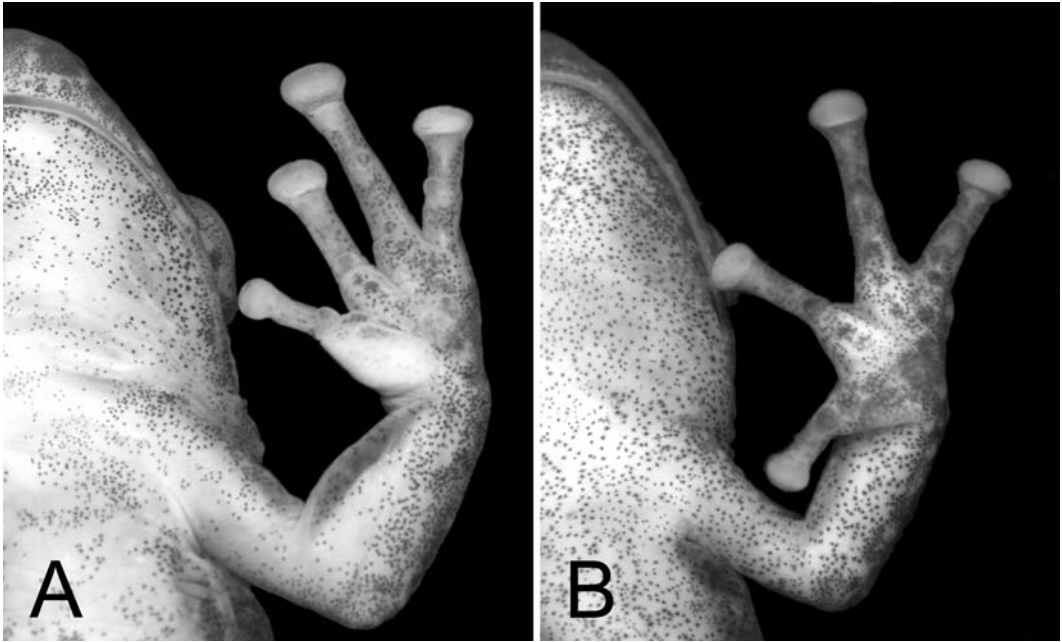


FIG. 1.—Ventral view of left arm of males of (A) *Scinax aromothyella* MACN 35265 (paratype), SVL 20.2 mm, (B) *Scinax berthae* MACN 37249, SVL 20.3 mm.

(GPS). Sex was determined by examination of secondary sexual characters (nuptial pads, vocal slits, and expansion of the vocal sac) or, when in doubt, by examination of gonads.

In males of *Scinax berthae* and the new species described below, the vocal sac is more expanded and folded than those of males of other species of the *S. catharinae* group. A brief discussion of vocal sac morphology and definitions employed by previous authors, as applicable to *Scinax*, was included in Faivovich (2002: character 36). It should be noticed that although in that paper both *S. berthae* and the new species (as *S. sp. 1*) were coded as 36.1 (i.e., vocal sac externally evident by loose, partially expanded skin), the condition of the vocal sac could actually be different from that present in all exemplars of the *S. ruber* clade, where the skin of the vocal sac seems to be thinner.

Specimens examined are in the following collections: American Museum of Natural History (AMNH); Centro Nacional de Investigaciones Iológicas (CENAI), housed at Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”; collection of Celio F. B. Haddad, Universidade Estadual Pau-

lista, Rio Claro, São Paulo, Brazil (CFBH); Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium (IRSNB); Laboratorio de Investigaciones Herpetológicas, Universidad de Buenos Aires, Argentina (LIH), partially housed at Museo Argentino de Ciencias Naturales “Bernardino Rivadavia,” Buenos Aires, Argentina (MACN); Museu Nacional, Rio de Janeiro, Brazil (MNRJ); Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil (MZUSP); Museo de História Natural, Universidade de Campinas, Campinas, São Paulo, Brazil (ZUEC); Departamento de Zoologia, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil (ZUF RJ). See Appendix I for additional specimens examined.

DESCRIPTION OF NEW SPECIES

Scinax aromothyella sp. nov.

Scinax berthae (no Barrio, 1962): Langone and Prigioni (1988) (part).

Scinax sp. 1: Faivovich (2002)

Holotype.—MACN 35278, adult male, from Argentina: Misiones: Departamento Guarany:

San Vicente: Km 1272, Ruta Nacional 14, Campo Anexo INTA "Cuartel Rio Victoria" (26°55' S, 54°25' W) Collected on 19 February 1994, by J. C. Baciluk and J. Faivovich.

Paratopotypes.—MACN 35272–35273, adult females; MACN 35262 (specimen with some superficial dissections), 35265–35271, 35274–35277, 37102–37117, adult males. Collected at the type locality on various dates.

Referred specimens.—MACN 37123 male, MACN 37124 female, from Argentina: Misiones: Departamento San Pedro: Piñalito, 20 January 1998; CENAI 1269 from Misiones: Departamento Iguazu: Villa Cabureí, 13 January 1966.

Definition and diagnosis.—A species of the *Scinax catharinae* species group characterized by a vocal sac somewhat differentiated externally; a moderately enlarged forearm (Fig. 1); thick, externally well differentiated inguinal gland absent; inguinal region and concealed areas of thigh and shank dark yellow in life; SVL males 20.2–24.8 ($n = 28$); SVL females 29.8–31.8 ($n = 2$).

The vocal sac is slightly distended externally, distinguishing males of *S. aromothyella* from most species of the *S. catharinae* group, with the exception of *S. berthae*, to which it is most similar. *S. aromothyella* differs from *S. berthae* by the robustness of the forearm (slender in *S. berthae*), toe webbing much less developed, and larger SVL of females (*S. aromothyella* 29.8–31.8, $n = 2$; *S. berthae* 23.5–25.0, $\bar{x} = 24.5$, $n = 4$); SVL of males partially overlaps (*S. aromothyella*: 20.2–24.8, $\bar{x} = 22.7$, $n = 28$; *S. berthae* 17.7–22.2, $\bar{x} = 20.5$, $n = 19$).

The lack of thick, externally well differentiated inguinal glands separates *S. aromothyella* from *S. centralis* Pombal and Bastos, 1996, *S. hiemalis* (Haddad and Pombal, 1987), and *S. jureia* (Pombal and Gordo, 1991). The smaller SVL of males differentiates *S. aromothyella* from *S. albicans* (Bokermann, 1967) (range 26.4–31.2, $n = 10$, Carvalho e Silva, 1994), *S. catharinae* (Boulenger, 1888) (range 30.4–35.1, $n = 5$; Carvalho e Silva, 1994), and *S. ariadne* (Bokermann, 1967) (range 32.6–35.3, $n = 4$; see Bokermann, 1967). Larger males of *S. aromothyella* are similar in SVL to smaller males of *S. longilineus* (B. Lutz, 1968), and *S. canastrensis* (Cardoso and Haddad, 1982), whose combined SVL is 24.5–30.5 (Andrade

and Cardoso, 1991; Cardoso and Haddad, 1982); these species are more robust and have a more developed supratympanic fold; the latter has several tubercles scattered on the dorsum and a more acuminate snout in dorsal view. Some overlapping occurs in male SVL between *S. aromothyella* and *S. flavogutattus* (Lutz and Lutz, 1939) (23.2–28.0, $n = 10$, Carvalho e Silva, 1994), but *S. aromothyella* can be distinguished by having a less protruded snout in profile, color pattern, and smaller female SVL (in *S. flavogutattus* 38.6–42.8, $n = 5$, Carvalho e Silva, 1994).

The larger SVL of males separates *S. aromothyella* from *S. machadoi* (Bokermann and Sazima, 1973) (range 14.6–17.0, $n = 10$, Carvalho e Silva, 1994; see Bokermann and Sazima, 1973), *S. argyreornatus* (Miranda-Ribeiro, 1926) (range 13.5–15.8, $n = 20$, Carnaval, 1997), and *S. agilis* (Cruz and Peixoto, 1982) (range 13.5–19.5, including females; see Cruz and Peixoto, 1982).

Reduced toe webbing separates *S. aromothyella* from *S. ranki* (Andrade et al., 1987), *S. canastrensis*, *S. centralis*, *S. berthae*, *S. ariadne*, *S. heyeri* (Weygoldt, 1986), *S. jureia*, and *S. longilineus*, all of which have toe webbing extending to the base of the disc on the lateral margin of Toe III and the medial margin of Toe V.

The nonhypertrophied arm differentiates *Scinax aromothyella* from *S. brieni* (De Witte, 1930), *S. obtriangulatus* (B. Lutz, 1973), *S. trapicheiroi* (B. Lutz, 1954), and *S. rizibilis* (Bokermann, 1964); furthermore, it differs from the latter species in having a smaller nuptial pad.

In life, a dark yellow inguinal region and hidden areas of thigh and shank distinguish *Scinax aromothyella* from *S. ariadne*, *S. angrensis* (B. Lutz, 1973), *S. albicans*, *S. catharinae*, *S. kautskyi* (Carvalho e Silva and Peixoto, 1991), *S. trapicheiroi* (all with these regions opaline green; Carvalho e Silva, 1994; B. Lutz, 1973), *S. littoralis* (Pombal and Gordo, 1991) (black bars on a whitish or greenish background; Pombal and Gordo, 1991), *S. hiemalis* and *S. ranki* (black blotches on a greenish background; Andrade and Cardoso, 1987; Haddad and Pombal, 1987), *S. carnevalli* (Caramaschi and Kisteumacher, 1991) and *S. jureia* (black blotches on a whitish background; Caramaschi and Kisteumacher,

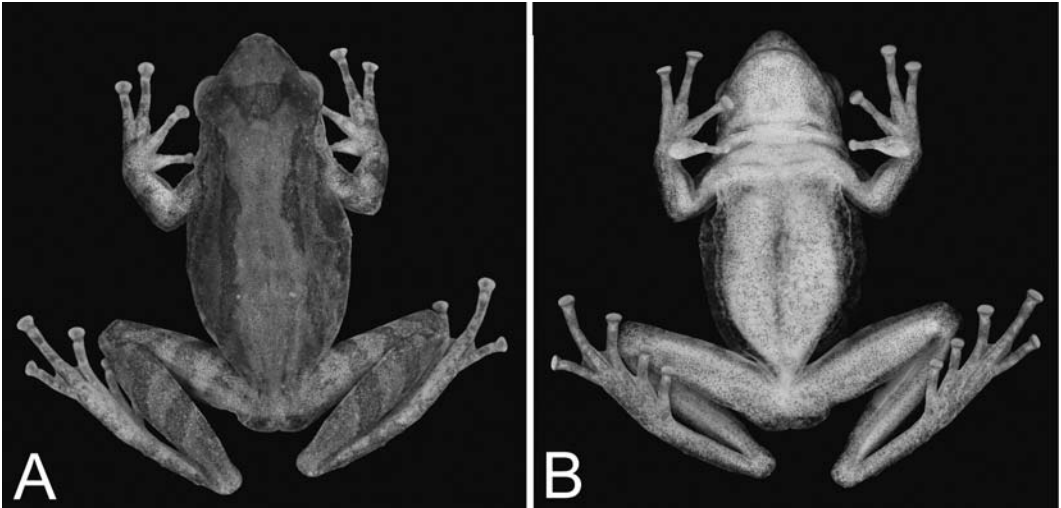


FIG. 2.—*Scinax aromothyella*, MACN 35278 (holotype), SVL 24.5 mm. (A) Dorsal view, (B) ventral view.

1989; Pombal and Gordo, 1991), *S. luizotavioi* (Caramaschi and Kisteumacher, 1991) (brown marbling; Caramaschi and Kisteumacher, 1989), *S. brieni* (pale blue; B. Lutz, 1973), *S. humilis* (B. Lutz, 1954) (“pale Nile blue to very pallid turquoise”; B. Lutz, 1973), and *S. obtriangulatus* (“dull grayish violet”; B. Lutz, 1973).

Description of the holotype.—Adult male (Figs. 2 and 3); body moderately robust, head nearly triangular in dorsal view, protruding in profile; head longer than wide, 32% of SVL. Nostrils slightly protruded, located laterally; distance between nostrils 43% of IOD. Tubercle between nostrils absent. Canthus rostralis rounded. Loreal region concave, forming abrupt slope toward lip. Eye large, ED 52% of IOD, almost equal to EN. Tympanum rounded, separated from eye by distance almost equal to TD. TD 25% larger than width of disc of Finger III. Supratympanic fold poorly developed. Some scattered, flat, barely distinguishable rounded tubercles above tympanum and on eyelid. Vocal sac subgular, slightly lateralized, externally expanded. Tongue oval, free laterally and posteriorly, shallowly notched posteriorly. Vomerine teeth in two series between choanae, though slightly displaced posteriorly. Choanae elliptical. Vocal slits present, longitudinal.

Arm slender, forearm robust. Axillary membrane absent. Ulnar tubercles absent. Fingers

slender; subarticular tubercles single, conical on Fingers I and II; rounded on Fingers III and IV. Palmar tubercle somewhat flat, distally bifid; thenar tubercle elliptical. discs elliptical, wider than long; disc on Finger I noticeably smaller than others. Webbing absent between Fingers III and IV, extremely reduced between Finger I and II, and II and III. Thick, unpigmented nuptial pad covering base of thumb dorsomedially, extending medially up to outer margin of the palmar tubercle, and distally up base of first phalanx. Hind limbs slender; TL 51% of SVL. A rounded, low tubercle present on heel. Toes slender; subarticular tubercles conical, those on Toe IV slightly rounded. Outer metatarsal tubercle conical, small; inner metatarsal tubercle sub-circular, nearly twice as large as outer tubercle. Discs subelliptical, wider than long. Webbing formula $I\ 2^{+}-2^{1/2}\ II\ 2-3^{+}\ III\ 2-3^{+}\ IV\ 3-2\ V$. Tarsal fold absent. Three flat, almost indistinguishable tubercles along tarsus.

Thin, irregular patch of glandular tissue present in inguinal region. Pectoral fold absent. Anal opening at upper level of thighs. Skin on throat and dorsum smooth, granular on belly and undersurfaces of thigh.

Color in preservative.—Dorsum light brown, with an inverted dark brown trapezoid-shaped interocular mark, posterior margin notched; two irregular longitudinal wide stripes on each side, one extending dorsolat-

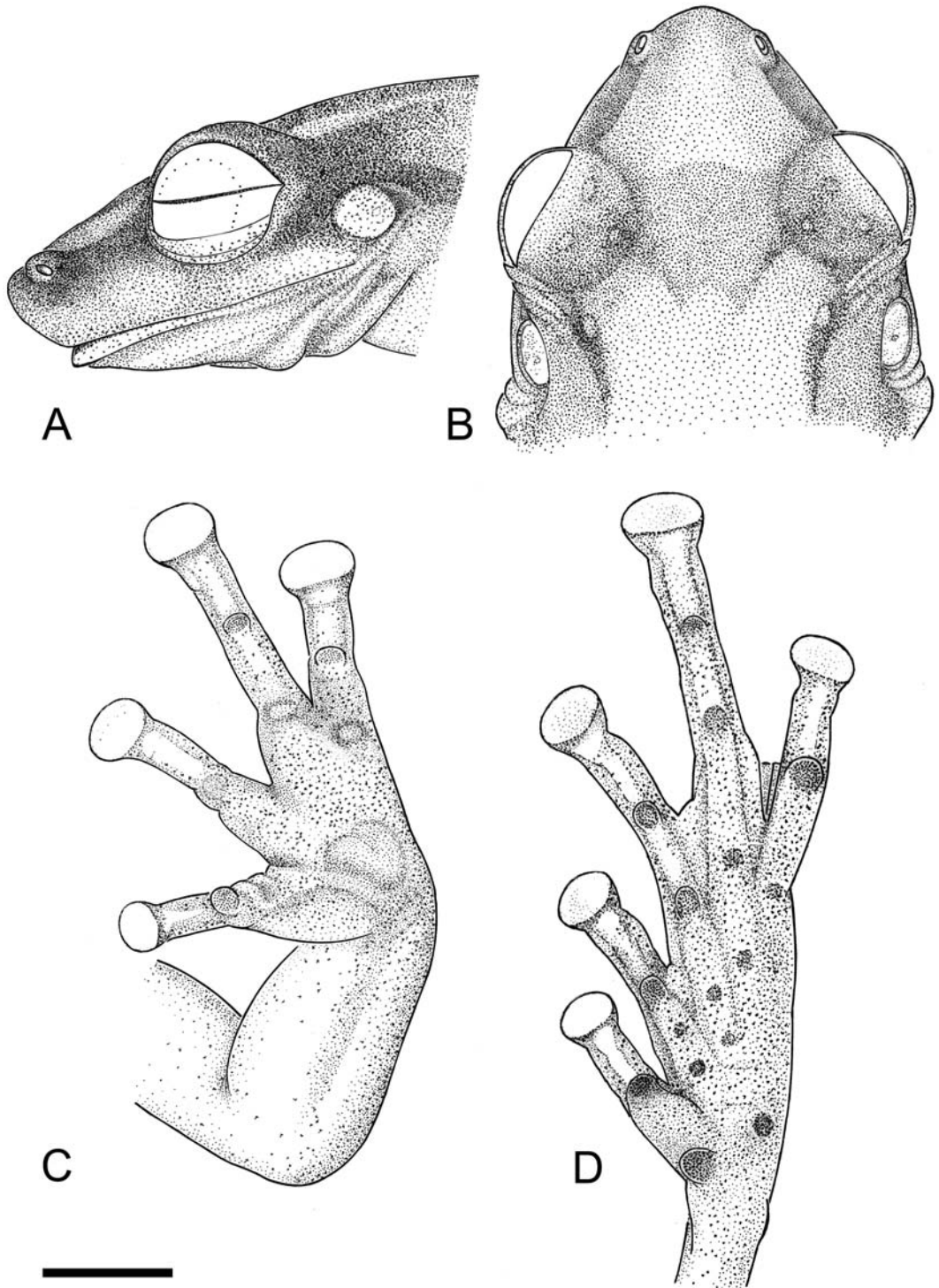


FIG. 3.—*Scinax aromothyella*, MACN 35278 (holotype). (A) Head, lateral view, (B) head, dorsal view, (C) left hand and forearm, ventral view, (D) left foot, ventral view. Scale = 2 mm.

erally from behind eye to beyond sacral region; the other, less defined, extends from posterolateral margin of eye ventrally, becoming diffuse before level of sacrum. Three dark brown diagonal bars with diffuse margins cover dorsal surface of shank, continuous to somewhat irregular, vertical bars on thigh; where marks extend to hidden surfaces and are separated by unpigmented areas. Poorly defined, irregular dark brown blotches occur on dorsal part of foot, toes, distal margin of thigh, forearm, arm, and Fingers. Venter creamy white, melanophores irregularly spaced over all ventral surfaces, including limbs, throat, belly. Inguinal region and proximal, hidden surface of thigh completely unpigmented.

Measurements of holotype.—SVL 24.5; HL 7.9; HW 7.4; IND 1.9; ED 2.4; EN 2.3; TD 1.2; TL 12.5; FL 10.5.

Variation among paratypes.—In preservative, the dorsum is lighter brown in some specimens. The width and shape of the dorsal longitudinal stripes are variable; the stripe is continuous in 21 of the 30 paratypes and discontinuous on 12 specimens. This stripe has regular margins on 16 specimens; in 8 specimens these stripes get wider at a portion posterior to the scapular region, while in four specimens, they get wider at the sacral region; in three specimens, they are expanded on both regions. In three specimens the stripes are diffuse, barely distinct. In most specimens the lateral stripe that runs from the posterolateral margin of the eye is less defined than the dorsal one; in eight of them, it diffuses just posterior to the arm, before bending posterovertrally. Twenty-five paratypes have an interocular trapezoid-shaped mark similar to the holotype, while the other four have a straight posterior margin on the trapezoid mark. In nine specimens, the vertical bars on the thigh are barely distinct, while in others the bars on the anterior and/or posterior surface of the thigh become irregular, forming an almost reticulate pattern that delimits unpigmented areas (more common on the anterior surface of the thigh) or that coalesces into a large, densely pigmented area (only on the posterior hidden surface of the thigh). In two specimens, there are two instead of three diagonal bars marks on the shank.

The ventral pattern ranges from tiny dark spots regularly scattered on the belly, throat,

and undersides of limbs to a brown vermiculation on the belly, formed by aggregations of those same spots. On some specimens the spots become even denser on the undersides of the hind limbs.

In terms of morphology, most variation involves the development and presence or absence of tubercles. Some paratypes differ from the holotype by having a few rounded supernumerary tubercles on the sole (mostly at the base and along metatarsals of Toes III, IV, and V) or the palm. The apparent absence of these tubercles in many specimens, including the holotype, is likely a preservation artifact. The degree of sloping of the loreal region toward the lip may be more abrupt in some specimens than in others.

The thin patch of glandular tissue in the inguinal region is visible in most specimens; however, it is not visible in a few specimens that lost pigmentation due to fixation. It is not clear if this is due to a fixation artifact or if the glandular tissue was never there. Cochran (1955) noted in *Scinax brieni* (as *Hyla strigilata brieni*) that the visibility of this character state was dependent on the quality of fixation.

The nuptial pad is present in all males, but the extent of thumb involved varies; in a few specimens some of the glands that make up the nuptial pad are also scattered along the medial margin of Finger II.

The two females are larger than males (see measurements below). Their forearms are not robust as in males, and no trace of glandular tissue is present in the inguinal region. The loreal region forms a gradual slope towards the lip in both females.

Measurements of the paratypes (mean \pm standard error, range).—Males ($n = 28$): SVL 22.7 ± 0.20 (20.2–24.8); HL 7.6 ± 0.07 (6.8–8.3); HW 7.2 ± 0.07 (6.3–7.8); IND 1.9 ± 0.03 (1.6–2.2); ED 2.3 ± 0.03 (1.9–2.5); EN 2.0 ± 0.03 (1.7–2.3); TD 1.3 ± 0.03 (0.9–1.5); TL 12.2 ± 0.1 (11.3–13.3); FL 10.0 ± 0.1 (9.0–10.8). Females ($n = 2$) SVL 29.8–31.8; HL 9.8–10.4; HW 9.5–9.7; IND 2.2–2.3; ED 2.8–3.0; EN 2.6–2.7; TD 1.9–2.0; TL 15.4–17.0; FL 12.5–13.0.

Color in life.—Field notes of the author described color in life of referred specimens (MACN 37123–37124). The dorsal color was similar to that of the preserved specimens, although individuals turned much darker

during the day. The ventral region was dirty white or creamy white, and the throat of calling males was yellowish. The areas that in preserved specimens appear as unpigmented in the inguinal region and hidden surfaces of thigh and shank were dark yellow. The iris was iridescent yellow, with some thin, darker reticulations. Four dark brown rays arise vertically and horizontally from the borders of the subelliptical pupil and extended to the exposed margins of the eye. While vocalizing at night, males had a lighter hue but turned darker during the day.

Natural history.—Most specimens from San Vicente were collected in open areas in semi-permanent swamps, during or immediately after heavy rains, in the months of December, January, and February. Most males called from the emerging vegetation, a short distance above the water surface. The two specimens from Piñalito were collected along a stream inside the forest. In the type locality, *S. aromothyella* was found in sympatry with *Bufo ictericus*, *Aplastodiscus perviridis*, *Hyla faber*, *H. minuta*, *H. semiguttata*, *Phyllomedusa tetraploidea*, *Scinax fuscovarius*, *S. perereca*. *Scinax* sp. (aff. *S. granulatus*), *Crossodactylus schmidtii*, *Leptodactylus fuscus*, *L. mystacinus*, *L. ocellatus*, *Odontophrynus americanus*, *Physalaemus albonotatus*, *P. cuvieri*, and *Proceratophrys avelinoti*.

Geographic distribution.—*Scinax aromothyella* is known from three localities in the province of Misiones, Argentina. The specimens treated as *Scinax* cf. *berthae* by Kwet and Di-Bernardo (1999) and by Kwet (2001) could actually be *S. aromothyella*; if this is the case, then this species might be distributed in some areas of the state of Rio Grande do Sul, Brazil.

Etymology.—The species name *aromothyella* is a noun in apposition, being derived from the Greek *aroma* (smell) + *thyella* (storm). The name is intended to mean “smell of the storm”, alluding to the propensity of these frogs to appear during or after heavy rains.

REMARKS

The new species was included as *Scinax* sp. 1 in the phylogenetic analysis performed by Faivovich (2002); on the resulting most-parsimonious trees, this species appears as

sister to *S. berthae*. The presence of glandular tissue in the inguinal region on this species was overlooked by Faivovich (2002); a review of this character state is being undertaken and will be included in a more thorough study of the phylogenetics of *Scinax*.

Scinax berthae is a species with a wide distribution (Barrio, 1964), ranging from São Paulo, Brazil, south to Punta Lara (the type locality) in northwestern Buenos Aires Province, Argentina, and extending west to Cerrito, Chaco Province (Langone and Prigioni, 1988; Lopez et al., 1999). It is a highly variable species, and a study to define the limits of this variation is seriously needed. B. Lutz (1973) expressed doubt concerning the identity of the two paratypes of *S. berthae* (as *Hyla*) from São Bernardo do Campo, São Paulo, suggesting that they could actually be *S. rizibilis*, an argument that was followed by Andrade and Cardoso (1987). While Andrade and Cardoso (1987) did not examine these paratypes, it is not clear whether B. Lutz (1973) examined them, since she based her description on the female paratype LIH 1084 (a specimen housed at the MNRJ, collected at the type locality). The paratype LIH 1088 is housed in MACN. The paratype LIH 1089 is lost (Langone and Prigioni, 1988; Varela, 1999). An examination of LIH 1088 indicates that it is morphologically indistinguishable from *S. berthae*, and is not *S. rizibilis*. Similar conclusions were reached by Pombal and Bokermann (Pombal, personal communication) upon comparison of specimens from São Paulo with paratopotypes.

Scinax aromothyella has been confused with *S. berthae* by Langone and Prigioni (1988), who cited this species from Villa Caburé, Misiones; the specimen (CENAI 1269) is actually *S. aromothyella*.

One feature that distinguishes *S. aromothyella* from *S. berthae* is the robust forearm in males. This character is related to the development of the *m. flexor carpi radialis*, and, as employed here, refers to a situation where the belly of the *m. flexor carpi radialis* is noticeably bulbous, instead of an almost flat strip. As discussed by Faivovich (2002), the variation in development of this muscle shows a continuum among the species of the *S. catharinae* group, but the difference between *S. berthae* and *S. aromothyella* is sufficient to distinguish them. The term hypertrophied

forearm is equivalent to character 50.1 in Faivovich (2002), that is, a situation where the *m. flexor carpi radialis* is so enlarged that its insertion is contiguous with the distal portion of the *m. coracobrachialis*.

In addition to the female specimens reported here, there are four females (MACN 35263–64, 37120, 37126) were collected along a forest stream at the type locality during four seasons of fieldwork. These females are superficially similar to the type series and to the referred specimens; however, they differ in being noticeably darker and having nostrils more protruded. It is still uncertain whether they are simply darker females of *S. aromothyella* or a different species.

Although two paratopotypes were collected along a stream in the forest, *S. aromothyella*, like *S. berthae*, is common in open areas around permanent or semipermanent water bodies. In this respect, they differ from many other species in the *S. catharinae* group, which are most common inside the forest (Almeida and Cardoso, 1985; Pombal et al., 1995).

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APPENDIX I

Additional Specimens Examined

Scinax agilis: CFBH 1942, 1944; *S. albicans*: MZUSP 69250–52; *S. angrensis*: ZUF RJ 2867–69, 5144, 5170; *S. argyreornatus*: MNRJ 114 (lectotype), CFBH 1283, 1292, 1298; *S. ariadne*: AMNH 78229 (paratype); *S. berthae*: LIH 1080 (holotype), MACN 36983–85, 36989–98, 37241–57; *S. brienii*: IRSNB 1027 (holotype), MACN 16994–95 (topotypes); *S. canastrensis*: ZUEC 4188–91, 4193 (paratypes); *S. carnevalli*: MZUSP 61045–48 (paratypes); *S. catharinae*: BMNH 1947.2.1266 (syntype); *S. centralis*: CFBH 2640–44 (paratypes); *S. flavogutattus*: MZUSP 53335–43; *S. heyeri*: CFBH 1041; *S. hiemalis*: MZUSP 60555 (holotype), 60556–57 (paratypes); *S. humilis*: MNRJ 2248 (holotype), 1478 (paratype), ZUF RJ 2242–43, 3133–34, 7503; *S. jureia*: MZUSP 74209, 74237–38 (paratypes); *S. littoralis*: MZUSP 73736–38 (paratypes); *S. longilineus*: ZUEC 4340, 7607–09, 7614 (topotypes); *S. luizotavioi*: MZUSP 61043–44 (paratypes); *S. machadoi*: AMNH 88645–46 (paratypes); *S. rizibilis*: MZUSP 73660 (holotype); *S. obtriangulatus*: MZUSP 107834–107835, 107839–40; *S. trapicheiroi*: MZUSP 3431, 3444, 3447, 3372; *S. ranki*: MZUSP 59540 (holotype), 59241–42 (paratype).

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A NEW SPECIES OF IGUANIAN LIZARD (*STENOCERCUS*) FROM THE WESTERN LOWLANDS OF SOUTHERN ECUADOR AND NORTHERN PERU

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ABSTRACT: I describe a new species of *Stenocercus* from the lowlands of southwestern Ecuador and northwestern Peru. The new species differs from other *Stenocercus* by the combination of the following characters: posterior circumorbitals present, one row of supraoculars enlarged, posterior head scales enlarged, projecting angulate temporals absent, canthals two, ventrals smooth, posthumeral and postfemoral mite pockets shallow, dorsolateral crests absent, inscriptional ribs not articulating midventrally, throat yellow and venter lavender in males. Some evidence suggests that the new species is closely related to *Stenocercus iridescens*, which occurs allopatrically in the lowlands of western Ecuador and southwestern Colombia.

Key words: Ecuador; Iguania; New species; Peru; *Stenocercus*; Systematics

WITH MORE than 50 species, *Stenocercus* Duméril and Bibron (1837) constitutes one of the most speciose squamate genera of South America. Most species of *Stenocercus* (Tropiduridae sensu Frost et al., 2001; Iguanidae sensu Macey et al., 1997) occur in the Andes from northern Colombia to central Argentina, with some exceptions such as *S. dumerilii*, which is known from eastern Para, Brazil (Avila-Pires, 1995). These lizards occupy a variety of habitats (e.g., dry and humid tropical forests, montane forests, paramo) at elevations of 0–4000 m.

Approximately one-fifth of the species of *Stenocercus* have been described during the last 15 years (Cadle, 1991, 1998, 2001; Avila-Pires, 1995; Torres-Carvajal, 2000). One of the main causes of this dramatic recent increase in the number of known species is that collections are being made in previously unexplored areas throughout the Andes (e.g., Lehr, 2002). Another reason is that existing collections have not been carefully examined. Hence, it is very likely that a considerable number of new

species will be described in the near future. Herein, I describe a new species of *Stenocercus* discovered in a previously unexplored forest of the western Andean slopes of southern Ecuador, and reassign specimens identified as *S. iridescens* in existing collections from northwestern Peru (Cadle, 1991).

MATERIALS AND METHODS

Most type specimens of the new species were collected in Ecuador and are deposited in the Museo de Zoología, Pontificia Universidad Católica del Ecuador, Quito (QCAZ). Museum abbreviations of other type specimens follow Leviton et al. (1985). Specimens of *S. iridescens* examined in this study are listed in Torres-Carvajal (2000), with additional specimens listed in Appendix I. Snout-vent length (SVL) and tail length (TL) were taken with a ruler and recorded to the nearest 1 mm. All other measurements were made with digital calipers and recorded to the nearest 0.1 mm. Osteological characters were examined from x-ray radiographs and from a cleared-and-double-stained adult female (QCAZ 6720). Sex was determined by noting the presence of hemipenes or sexually dichromatic characters. Eggs were incubated in a terrarium at 25–28 C. Egg volume was calculated with the prolate spheroid formula: $V = 4/3 \pi (\text{length}/2)(\text{width}/$

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2)². Descriptions and illustrations were prepared with the aid of a stereomicroscope equipped with a camera lucida. I follow the terminology of Cadle (1991) and Torres-Carvajal (2000, 2004) for characters included in the description.

SYSTEMATICS

Stenocercus puyango sp. nov.

Holotype.—QCAZ 6723, an adult male, from Puyango (03° 53' S, 80° 04' 47" W, 300 m), Provincia El Oro, Ecuador, collected on 7 January 2004 by Martha C. Carvajal-Aguirre and Omar Torres-Carvajal.

Paratypes.—ECUADOR: QCAZ 6355, from 19 km N Alamor, Provincia El Oro, collected on 28 March 2003 by Martín Bustamante and Italo G. Tapia; QCAZ 6356, from Bosque Protector Puyango (3.88° S, 80.083° W), Provincia El Oro, collected on 28 March 2003 by Martín Bustamante and Italo G. Tapia; QCAZ 6701–6703, 6705–6713, same data as holotype except collected on 6 January 2004; QCAZ 6715–6722, 6724, 6725, same data as holotype; AMNH 21934–36, from Río Puyango, collected on 12 October 1921 by G. H. H. Tate; PERU: MVZ 82364, from 21 km E, 7 km N Olmos, 1310 m, Departamento Lambayeque, collected on 16 August 1967 by R. Huey; LSUMZ 26989, from Rica Playa, Río Tumbes, Departamento Tumbes, collected on 30 October 1973 by D. A. Tallman; KU 219834, from Matapalo, 90 m, Departamento Tumbes, collected on 12 January 1991 by Eric R. Wild; LSUMZ 39443, 39445–47, 39451, from Quebrada Faical, E El Caucho, 24 km SE Pampa de Hospital, 400 m, Departamento Tumbes, collected between 21–27 June 1979 by T. S. Schulenberg; AMNH 22186, no locality data.

Diagnosis.—(1) Maximum total length in males 309 mm ($n = 14$); (2) maximum total length in females 265 mm ($n = 11$); (3) vertebrae 42–50; (4) paravertebrals 43–53; (5) scales around midbody 30–45; (6) supraoculars 4–6; (7) internasals 2–3; (8) postrostrals 4; (9) loreals 2–4; (10) gulars 18–22; (11) lamellae on Finger IV 15–20; (12) lamellae on Toe IV 22–27; (13) posthumeral pocket shallow, Type 2 of Cadle (1991); (14) postfemoral pocket shallow, Type 5 of Cadle (1991); (15) parietal eye usually visible; (16) occipital scales large, smooth, imbricate; (17) projecting angulate temporals

absent; (18) enlarged supraoculars occupying most of supraocular region in one row; (19) scales on frontonasal region weakly imbricate anteriorly; (20) preauricular fringe short; (21) neck folds absent; (22) lateral and dorsal nuchals similar in size; (23) posterior gulars in adults smooth, imbricate, not mucronate, not notched; (24) lateral and dorsal body scales similar in size; (25) vertebral crest prominent; (26) dorsolateral crest absent; (27) ventrals in adults smooth, imbricate, not mucronate; (28) scales on posterior surfaces of thighs keeled, imbricate, mucronate; (29) prefemoral fold absent; (30) inguinal groove absent; (31) preanals projected; (32) tail strongly compressed laterally in adult males; (33) tail length 68–73% of total length; (34) caudal whorls per autotomic segment three; (35) caudals not spinose; (36) dark stripe extending anterodorsally from subocular region to supraciliaries in females and some males; (37) gular region of adult females black or densely pigmented; (38) gular region of adult males not black; (39) black blotch on ventral surface of neck in adult males usually present; (40) thin black or dark brown midventral line present; (41) black patch on ventral surface of thighs absent; (42) background color of dorsum in females and males dark brown; (43) postxiphisternal inscriptional ribs not articulating midventrally.

From all species of *Stenocercus*, *S. puyango* is similar to those species included in the “*Ophryoessoides* group” (Cadle, 2001) in having an enlarged row of supraocular scales and large posterior head scales. However, *S. puyango* differs from species in the “*Ophryoessoides* group”, except *S. iridescens*, by having smooth head scales and smooth ventrals (slightly keeled in some juveniles and subadults). The only two other species of the “*Ophryoessoides* group” with relatively smooth head scales—*S. aculeatus* and *S. fimbriatus*—have strongly keeled ventrals. *Stenocercus puyango* is distinguished from *S. iridescens* (character states in parentheses) by having a shallow postfemoral pocket (postfemoral pocket absent), posterior circumorbitals (posterior circumorbitals generally absent, observed only in 4% of the specimens examined), and by lacking inscriptional ribs that articulate midventrally (three pairs of postxiphisternal inscriptional ribs articulate midventrally) and black marks around tympanum



TABLE 1.—Summary of morphological characters, measurements (mm), and color patterns of *Stenocercus iridescens*, *S. limitaris*, and *S. puyango*. Range followed by mean \pm standard deviation, or range followed by mode are given for quantitative characters. Data for *S. iridescens* and *S. limitaris* are from Torres-Carvajal (2000) and Cadle (1998), respectively.

Character	<i>S. iridescens</i> <i>n</i> = 42	<i>S. limitaris</i> <i>n</i> = 44	<i>S. puyango</i> <i>n</i> = 33
Scales around midbody	35–52	39–54	30–45
	41.57 \pm 3.31	47.30 \pm 3.16	41.06 \pm 2.78
Vertebrales	40–52	40–52	42–52
	45.31 \pm 3.22	45.70 \pm 2.54	46.38 \pm 2.62
Gulars	16–20	17–23	18–22
	18.19 \pm 1.09	20.10 \pm 1.28	19.00 \pm 1.17
Supraoculars	2–5	3–5	4–6
	3	4	4
Internasals	2–4	4–5	2–4
	2	4	2
Subdigitals Finger IV	15–18	17–23	15–20
	15.90 \pm 0.89	19.70 \pm 1.26	16.64 \pm 1.32
Subdigitals Toe IV	22–28	24–32	22–27
	24.73 \pm 1.57	27.50 \pm 1.93	24.70 \pm 1.45
Tail length/total length	0.62–0.68	0.66–0.71	0.68–0.73
	0.66 \pm 0.01	0.69 \pm 0.01	0.70 \pm 0.01
	<i>n</i> = 30	<i>n</i> = 16	<i>n</i> = 25
Maximum SVL males	99	97	108
Maximum SVL females	78	82	82
Posthumeral pocket	shallow	deep	shallow
Postfemoral pocket	absent	deep	shallow
Dorsal head scales	smooth	keeled, wrinkled, or multicarinate	smooth
Posterior circumorbitals	absent	present	present
Keeled angulate temporal	absent	present	absent
Ventral scales in adults	smooth or slightly keeled	strongly keeled, mucronate	smooth
Throat color in adult males	yellow	unknown	yellow
Venter color in adult males	lavender	unknown	lavender

or posterior gular region in males (males with small black irregular marks on posterior gular region and around tympanum, Fig. 1). Measurements, scutellation, and other morphological characters of *Stenocercus puyango* are presented in Table 1.

Description of holotype.—Male; SVL = 88 mm; TL = 198 mm; maximum head width = 16.2 mm; head length = 20.6 mm; head height = 14.7 mm; occipitals, parietals, interparietal, and postparietals large, smooth, slightly imbricate (Fig. 2); parietal eye visible; supraoculars in five rows, smooth, slightly imbricate, with one row more than three times larger than adjacent rows; anterior and poste-

rior circumorbitals smooth, imbricate; canthals two; anteriormost canthal separated from nasal by two tiny scales; scales in frontonasal region slightly imbricate; internasals two; postrostrals four, wider than long; supralabials four; infralabials five; loreals three; lorilabials in one row; preocular not divided, in contact with posterior canthal; lateral temporals imbricate, slightly keeled; gulars in 19 rows between tympanic openings; all gulars smooth, imbricate, each bearing one apical pit; second infralabial in contact with first three sublabials; mental in contact with first pair of infralabials and first pair of postmentals; dorsal and lateral scales of body and neck keeled, imbricate;

←

FIG. 1.—(A–B) *Stenocercus puyango*, paratype, QCAZ 6721, female, 65 mm SVL (LAC); (C–D, G) *S. puyango*, holotype, QCAZ 6723, male, 88 mm SVL (LAC); (E, H) *S. iridescens*, MCZ 156849, male, 85.7 mm SVL (KIM); (F) *S. iridescens*, USNM 285780, male, 88 mm SVL (RWM).

scales around midbody 41; vertebrals large, in 48 rows, forming a prominent serrate vertebral crest; paravertebrals 49; ventrals smooth, imbricate; preauricular fringe short, composed of three enlarged scales, of which the ventralmost is largest; neck and body folds absent; limb scales keeled, imbricate; ventral scales of hind limbs smooth or slightly keeled; lamellae on Finger IV 17; lamellae on Toe IV 24; tail strongly compressed; caudals keeled, imbricate; basal subcaudals smooth, imbricate; vertebral crest extending more than half length of tail; tail length 2.2 times SVL; posthumeral pocket shallow with wide opening and lined with tiny scales (Type 2 of Cadle, 1991); postfemoral pocket shallow with slit-like opening (Type 5 of Cadle, 1991); two xiphisternal and two long postxiphisternal pairs of inscriptional ribs that do not articulate midventrally (Pattern 1A of Torres-Carvajal, 2004).

Color in life of holotype.—Dorsum light brown with darker chevrons over vertebral line; distinct dark brown chevron on suprascapular region; cream line extending vertically from shoulder to dorsolateral part of body; subocular and loreal regions cream; dark brown interorbital bar, wider between semi-circles; occipital region with two black blotches; gular region rosy; borders of infralabials, sublabials, postmentals, mental, and anterior gulars with irregular light red marks; posterior gular region, and ventral and lateral sides of neck with tiny red marks aligned longitudinally; black blotch on ventromedial aspect of neck; throat bright yellow; ventral surface of body between pectoral and pelvic girdles lavender with a faint, narrow dark midventral line; flanks of body with tiny red marks between fore limbs and hind limbs (Fig. 1).

Variation.—Sexual variation in measurements and scutellation of *Stenocercus puyango* is presented in Table 2. Posterior circumorbitals are absent in 9% of the specimens and number of loreals varies from 2–4 (mode = 2). The second infralabials are not in contact with the third sublabials in 39% of the specimens, and the ventrals are slightly keeled in two adult males. A dark red or black patch is present on the ventromedial aspect of the neck in most males (69%), whereas an oblique subocular dark band is absent in 25% of the specimens.

An adult female (QCAZ 6702) had the following coloration in life: dorsum dark brown

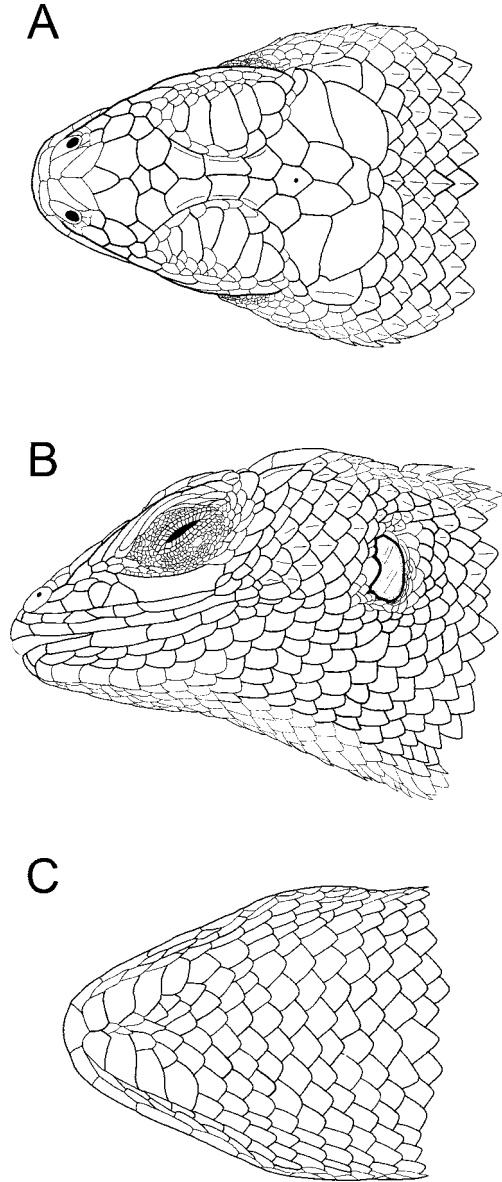


FIG. 2.—*Stenocercus puyango*, QCAZ 6723, male (holotype). (A) Dorsal, (B) lateral, and (C) ventral views of the head. Scale bar = 5 mm.

with darker chevrons over vertebral line; cream line extending longitudinally from subocular region, through dorsal border of tympanum, to level of insertion of forelimbs; another cream line extending vertically from the former to shoulder; subocular and loreal regions white cream; posteroventrally oriented dark brown band on subocular region; dark brown

TABLE 2.—Sexual variation in scutellation and measurements (mm) of *Stenocercus puyango*. Range (first line), mean \pm standard deviation (second line), and n (third line) are given.

Character	Males	Females
Scales around midbody	38–45	30–45
	41.68 \pm 1.99	40.56 \pm 3.41
	16	16
Vertebrales	42–50	43–52
	46.37 \pm 2.52	46.66 \pm 2.64
	16	15
Gulars	18–22	18–21
	19.19 \pm 1.17	18.87 \pm 1.20
	16	16
Supraoculars	4–6	4–5
	4.75 \pm 0.68	4.37 \pm 0.5
	16	16
Internasals	2–4	2–4
	2.18 \pm 0.54	2.62 \pm 0.88
	16	16
Subdigitals Finger IV	15–20	15–18
	17.06 \pm 1.44	16.31 \pm 1.08
	16	16
Subdigitals Toe IV	23–27	22–27
	25.00 \pm 1.26	24.56 \pm 1.50
	16	16
Tail length/total length	0.68–0.73	0.68–0.70
	0.71 \pm 0.01	0.69 \pm 0.01
	12	8
Maximum SVL	108	82

interorbital bar; gular region and neck dark brown; ventral surfaces of body, limbs, and tail cream with dark brown flecks; 8-shaped dark brown mark on throat; thin dark brown mid-ventral stripe between 8-shaped mark and vent; three large cream blotches on posterior surface of each thigh. Other females have similar color patterns (Fig. 1).

Juvenile males (QCAZ 6701, 6703) also have yellow throats, but they differ from adult males in having dark throat marks similar to those observed in females. However, these throat marks are faint, which suggests that the neonatal throat pattern is retained in females and modified in adult males.

Natural history.—Specimens were active between 1000–1600 h. Whereas juveniles and some adult females were found on leaf litter, adult males and some females were found on rocks or logs exposed to the sun. Several adult males were observed doing push-up displays. An adult female (QCAZ 6721) laid two eggs

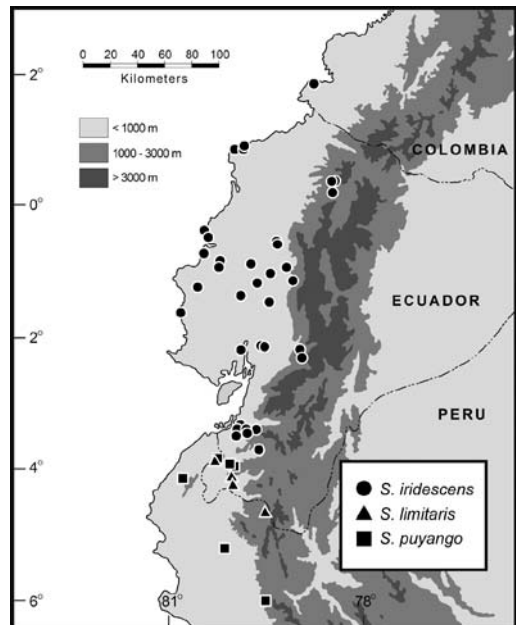


FIG. 3.—Distribution of *Stenocercus puyango*, *S. iridescens*, and *S. limitaris*.

in captivity on 10 January 2004. The sizes of these eggs were 17.29 mm \times 8.72 mm and 17.42 mm \times 8.73 mm; their volumes were 688.38 mm³ and 695.14 mm³, respectively. After 96 days, a 0.7 g neonate (SVL = 26.7 mm, TL = 54.7 mm) hatched from one of the eggs.

Distribution and ecology.—*Stenocercus puyango* inhabits lowland deciduous forests of the western slopes of the Andes in southern Ecuador and northern Peru (Fig. 3). It occurs at elevations of 90–1500 m in Provincia El Oro (Ecuador) and Departamentos Tumbes, Piura, and Lambayeque (Peru). *Stenocercus puyango* is sympatric with *S. limitaris* at Quebrada Faical in Departamento Tumbes, Peru (Cadle, 1998). It is very likely that these two species are sympatric at other localities in southwestern Ecuador and northwestern Peru as well. One of the paratypes (QCAZ 6355) of *S. puyango* was collected close to Alamor (Provincia Loja, Ecuador), where both *S. limitaris* and *S. carrioni* occur (Cadle, 1998; Fritts, 1974).

Etymology.—The specific name is a noun in apposition and refers to the Puyango Protected Forest, where the holotype of this species was collected. This 2658 ha reserve in southwest-

ern Ecuador has one of the world's largest collections of petrified tree trunks, on which several adult males and females of the new species were found.

Remarks.—Similarity in external morphology and color patterns (Fig. 2), as well as adjacent geographical distribution (Fig. 3), suggest that the new species is closely related to *S. iridescens* (Table 1). Günther (1859) described *S. iridescens* as having smooth or very indistinctly keeled ventrals, but there seems to be some confusion concerning the degree of keeling of ventral scales in this species (e.g., Cadle, 1998, 2001; Fritts, 1974). Similar to other species of *Stenocercus* (e.g., *S. festae*), there is ontogenetic variation in the degree of keeling of the ventral scales in *S. iridescens*. Juveniles have keeled ventrals, which become less keeled or smooth in adulthood.

Stenocercus limitaris is another species with enlarged head scales that occurs in the lowlands of southwestern Ecuador and northwestern Peru in sympatry with *S. puyango*. The main differences between these two species (Table 1) are that *S. limitaris* has keeled dorsal head scales, a strongly keeled angulate temporal, strongly keeled and mucronate ventrals, and deep posthumeral and postfemoral pockets (Cadle, 1998).

Before Frost (1992) synonymized *Ophryoessoides* and *Proctotretus* with *Stenocercus*, species of *Stenocercus* with enlarged posterior head scales, one row of enlarged supraoculars, keeled ventrals, and pairs of inscriptional ribs articulating midventrally were placed in *Ophryoessoides* (Fritts, 1974). Even recently the term “*Ophryoessoides* Group” has been proposed to refer to the species of *Stenocercus* that have the character states mentioned above (Cadle, 2001). However, the distribution of several morphological characters among species of *Stenocercus*, including those used by Fritts (1974) to diagnose *Ophryoessoides*, suggest that *Ophryoessoides* is not a natural taxon (Frost, 1992). *Stenocercus puyango* is an example of a species with some but not all of the diagnostic characters of “*Ophryoessoides*”. It has enlarged supraoculars and posterior head scales (Fig. 2), but it has smooth ventrals and its inscriptional ribs do not articulate midventrally. Without a hypothesis of phylogenetic relationships among species of

Stenocercus, the phylogenetic status of “*Ophryoessoides*” remains unclear.

RESUMEN

Describo una especie nueva de *Stenocercus* de tierras bajas del suroccidente ecuatoriano y noroccidente peruano. La especie nueva se distingue de otras especies de *Stenocercus* por la combinación de los siguientes caracteres: circunorbitales posteriores presentes, una hilera de escamas supraoculares ensanchada, escamas posteriores de la cabeza grandes, escamas temporales angulares no proyectadas, dos cantales, ventrales lisas, bolsillos posthumerales y postfemorales poco profundos, crestas dorsolaterales ausentes, articulación medioventral de costillas abdominales ausente, pecho amarillo y vientre rosado en machos. Algunos de estos caracteres sugieren que la especie nueva está cercanamente emparentada con *Stenocercus iridescens*, la cual está distribuida alopatricamente en las tierras bajas del occidente ecuatoriano y suroccidente colombiano.

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APPENDIX I

Additional Specimens

Stenocercus iridescens.—COLOMBIA: *Nariño*: Tumaco, 1° 47' 55" N, 78° 48' 56" W, 0 m, ICN 4225; ECUADOR: *Imbabura*: Apuela, 0° 21' 0" N, 78° 30' W, USNM 200901; 1 km E Apuela, 1950 m, USNM 200902; 2 km NE Río Apuela, 1950 m, USNM 200903–04; 0.5 km W Río Apuela, 1860 m, USNM 200905–10; 2 km W Apuela, 1850 m, USNM 200911; 1 km SW Peñaherrera, 1950–2000 m, USNM 200912–13; 3 km SW Peñaherrera, along trail between Apuela and García Moreno, 1825 m, USNM 200914–17; 10 km S Peñaherrera, USNM 200918–19; Charguayacu USNM 200920; *Los Ríos*: Centro Científico Río Palenque, 0° 35' S, 79° 22' W, 150–200 m, USNM 285460–65; Hacienda El Triunfo, ca. 30 km N Vices, 01° 30' S, 79° 40' W, USNM 222800; Jaumeche, 01° 10' S, 79° 40' W, USNM 222801; 1 km E Jaumeche, 40–70 m, USNM 285780–81; Quevedo, USNM 200921–34; *Manabí*: 12 km NNE Jipijapa, USNM 200935; 4 km W Calceta, USNM 200936–38; Junín USNM 200939; 2 km N San Clemente, USNM 200940; 9 km N San Vicente, 0 m, USNM 200941–45; *Guayas*: Cuatro Hermanitos Experimental Station, NW of Guayaquil, USNM 200981; Estero de Soledad near Río Churute, 02° 30' S, 79° 44' W, 5 m, USNM 222797–99; Milagro, 2° 7' S, 79° 35' 60" W, USNM 200982; Hacienda San Miguel, 5 km E Milagro, USNM 200983–88; 21 km SW El Empalme, USNM 200995–96; *El Oro*: 2 km S Pasaje, USNM 200946–54; 15 km E Pasaje, 100 m, USNM 200955; 7 km SE Buena Vista, USNM 200956; Machala, USNM 200957–58; 7 km SSE Machala, 20 m, USNM 200959–76, 222585; Santa Rosa, 3° 27' S, 79° 58' W, USNM 200977–80.