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A New Species of *Scinax* Wagler, 1830 (Anura: Hylidae) From the Middle Amazon River Basin, Brazil

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ABSTRACT

A new species of the hylid genus Scinax *is described and illustrated. The new taxon was found in the Amazonian rainforest of northern Brazil, municipalities of Maués and Careiro da Várzea, state of Amazonas. The new species is characterized by its moderate size (male mean snout-vent length 36.3 mm); body robust; large, orange, black-bordered axillary and inguinal spots; and bilobate vocal sac. This new species was found in primary and secondary forest on branches of shrubs or trees in, or next to, permanent ponds and flooded areas.*

Key-Words: Amphibia; Hylinae; Tree-frog; Taxonomy; New species.

INTRODUCTION

Scinax Wagler, 1830 currently comprises about 110 recognized nominal species, distributed from eastern and southern Mexico to Argentina and Uruguay, Trinidad and Tobago, and Santa Lucia – eastern Caribbean Sea (Frost, 2013). In a cladistic analysis of the genus, Faivovich (2002) recognized two major clades: the *Scinax catharinae* and the *S. ruber* clades. This was later corroborated by Faivovich *et al.* (2005), based on a larger phylogenetic analysis of the family Hylidae as a whole. Within the *S. ruber* clade, Faivovich *et al.* (2005) recognized two distinct species groups; *S. rostratus* group and *S. uruguayus* group, but they left a large number of species unassigned to any of those groups.

Up to this point, 28 species of *Scinax* are known from the Amazon region (*sensu* Goulding *et al.*, 2003), where they may occur in primary forest, secondary growth and savanna: *S. baumgardneri* (Rivero, 1961), *S. blairi* (Fouquette & Pyburn, 1972), *S. boesemani* (Goin, 1966), *S. chiquitanus* (De la Riva, 1990), *S. cruentommus* (Duellman, 1972), *S. danae* (Duellman, 1986), *S. exiguus* (Duellman, 1986), *S. funereus* (Cope, 1874), *S. fuscomarginatus* (Lutz, 1925), *S. fuscovarius* (Lutz, 1925), *S. garbei* (Miranda-Ribeiro, 1926), *S. ictericus* Duellman & Wiens, 1993, *S. iquitorum* Moravec, Tuanama, Pérez and Lehr, 2009, *S. jolyi* Lescure & Marty, 2000, *S. karenanneae* (Pyburn, 1993), *S. kennedyi* (Pyburn, 1973), *S. lindsayi* Pyburn, 1992, *S. nebulosus* (Spix, 1824), *S. oreites* Duellman & Wiens, 1993, *S. parkeri* (Gaige, 1929); *S. pedromedinae* (Henle, 1991), *S. proboscideus* (Brongersma, 1933), *S. rostratus* (Peters, 1863), *S. ruber* (Laurenti, 1768), *S. trilineatus* (Hoogmoed & Gorzula, 1979), *S. x-signatus* (Spix, 1824) and

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S. wandae (Pyburn & Fouquette, 1971) (see Rivero, 1961; Goin, 1966; Lutz, 1973; Duellman, 1972a,b; Hoogmoed & Gorzula, 1979; Duellman & Wiens, 1992, 1993; Acosta-Galvis, 2000; De la Riva *et al.,* 2000; Barrio-Amorós, 2004; Lynch, 2006; Moravec *et al.,* 2009; Avila-Pires *et al.,* 2010; Frost, 2013; some distributional data are based on authors *pers. observ.*). Of those species mentioned, fourteen have been reported from Brazilian Amazonia (*S. boesemani, S. cruentommus, S. funereus, S. fuscomarginatus, S. fuscovarius* [municipality of São João do Araguaia, Pará, Brazil; coordinates 48°25'17"W and 05°32'06"S, our *pers. observ.*], *S. garbei, S. lindsayi, S. nebulosus, S. proboscideus, S. pedromedinae, S. rostratus, S. ruber, S. trilineatus* and *S. x-signatus*) (Avila-Pires *et al.,* 2010; Sturaro *et al.,* 2010; Hoogmoed & Avila-Pires, 2011; Frost, 2013). Several of these nominal species are suspected to comprise complexes of several distinct species, based mostly on molecular studies (see Fouquet *et al.* 2007 for an example).

During fieldwork at Floresta Nacional do Pau-Rosa (FNPR), Rio Paraconi, municipality of Maués, state of Amazonas, Brazil, as part of a scientific cooperation between Museu Paraense Emílio Goeldi, Conservation International-Brazil and Instituto Chico Mendes de Conservação da Biodiversidade, we found a population of a species of *Scinax* that we were unable to assign to any described species. Additional specimens from a different population were later found in the herpetological collection of the Museu Paraense Emilio Goeldi. Here we describe these two populations as a new species. We compare the new species with all species occurring in Amazonia, and comment on the problematic status of a few *Scinax* species described by Spix, 1825.

MATERIALS AND METHODS

Measurements were taken with an electronic caliper (to the nearest 0.1 mm) under a stereomicroscope following Duellman (1970: see also Napoli, 2005): **SVL** (snout-vent length), **HL** (head length), **HW** (head width), **ED** (horizontal eye diameter), **UEW** (upper eyelid width), **IOD** (interorbital distance), **IND** (internarial distance), **TD** (horizontal tympanum diameter), **TL** (tibia length), **FL** (foot length), **3FD** (third finger disk diameter), and **4TD** (fourth toe disk diameter). Eye-nostril distance **(END)** and nostril to tip of snout distance **(NSD)** follows Napoli (2005), and thigh length **(THL)** follows Heyer *et al.* (1990). The fingers are numbered II-V following Fabrezi & Alberch (1996). Formula for description of toe webbing is based on Savage & Heyer (1967) as modified by Myers & Duellman (1982). Ventral and lateral views of snout follow Heyer *et al.* (1990). The tongue shape follows Duellman (1970).

Sex was determined by the presence of a vocal sac and vocal slits (males) and by the presence of eggs (female). Specimens examined for comparison are listed in Appendix I. Institutional abbreviations are as listed in Frost (2013). The collection of the Zoölogisch Museum, Amsterdam, the Netherlands (ZMA), in 2011 was incorporated in the collection of the Museum of Natural History, Leiden, the Netherlands, but still maintains its original acronym and registration numbers. The collection in the Museu Paraense Emílio Goeldi, municipality of Belém, state of Pará, Brazil, was recently renamed Coleção Herpetologica, Oswaldo Rodrigues da Cunha, but still maintains its original acronym (MPEG).

RESULTS

Scinax sateremawe, new species (Figures 1-6, Table 1)

Holotype: MPEG 28677 (Field Number FPR 251), adult male, from Comunidade São Tomé, Rio Paraconi, Floresta Nacional de Pau-Rosa (FPR), Municipality of Maués, state of Amazonas, Brazil (03°55'7"S and 58°24'19"W, 40 m a.s.l.), collected by M.J. Sturaro and P.L.V. Peloso on 28 February 2009.

Paratypes: MPEG 28675-76 (Field Numbers FPR 144-145), two adult males, from Comunidade Bragança, Rio Paraconi, Floresta Nacional de Pau-Rosa, municipality of Maués, Amazonas, Brazil (03°56'50"S and 58°26'36"W, 45 m a.s.l.), collected by M.J. Sturaro and P.L.V. Peloso on 25 February 2009. MPEG 28678-80 (Field Numbers FPR 252-254), three adult males, same locality as holotype, collected by M.J. Sturaro and P.L.V. Peloso on 28 February 2009. MPEG 13932 (Field number JPC 15654), adult female, from the municipality of Careiro da Várzea, Amazonas, Brazil, collected by J.P. Caldwell and L.J. Vitt on 20 December 1998. MPEG 13933 (Field number JPC 15852), adult male, from the municipality of Careiro da Várzea, Amazonas, Brazil, collected by J.P. Caldwell and L.J. Vitt on 29 December 1998. MPEG 13934-36 (Field Numbers JPC 16131, 16133 and 16136, respectively), three adults males, from the municipality of Careiro da Várzea, Amazonas, Brazil, collected by J.P. Caldwell and L.J. Vitt on 9 January 1999.

Diagnosis: A moderate-sized *Scinax,* with webbing between toes I and II not extending beyond the subarticular tubercle of toe I, and oval discs on fingers; characterized by the following combination of characters: (1) males in the type series SVL 35.2-38.1 mm, female SVL 36.6 mm; (2) body robust, not flattened; (3) snout rounded in dorsal and lateral views; (4) skin on dorsum with small tubercles; (5) tubercles absent

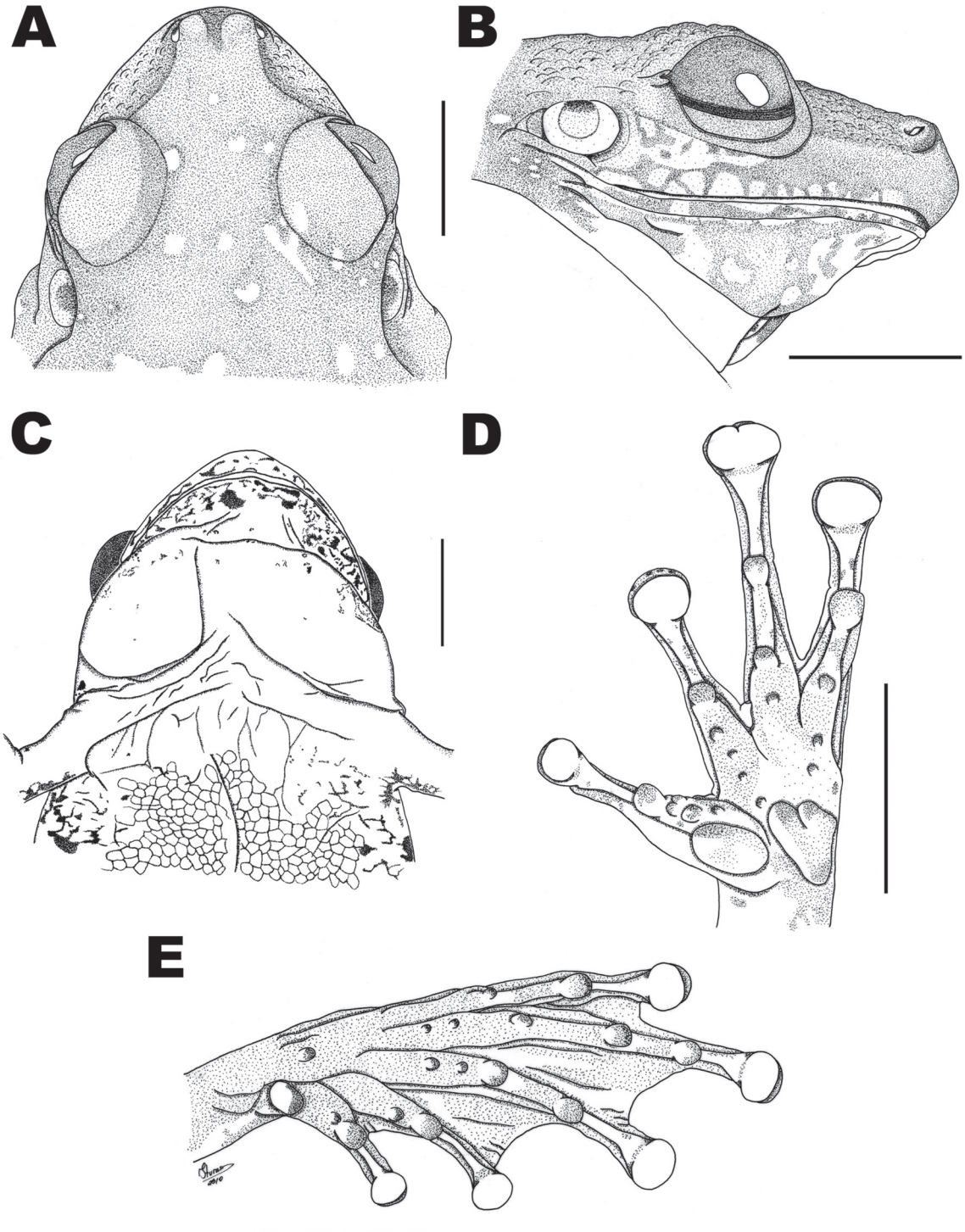

FIGURE 1: *Scinax sateremawe* sp. nov. (male, holotype, MPEG 28677). **(A)** Dorsal, **(B)** lateral, and **(C)** ventral views of the head. **(D)** Palmar, and **(E)** plantar views of left hand and right foot. Scale bars: 5 mm.

TABLE 1: Measurements (in millimeters) of the type series of *Scinax sateremawe* sp. nov. Abbreviations are defined in the Materials and Methods section. Values for holotype in bold. The only female specimen is marked with an asterisk (*) and its values in italics.

Specimens (MPEG)	Measurements/counts														
	SVL	**HL**	**HW**	**ED**	**UEW**	**IOD**	**IND**	**END**	**NSD**	**TD**	**THL**	**TL**	**FL**	**3FD**	**4TD**
28675	36.5	12.9	12.8	4.2	3.6	3.6	2.7	4.0	1.6	2.0	18.0	19.2	25.7	1.7	1.6
28676	35.2	12.0	11.7	4.2	3.2	3.6	2.7	4.0	1.8	2.2	15.6	18.7	26.8	1.7	1.7
28677	**38.1**	**12.6**	**13.2**	**3.7**	**3.5**	**3.9**	**2.8**	**4.0**	**1.8**	**2.1**	**17.4**	**19.8**	**26.1**	**1.8**	**1.5**
28678	36.7	12.8	13.1	3.6	3.0	4.1	2.7	4.2	1.7	2.0	17.5	18.7	26.7	1.5	1.4
28679	36.4	13.0	13.0	3.7	3.3	4.0	2.8	4.1	1.7	2.5	17.0	19.4	26.3	1.8	1.4
28680	35.6	12.4	12.8	4.2	3.4	3.7	2.8	4.0	1.4	2.2	18.0	19.5	26.0	2.0	1.8
*13932**	*36.6*	*13*	*12.6*	*4.2*	*3.6*	*4*	*2.9*	*4.1*	*1.7*	*2.1*	*17.7*	*19.6*	*26*	*2.1*	*2*
13933	36.2	12.8	12.6	4.1	3.6	4.1	2.7	4	1.7	2.2	17.5	19	25.5	1.8	1.8
13934	35.7	12.8	12.7	4.3	3.3	3.9	2.6	4	1.8	2	17.6	19	24.5	2	2
13935	36.1	13	12.3	4.3	3.2	4.4	2.6	2.6	1.9	1.8	17.7	19.7	26.3	2	2
13936	36.2	12.9	12.1	4.3	3.2	4.2	2.6	3.9	1.8	1.8	18.4	19.9	26.3	2	2.1
Mean	36.3	12.7	12.6	4.1	3.4	4.0	2.7	3.9	1.7	2.1	17.5	19.3	26.0	1.9	1.8

on lower jaw; (6) ulnar and tarsal tubercles absent or indistinct; (7) lateral fringes on fingers; (8) tubercles absent on heel; (9) flanks gray with one or two large white (orange, in life) axillary and inguinal blotches, margined by black anteriorly and posteriorly; (10) dorsum predominantly gray with large dark-gray blotches and small light-gray spots; (11) presence of a small axillary membrane reaching the proximal 1/4 of the upper arm; (12) anterior and posterior surfaces of thighs with large, white (orange, in life), black-bordered blotches and marked dark- and light-brown (13) posterior surfaces of tibiae with large black-bordered, white (orange, in life) spots; (14) anterior portion of gular region with an irregularly mottled brown area, darker laterally; (15) bilobate vocal sac.

Comparison with species of Scinax *present in Amazonia:* States of character in species under comparison are

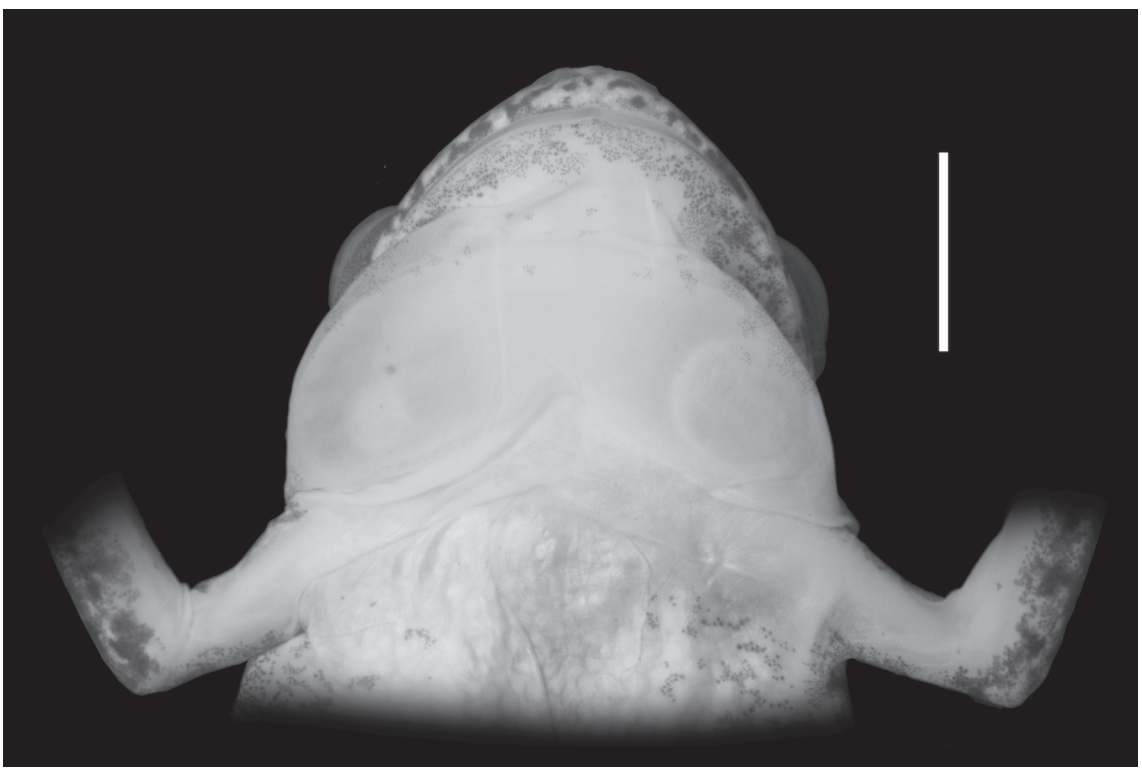

FIGURE 2: Ventral view of the head depicting the bilobate vocal sac of *Scinax sateremawe* sp. nov. (male, paratype, MPEG 28676). Scale bar: 5 mm.

given in parentheses. The comparisons were made directly with examined specimens and/or the literature (when the latter is the case, the reference is given in parentheses).

The males of *Scinax sateremawe* sp. nov. differ from *S. blairi, S. baumgardneri, S. cruentommus, S. danae, S. exiguus, S. fuscomarginatus, S. karenanneae, S. lindsayi, S. parkeri, S. pedromedinae, S. trilin-*

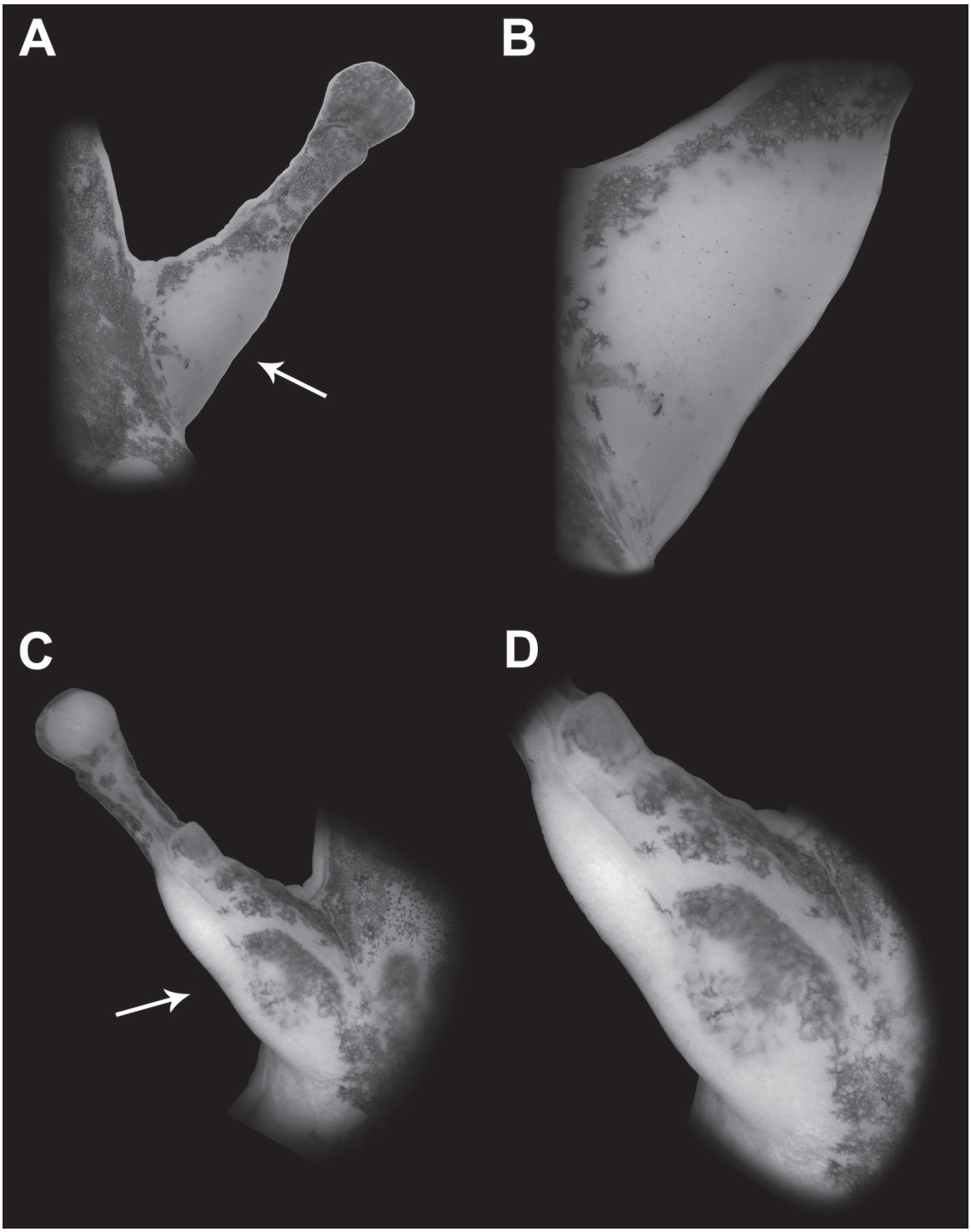

FIGURE 3: Finger I of *Scinax sateremawe* sp. nov. (holotype, MPEG 28677). **(A)** General view and **(B)** detail of nuptial pad on Finger I in dorsal view. **(C)** General view and **(D)** detail of nuptial pad on Finger I in ventral view (Photos by Alexandre Bonaldo and Regiane Saturnino).

eatus and *S. wandae* by its larger size (SVL < 30 mm in all species mentioned) (Rivero, 1961; Pyburn & Fouquette, 1971; Fouquette & Pyburn, 1972; Duellman, 1986; Pyburn, 1992, 1993; Gaige, 1929).

From the *Scinax rostratus* group (*S. garbei, S. kennedyi, S. nebulosus, S. pedromedinae, S. proboscideus* and *S. rostratus*) the new taxon differs by the absence of conspicuous pointed or small rounded tubercles on the heel and lower jaw (present in all species of the *S. rostratus* group, except *S. kennedyi*), absence of a triangular mark between the eyes (present), and by its rounded snout (elongate pointed snout) (Duellman, 1972b; Henle, 1991).

Scinax sateremawe sp. nov. differs from *S. boesemani* by its brown or dark gray with dark-brown irregular blotches and smaller light-gray or light-cream dorsal color pattern (greenish or reddish brown with scattered light spots and few small black spots), and absence of a canthal-postocular dark stripe (present, extending from nostril through eye to above insertion of the forearm), and posterior surface of thighs brown with irregular white spots (uniformly brown).

From *S. chiquitanus* it differs in dorsal coloration (dorsum tan with or without diffuse small dark brown blotches; in life, at night, males yellowish golden to orange, females beige or pale brown, both sexes dark brown by day) and posterior surface of thighs brown with irregular white spots (posterior surfaces of thighs uniform tan with or without a broad, dark

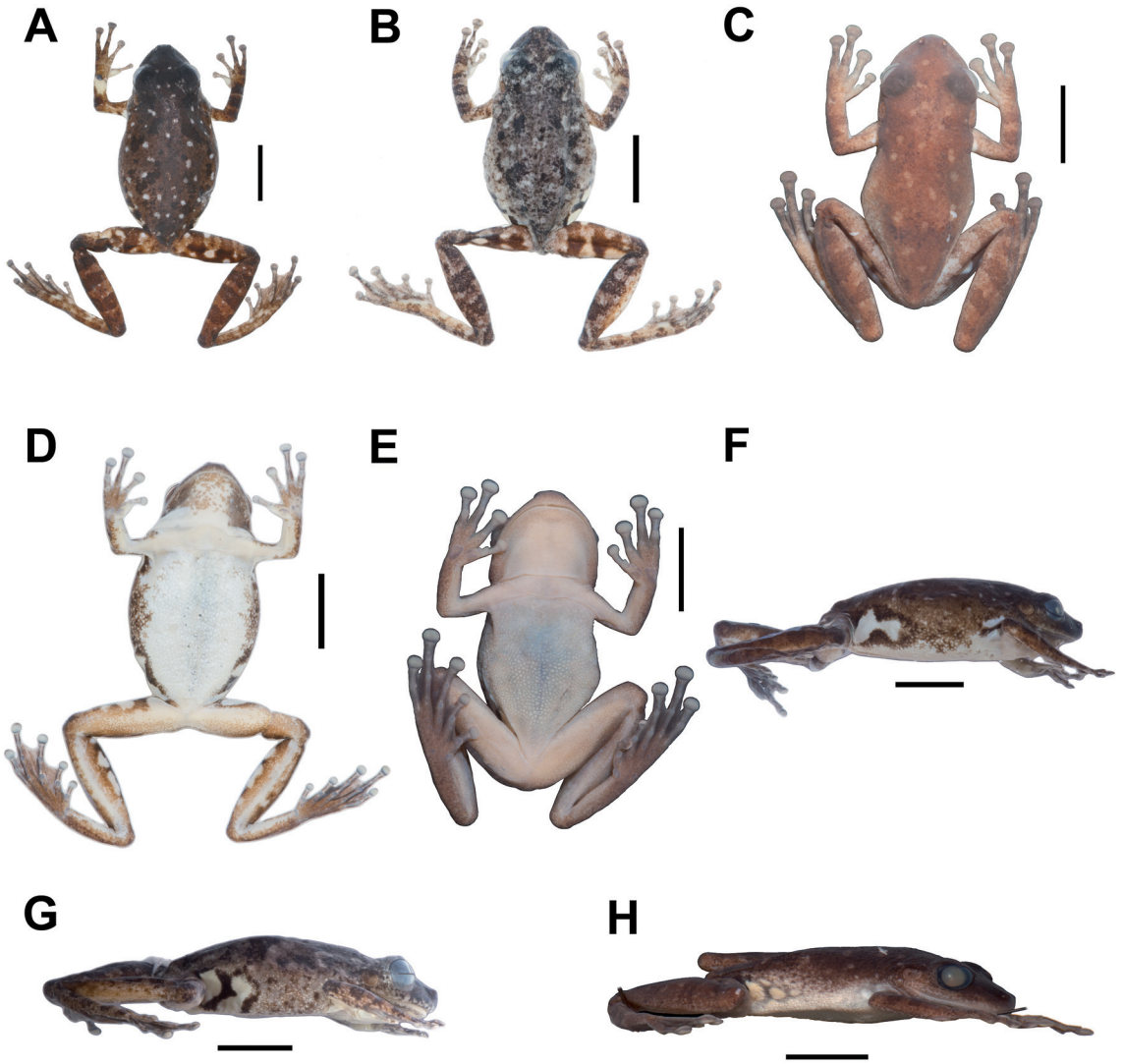

FIGURE 4: Variation of color pattern in the type series of *Scinax sateremawe* sp. nov. Dorsal views of **(A)** the male holotype (MPEG 28677), **(B)** a male (MPEG 28676), and **(C)** the sole female specimen (MPEG 13932). Ventral views of **(D)** the holotype and **(E)** of the female. Lateral view of **(F)** the holotype and **(G, H)** two males (MPEG 28676 and MPEG 13934, respectively). Scale bars: 10 mm.

brown longitudinal stripe or lightly pigmented spots) (De la Riva, 1990; Duellman & Wiens, 1993).

From *S. funereus,* the new taxon differs in coloration (dorsum tan, pale green or greenish tan in life, with dark brown markings usually consisting of canthal stripe, interorbital bar, spots on lips, pair of elongate marks in scapular and sacral regions, three transverse bars on each segment of limbs, and spots on head, body, and limbs that typically correspond to outlines of tubercles) and pattern of the flanks (yellow with dark brown stripes or series of dashes) (Duellman & Wiens, 1993).

From *S. fuscovarius* it is distinguished by dorsal color pattern (predominantly beige with irregular dark blotches, in some specimens weakly defined, and gular region cream), snout rounded in dorsal view (subovoid), absence of granules on the gular region (present), supratympanic fold weakly marked (strongly marked).

From *S. ictericus* it differs by dorsal coloration (olive green, light brown or yellowish tan with dark brown markings, canthal stripe, interorbital bar, transverse bars on limbs, and irregular mostly transverse marks on body) and in having a bilobate vocal sac (single) (Duellman & Wiens, 1993).

From *S. iquitorum* it differs by dorsal coloration (light olive-green to brown with small round dark-gray dots randomly distributed on head and concentrated mostly in areas of inconspicuous dark-gray interorbital, scapular and sacral transverse blotches, in life) and flanks predominantly light brown, with two indistinct longitudinal lines of small light-gray spots (flanks white with dark gray to black spots) (Moravec *et al.,* 2009).

It differs from *S. oreites* by dorsal coloration (creamy tan to brown, yellowish tan or brown in life, with creamy white dorsolateral stripe extending from eye to groin) and posterior surface of thighs with large, orange, black-bordered blotches and marked dark- and light-brown (posterior surfaces of thighs dark brown with bright yellow mark distally) (Duellman & Wiens, 1993).

Scinax sateremawe sp. nov. differs from *S. ruber* by the dorsal color pattern (dorsum gray [in life, tan to dull green], with wide tan (creamy tan to yellow in life) dorsolateral stripe with dark borders extending from eyelid to sacrum usually evident, a discontinuous tan middorsal stripe also usually present), color of flanks (cream with yellow spots usually edged with black in groin), dorsal pattern color of forearms (predominantly light-brown to brown, without dark-gray transverse bars), and by its smaller size (SVL in males 29.4-41.2 mm, but this most likely refers to several cryptic species) (Duellman & Wiens, 1993).

FIGURE 5: Adult male of *Scinax sateremawe* sp. nov. in life (MPEG 28680, SVL = 35.6 mm, paratype) from the type-locality, Comunidade São Tomé, Rio Paraconi, Floresta Nacional de Pau-Rosa, Maués, Pará, Brazil.

The new species differs from *S. x-signatus* by its dorsal color pattern (dorsum cream with two pairs of inwardly curved blotches, one pair in the scapular area and one in the sacral area, roughly forming a X, without scattered light spots), presence of large orange inguinal blotches, margined by black (absent) (specimens from MPEG and plate XI, Figure 3 of Spix [1824]), and posterior surface of thighs (mottled yellow and black).

See Discussion for additional comments on *S. ruber* and *S. x-signatus.*

Description of holotype: Adult male, body robust; head narrower than body; head width 35% of SVL; head length 33% of SVL; head slightly wider than long (HW/HL = 1.05); snout nearly rounded in dorsal and lateral views (Fig. 1A-B); eye-nostril distance slightly wider than eye diameter (END/ED = 1.08); nostrils directed dorsolaterally, nearly elliptical, slightly protruding; internarial region concave; canthus rostralis almost straight, not very distinct; loreal region slightly concave; eye diameter 29% of head length; top of

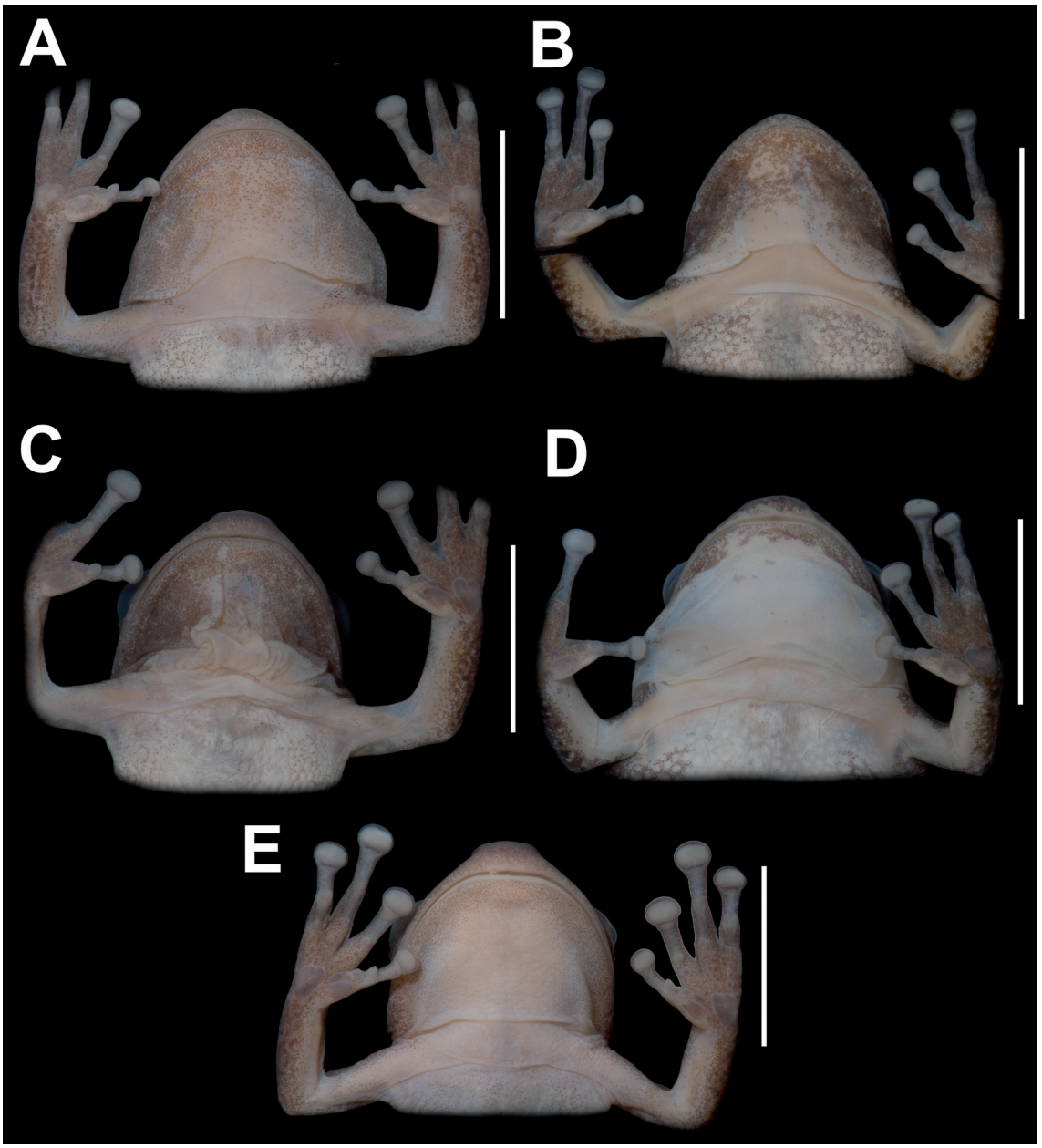

FIGURE 6: Variation in throat color pattern in the type series of *Scinax sateremawe* sp. nov. **(A)** MPEG 13933, male; **(B)** MPEG 28678, male; **(C)** MPEG 13934, male; **(D)** MPEG 28680; and **(E)** MPEG 13932, female. Scale bars: 10 mm.

head flat; interorbital distance 1.5 times upper eyelid width, 32% of head width; feeble supratympanic fold; tympanum distinct, round; tympanum diameter 57% of eye diameter, distance eye-tympanum 71% of diameter tympanum; vocal sac bilobate, subgular, with two oblique longitudinal folds, posteriorly limited by a concave skin fold (Fig. 1C, Fig. 2[1]); vocal slits present, extending diagonally from the lateral base of tongue to the angles of jaws; tongue large, ovoid, free laterally and posteriorly; vomerine odontophores transverse, medially in contact, each with a series of vomerine teeth (eight on the left, seven on right), situated between the oblique, oval choanae, which are larger than the vomerine odontophores.

Axillary membrane extends to about one-half the upper arm length; pectoral fold weakly marked. Arm slender, forearm robust; ulnar tubercles absent; indistinct transverse fold separating forearm and hand on dorsal surface. Palmar tubercle flat, bifid; thenar tubercle oval, large, protruding, about two times the size of the subarticular tubercles. Fingers slender; all fingers basally webbed, with narrow lateral fringes (on both sides) to base of discs, on both sides of the fingers (Fig. 1D); relative finger lengths II < III < V < IV, fingers with relatively large, truncated discs, disc of finger II smaller than those of the other fingers; transverse diameter of the disc on finger IV 76% diameter of tympanum. Subarticular tubercles of fingers II and III subconical, protruding, as wide as the digit; finger IV with two subarticular tubercles, the one under the penultimate articulation round and as wide as the digit, the one under the antepenultimate articulation rounded but much smaller; finger V with one large flattened subarticular tubercle slightly narrower than the digit under the penultimate articulation and a minuscule tubercle under antepenultimate articulation; all fingers with small, round, supernumerary tubercles; no prepollical spine; thick, large white nuptial pad covering base of finger II dorsomedially, extending medially to the inner margin of the thenar tubercle, and distally to the base of the first phalanx (Fig. 3).

Thigh length 46% of SVL, tibia length 52% of SVL; foot length 69% of SVL; tarsal fold and tarsal tubercles absent. Inner metatarsal tubercle large, oval, protruding; outer metatarsal tubercle small, rounded. Toes slender; relative toe lengths I < II < III < V < IV (toe V only slightly larger than III); subarticular tubercles round, protruding, as wide as digits; supernumerary tubercles small, increasing in size from base toward first subarticular tubercle; toe discs more or less same size as discs of fingers, transversely expanded, toe discs I-II smaller than toe discs III-V. Webbing formula I(2)-(2)II(1)-(2)III(1)-(2)IV(2)-(1)V, web of toes III and IV continued as a narrow fringe (on both sides of toe) to disc, on both sides of the toes (Fig. 1E).

Skin of dorsum shagreen; dorsal surface head shagreen, with some isolated larger tubercles; skin of throat and chest smooth; skin of belly and ventral surfaces of thighs areolate. Measurements in Table 1.

Color in preservative: Dorsum brown with dark-brown irregular blotches and smaller light gray, slightly round spots. Flanks predominantly light-brown, with two indistinct longitudinal lines of small light-gray spots; one large white axillar spot divided by horizontal dark-brown band; one large white inguinal blotch divided by a vertical dark-brown band on the left hand side, incompletely divided on the right hand side. Inguinal spots narrowly separated from a large white spot on the anterior surface of thigh; thigh dorsally with dark- and light-brown areas and four white spots, ventral surface of thigh cream, posterior surface of thigh light-brown with white spots. Gular region centrally with large, brown irregular spots, laterally brown, posterior part white. Chest and belly white, central area of belly with some small, solid black, subepidermal globules (not likely to be melanophores). Forearms and tibiae dorsally gray with dark-gray transverse bars. Ventral surface of forearm cream; hands and feet brown with gray tubercles (Fig. 4A, C-D). Ventral surfaces of tibiae with narrow, longitudinal cream band; three white, dark-bordered spots on border of posterior and ventral surfaces.

Color in life (photos of MPEG 28680): Dorsum brown with irregular dark brown blotches and smaller cream spots. Lips with cream and brown irregular marks. Dorsal surface of fore- and hindlimbs brown with dark brown bands. Anterior and posterior surface of thighs with large, orange, black-bordered blotches, and marked dark- and light-brown. Posterior surfaces of tibiae with large black-bordered, orange spots. Dorsolateral region brown with irregular small cream spots. Large, orange, black-bordered inguinal and axillar spots. Bones white. Upper part of iris golden, lower part silver (Fig. 5).

Paratype variation: The type series is rather homogeneous morphologically. The number of vomerine teeth varies from 5-9 (on the left side) and 6-9 (on

1. A paratype (MPEG 28676) – not the holotype – is shown in Figure 2. Water was inserted in the vocal sac to show the medial lobe. As this could damage the specimen, we opted not to perform such procedure with the holotype.

the right side). The vomerine odontophores can be in contact or not. Variation in foot webbing formula is I(2)-(2⁻-2)II(1)-(2⁻-2⁺)III(1)-(2⁻- 2⁺)IV(2⁻- 2⁺)-(1)V.

Dorsal color pattern of paratypes is similar to that of the holotype, but light-gray spots on the back are more irregularly scattered. Some males have a dark gray dorsum with less distinct light-gray spots. The female has a reddish-brown dorsum with brown irregular blotches (less evident) and light-cream spots (Fig. 4).

Throat pattern varies from cream with few melanophores on the edges of jaw (female) to cream with brown or dark-brown flecks (males) (Fig. 6).

Belly and flanks, similar to that of the holotype. None of the paratypes has the black dots in the middle of the belly, which are present in the holotype. Most specimens have both axillary and inguinal spots. Axillary spots are usually present, but are absent in one male (MPEG 28680). Axillary spots are distinctly smaller than those in the inguinal region, and may consist of a single round spot or be composed of several smaller spots. Inguinal spots are present in all specimens. Inguinal spots may be undivided, or divided with two or three divisions. Some specimens may show different patterns on the left and right sides (Fig. 4).

Summary of measurements of the type series is given in Table 1.

Distribution: So far, *Scinax sateremawe* sp. nov. is known only from the vicinities of the type locality in Maués, Amazonas, Brazil and from Careiro da Várzea, Amazonas, Brazil (Fig. 7).

Notes on natural history: At Floresta Nacional de Pau-Rosa, Maués, all male *S. sateremawe* sp. nov. were found calling on branches of shrubs or trees around a large temporary pond (MPEG 28677-28680) and a flooded area (MPEG 28675-28676), in terra-firme forest at night (between 20:30 h and 22:30 h). The species seems to be locally abundant. Several other species were actively reproducing in the same areas in which we found *S. sateremawe* sp. nov., including four species of *Dendropsophus* [*D. minutus* (Peters, 1872) and three unidentified species] and another species of *Scinax* (not identified; calling high in the canopy). Other sympatric frogs included the leptodactylid *Hydrolaetare schmidti* (Cochran & Goin, 1959), the microhylids *Chiasmocleis avilapiresae* Peloso & Sturaro, 2008 and *Hamptophryne boliviana* (Parker, 1927).

In Careiro da Várzea, this new species was found on sticks, vertical stems and *Heliconia* leaves, 10-200 cm above the ground or water, in secondary old forest or a forest pond, at night (between 19:45 h

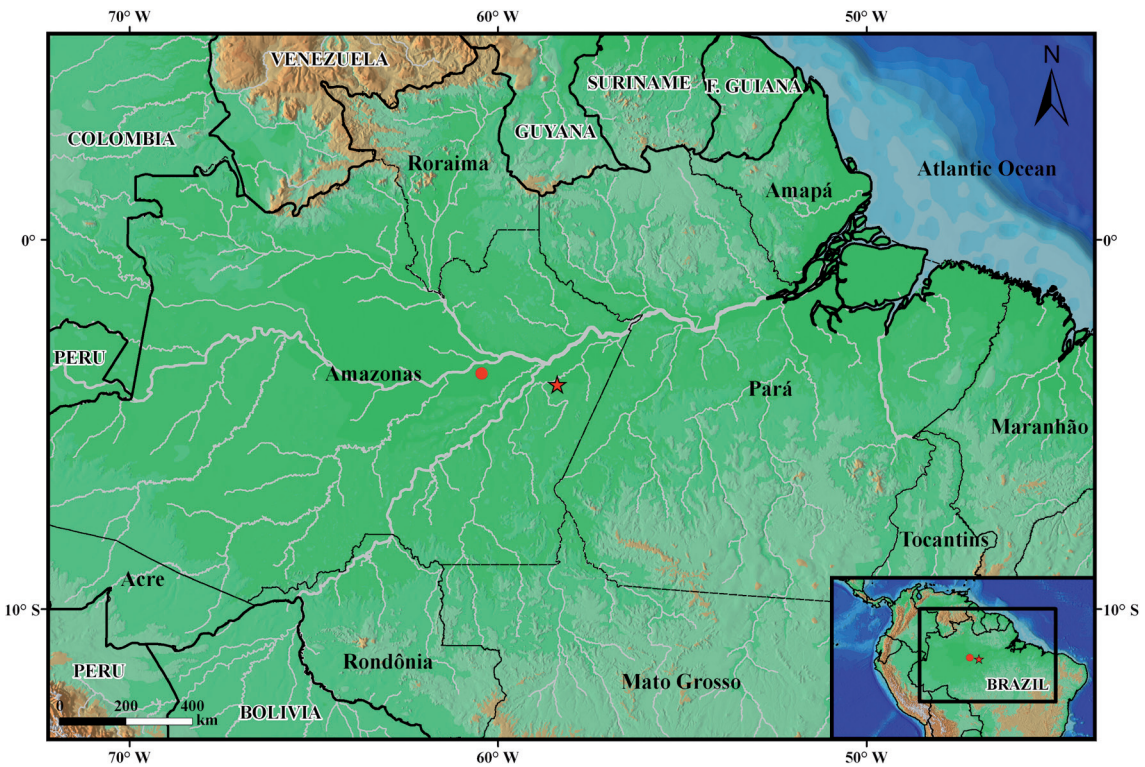

FIGURE 7: Map of Central Amazonia, showing the distribution of *Scinax sateremawe* sp. nov. Star = Comunidade São Tomé, Maués, Amazonas, Brazil (type-locality) and Comunidade Bragança, Maués, Amazonas, Brazil. Circle = Careiro da Várzea, Amazonas, Brazil.

and 19:56 h). Tadpoles and advertisement call of *S. sateremawe* sp. nov. are unknown.

Etymology: The specific name is derived from the Tupi name Sataré-Mawé. The Sateré-Mawé (or Sataré-Maué) is an indigenous tribe inhabiting the middle Rio Amazonas, in the Rio Madeira-Rio Tapajós interfluvial area, where both localities from where the species is known are situated. The Sateré-Mawé are widely known for some legends regarding the domestication of the Guaraná plant (*Paullinia cupana* Kunth) (Lorenz, 1992). Guaraná is present in all of Amazonia but is especially abundant in the region of the Rio Maués (Maués River). Its fruit is used to make is a popular beverage in Brazil and is often used as a stimulant.

DISCUSSION

The presence of white nuptial pads on the inner finger in the genus *Scinax* has been reported for many species – *S. aromothyella* Faivovich, 2005; *S. belloni* Faivovich, Gasparini & Haddad, 2010; *S. constrictus* Lima, Bastos and Giaretta, 2004; *S. flavoguttatus* (Lutz & Lutz, 1939); *S. garbei; S. hayii* (Barbour, 1909); *S. ictericus; S. kennedyi, S. lutzorum* Cardoso & Pombal Jr., 2010; *S. oreites; S. perpusillus* group; *S. rogerioi* Pugliese, Baêta & Pombal Jr., 2009; *S. sugillatus* (Duellman, 1973) – including the type-species of the genus *Scinax auratus* (Wied-Neuwied, 1821) (Pyburn, 1973; Duellman, 1978; Heyer *et al.,* 1990; Duellman & Wiens, 1992, 1993; Lima *et al.,* 2004; Faivovich, 2005; Pugliese *et al.,* 2009; Faivovich *et al.,* 2010). Faivovich *et al.* (2010) claimed the first report of this character for the *Scinax perpusillus* group, but Heyer *et al.* (1990) already observed and described an indistinct white granular nuptial pad in a species they considered to be *S. perpusillus* from Estação Biológica de Boracéia, state of São Paulo, Brazil. We have observed white nuptial pads in males of *Scinax sateremawe* sp. nov. and in other Amazonian species: *S. boesemani, S. cruentommus, S. parkeri, S. garbei, S. nebulosus, S. proboscideus, S. ruber, S. rostratus, S. x-signatus, S. fuscovarius, S. trilineatus, S. fuscomarginatus* and *S. funereus.* The presence of nuptial pads in males of *Scinax* is an important sexual dimorphic character, which has been largely ignored in *Scinax* systematics, but which, with more detailed observation, may prove to be important in studies of biology and taxonomy of the genus.

Few references discuss the presence of bilobate vocal sacs in *Scinax,* although this character state is also present in other species of the genus, such as *S. karenanneae, S. lindsayi, S. castroviejoi* De la Riva, 1993, and *S. oreites* (Pyburn, 1993; De la Riva, 1993; Duellman & Wiens, 1993). Until now, we do not know whether these species are closely related or whether this character evolved multiple times within *Scinax.* An ample phylogeny, including as many species as possible, and reconstructions of the characters currently used in the taxonomy of the genus is necessary to elucidate character evolution in this group.

Nomenclatural issues in *Scinax*

Although the application of the name *Scinax ruber* is well defined and a neotype is existent, a lot of confusion still exists. *Scinax ruber* has been widely applied to several distinct morphotypes (many very different from that of the neotype) found in Amazonian rainforest and other regions. Fouquet *et al.* (2007) showed an example of the complexity of the *S. ruber* species group in French Guiana, revealing through molecular analyses six distinct lineages within the group. We have showed that the new taxon described here differs conspicuously from *S. ruber* from the type locality Paramaribo, Suriname. However, a thorough review of Amazonian populations to which the name *S. ruber* has been applied is necessary.

Another source of taxonomic confusion within the genus is *Scinax x-signatus.* The holotype (ZSMH 2494/0) of this species is presumably lost (Hoogmoed & Gruber, 1983; Glaw & Franzen, 2006), and the type locality is not very precise ("Habitat in Provincia Bahiae") (Spix, 1824). Lutz (1973) redescribed this species, including material from the state of Bahia and other localities. Vanzolini (1981) commented about some localities where Spix (1824) collected, clarifying some dubious localities, but did not mention *S. x-signatus.* Heyer *et al.* (1990) diagnosed and redescribed *S. x-signatus* (as *Ololygon x-signata*) from Estação Ecológica de Boracéia (about 850 km S from Bahia), state of São Paulo, Brazil, based on a single specimen (MZUSP 54382), which is possibly not from that locality, according to Heyer *et al.* (1990). Although helpful in understanding the problem in *S. x-signatus,* these publications do not help to elucidate the taxonomy of this species.

Hoogmoed & Gruber (1983) placed *Hyla coerulea* Spix, 1824 and *Hyla affinis* Spix, 1824 in the synonymy of *S. x-signatus,* based on the original descriptions and figures of the three taxa (in Spix, 1824). We reexamined the descriptions and figures of all three species and conclude that *S. x-signatus* is distinct

from the other two taxa described by Spix (1824). However, we refrain from revalidating *H. affinis* and *H. coerulea* here, because that would simply add more confusion to the already chaotic situation concerning *S. x-signatus.* This should only be done after a careful study trying to associate these names with extant populations of *Scinax.* For the purpose for this work it suffices to say that *S. sateremawe* sp. nov. clearly differs from *S. x-signatus* (and for that matter from *H. affinis* and *H. coerulea*). It differs in coloration from Spix's drawings of *H. affinis* (dorsum predominantly green without scattered light-gray spots, and surfaces of thighs without dark bars), from *H. coerulea* (dorsum predominantly green without scattered light-gray spots and red eyes) and *S. x-signatus* (dorsum brown with two opposed dark brown chevron marks between shoulders and another two on the sacral region). It may be necessary to designate a neotype for *Scinax x-signatus* (and also for *H. affinis* and *H. coerulea*) before any major advance in the systematics of the complex is possible.

RESUMO

Uma nova espécie de hilídeo do gênero Scinax *é descrita e ilustrada. O novo táxon foi encontrado na Amazonia, região norte do Brasil, municípios de Maués e Careiro da Várzea, Estado do Amazonas. A nova espécie é caracterizada pelo tamanho moderado (machas com media de comprimento rostro-cloacal de 36.3 mm); corpo robusto; mancha axiliar e inguinal grande, laranja bordeada de preto; e saco vocal bilobado. Essa nova espécie foi encontrada em floresta primária e secondária sobre ramos de arbustos e árvores sobre ou próximo a poças permanentes ou áreas alagadas.*

Palavras-Chave: Amphibia; Hylinae; Amazonas; Taxonomia; Espécie nova.

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APPENDIX I

Additional species examined

Institutional abbreviations follow Frost (2013). Other acronyms are as follows (the first three are categories in the Brazilian system of protected areas): ESEC: Estação Ecológica (= Ecological Station); FLONA: Floresta Nacional (= National Forest); FLOTA: Floresta Estadual (= State Forest); PPBio: Programa de Pesquisa em Biodiversidade (= Program of Research in Biodiversity); REBIO: Reserva Biológica (=Biological Reserve); UHE: Usina Hidroelétrica (=Hydroelectric powerstation); MSH: field numbers of Marinus S. Hoogmed.

Scinax boesemani (28): BRAZIL: AMAPÁ: *Oiapoque* (MPEG 20365-67); PARÁ: *Faro/Oriximiná:* FLOTA Faro (MPEG 23270); *Alenquer:* ESEC Grão-Pará South (MPEG 29698-29714); *Óbidos:* ESEC Grão-Pará Center (MPEG 30875). FRENCH GUIANA (MPEG 5075). SURINAME: near Onverwacht (AMNH 75555, paratype); *Zanderij* (RMNH 12601, holotype); *Brokopondo:* 1 km SW Brownsweg (AMNH 107847-48); MAROWIJNE: *Albina* (MPEG 8261).

Scinax cruentommus (4): ECUADOR: NAPO: *Santa Cecilia* (AMNH 93189-92).

Scinax fuscovarius (11): BRAZIL: GOIÁS: *Maniçu:* UHE Serra da Mesa (MPEG 9025-28; MPEG 9030-31; MPEG 9033; MPEG 9035; MPEG 9039; MPEG 9041; MPEG 9044).

Scinax fuscomarginatus (10): BRAZIL: PARÁ: *Altamira:* left margin of Rio Xingu, UHE-Belo Monte, km 55 (MPEG 26297-26306).

Scinax funereus (5): COLOMBIA: PUTUMAYO (AMNH 116221-22). PERU: LORETO (AMNH 43252, 116221-166222).

Scinax garbei (11): BRAZIL: AMAZONAS: *Manaus:* Instituto Nacional de Pesquisas da Amazônia (= INPA) (MPEG 16077); *Maués:* Caiaué, Rio Paraconi (MPEG 28699). PARÁ: *Anapú:* right margin of Rio Xingu, UHE-Belo Monte, Caracol (MPEG 26307-26311); *Almeirim/Monte Alegre:* REBIO Maicuru (MPEG 30301-30302); *Carajás:* Área de Influência do Projeto (= área influenced by project) Salobo (MPEG 8556-57); *Vitória do Xingu:* UHE-Belo Monte, Ilha da Taboca (MPEG 10289).

Scinax nebulosus (33): BRAZIL: PARÁ: *Altamira:* left margin of Rio Xingu, UHE-Belo Monte, km 55 (MPEG 26329-39); *Óbidos:* ESEC Grão-Pará Center (MPEG 30733-42); *Portel:* FLONA de Caxiuanã, Plot PPBio (MPEG 24993-25503).

Scinax parkeri (4): BRAZIL: AMAZONAS: *Manicoré:* 150 km from Fazenda Formosa (MPEG 17355, 17396-98).

Scinax pedromedinae (11): BRAZIL: AMAZONAS: Tefé: ESEC Mamirauá (MPEG 5334, 5341-44, 7249, 7321-22, 7331, 7443, 7469).

Scinax proboscideus (8):BRAZIL: PARÁ: *Alenquer:* ESEC Grão-Pará South (MPEG29668). SURINAME: MAROWIJNE: *Upper Gran Rio* (ZMA 5710; holotype); *Lely Mountains* (RMNH [3 ex. MSH 1700, 1705]). FRENCH GUIANA: Cayenne: Petit Saut, Sinnamary river (RMNH [2 ex. MSH 5371, 5383], MPEG 5082).

Scinax rostratus (4): BRAZIL: PARÁ: *Aveiro:* right margin of Mamuru River (MPEG 28060-61); *Vitória do Xingu:* left margin of Xingu River, Comunidade Arroz Cruz (MPEG 10698). VENEZUELA: SUCRE: *Arismendi:* San Juan de lâs Galdonas (MPEG 8262).

Scinax ruber (9): SURINAME: PARAMARIBO: RMNH 15292B (neotype); BROKOPONDO (AMNH 130367). FRENCH GUIANA: CAYENNE: 20 km NE Petit Saut, Sinnamary River (MPEG 5050, MPEG 5131-32); Vidal Site, Remire-Degrad des Cannes Road, SE Cayenne (MPEG 5700-03).

Scinax trilineatus (17): VENEZUELA: BOLIVAR: 12 km SE El Manteco (RMNH (18357 [holotype], 18258-59 [paratypes]); GUYANA (AMNH 97949 [paratype]): Isheartun (AMNH 43637 [paratype]); *Moro,* Rupununi River (AMNH 46248 [paratype]); *Parabam* (AMNH 97944-48 [paratypes]); SURINAME: MAROWIJNE: *Sipaliwini* (RMNH 18260 [paratype]). BRAZIL: PARÁ; *Belém* (MPEG 6183, MPEG 6290-91, MPEG 6297, MPEG 6324)

Scinax cf. ***x-signatus*** (7): BRAZIL: PARÁ: *Belém* (MPEG 1768, MPEG 1770-75).