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A new species of *Scinax* Wagler (Anura: Hylidae) from Paraná, Southern Brazil

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Abstract

In this article, we describe a new species of *Scinax* from the state of Paraná, southern Brazil, based on the external morphology of adults and their advertisement calls. The new species is diagnosed by the size of its males (SVL 27.8–31.6 mm); the snout subovoid in the dorsal view and slightly acuminate in profile; the vocal sac subgular and ventrally not reaching the pectoral region; and the advertisement call composed of a single pulsed note with 7–13 pulses, and a duration of 0.16–0.25s. This new species occurs in natural highland grassland formations, in the threatened ecosystem of the Atlantic Forest in the state of Paraná, southern Brazil.

Key words: Hylinae, *Scinax rossaferesae* **sp. nov.**, taxonomy, advertisement call, grassland, Araucaria Forest

Introduction

Scinax Wagler is the most species-rich genus of Hylidae, with 116 described species (Frost 2016). Five morphological synapomorphies are currently recognized within the genus: the presence of webbing between toes I and II that does not extend beyond the subarticular tubercle of Toe I, the ability to bend Finger I and Toe I, the origin of the pectoralis abdominalis muscle through well-defined tendon, and the pectoralis abdominalis muscle overlapping the obliquus externus muscle (Faivovich 2002; Faivovich *et al.* 2005). The genus comprises both the *S. catharinae* and *S. ruber* clades (Faivovich 2002; Faivovich *et al.* 2005). The latter is composed of 69 species, of which 58 are not included in the two monophyletic groups recognized: the *S. rostratus* and the *S. uruguayus* groups (Faivovich *et al*. 2005). Species of the *S. ruber* Clade are widely distributed in different environments, occurring from eastern and southern Mexico to eastern central Argentina, also including the islands of Trinidad & Tobago and St. Lucia (Frost 2016).

In Brazil, *Scinax* is widely distributed in all biomes (Frost 2016), including the southern grasslands of the Atlantic Forest (e.g. Crivellari *et al.* 2012; Guerra & Bastos 2014, Santos 2014). This ecosystem is characterized by grasslands interspersed with Araucaria forest, rocky outcrops, riparian forests, island forest patches (regionally known as *capões*), and forests that are linked to the topographic steppes (*escarpas*) that split the plateaus of southern Brazil (Maack 1968). Guerra & Bastos (2014) and Santos (2014) reported ten species of the *Scinax ruber* Clade for this biome: *S. fuscomarginatus* (Lutz), *S. fuscovarius* (Lutz), *S. granulatus* (Peters), *S. imbegue* Nunes, Kwet & Pombal, *S. similis* (Cochran), *S. nasicus* (Cope), *S. perereca* Pombal, Haddad & Kasahara, *S. squalirostris* (Lutz), *S. tymbamirim* Nunes, Kwet & Pombal, and *S. uruguayus* (Schmidt).

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In this paper, we describe a new species of the *Scinax ruber* Clade collected during fieldwork in the natural grasslands of the state of Paraná, southern Brazil on the basis of morphological and acoustical characters.

Material and methods

Type specimens are deposited in the Museu de História Natural Capão da Imbuia, Curitiba, Paraná, Brazil **(MHNCI)**, Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil **(MZUSP)**, and Célio F. B. Haddad Amphibian collection, Rio Claro, São Paulo, Brazil **(CFBH)**. See Appendix 1 for a complete list of examined specimens.

The webbing formula follows Savage & Heyer (1967) as modified by Myers & Duellman (1982). Dorsal and profile outline nomenclature of the snout follows Duellman (1970). We took fourteen measurements of the adult specimens, of which eleven follow Duellman (1970): **SVL** (snout-vent length), **HL** (head length), **HW** (head width), **ED** (eye diameter), **IOD** (interorbital distance), **ED** (eye diameter), **TD** (tympanum diameter), **END** (eye-nostril distance), **IND** (internarial distance), **TL** (tibia length), and **FL** (foot length); and three follow Heyer *et al.* (1990): **NSD** (nostril to tip of snout distance), **TAL** (tarsal length), and **THL** (thigh length). We also used two other measurements: **3FD** (third finger disk diameter) and **4TD** (fourth toe disk diameter); following Napoli & Caramaschi (1998). All measurements (in millimeters) were recorded with a Lee digital caliper under a Tecnival stereomicroscope and rounded to the nearest 0.1 mm. Sex of the specimens were determined by the presence of secondary sexual traits (nuptial pads; vocal slits; and expansion of the vocal sac).

The advertisement calls were recorded using a tape recorder (Marantz PMD-222) coupled with a directional microphone (Sennheiser ME-66) and carried out at 44.1 kHz with 16-bit resolution. Air temperature and relative humidity were obtained using a compact pen-type Thermohygrometer (Icel Ht7020). All recordings were analyzed on Cool Edit 96 (Syntryllium Software Corporation) with FFT 256 points, frame overlap = 50%, and the Hamming function. We analyzed nine call parameters: call duration (s), interval between calls (s), pulse duration (s), call repetition rate (n/s—notes per second), dominant frequency (Hz), minimum frequency and maximum frequency observable in the sonogram (Hz), number of pulses per note, and pulse repetition rate (p/s—pulses per note duration). Temporal parameters were obtained directly from the oscillogram. Terminology for advertisement call descriptions follows Heyer *et al*. (1990). We edited spectrograms, waveforms, and power spectrums with Adobe Photoshop CS3.

Results

***Scinax rossaferesae* sp. nov.**
(Figs. 1–3)

Scinax sp. gr. *ruber*—Crivellari *et al.* (2012), Crivellari *et al.* (2014: fig. 6G), Guerra & Bastos (2014: fig. 25).

Holotype. CFBH 21027, adult male, from Parque Estadual do Cerrado (24°14'47.16" S; 49°45'7.39" W), municipality of Jaguariaíva, state of Paraná, Brazil, collected on October 21, 2008 by B.V.M. Berneck, R. Recoder, M.V. Segalla, and P.H. Valdujo.

Paratypes. Eleven adults collected in two localities in the state of Paraná, Brazil. All are males unless otherwise stated: MZUSP 157140–157142, MHNCI 9226–9228 from Parque Estadual Guartelá (24°37'49.54" S; 50°17'30.61" W), municipality of Tibagi, state of Paraná, Brazil, collected on March 30, 2011 and September 29, 2013. MHNCI 9841, 9843–9844, CFBH 39390 (female), 39391 from Parque Estadual Vila Velha (24°14'02" S; 49°59'28" W), municipality of Ponta Grossa, state of Paraná, Brazil, collected on March 30, 2011 and October 10, 2011.

Diagnosis. The new species is diagnosed by the following set of characters: 1) SVL 27.8–31.6 mm in males; 2) subovoid snout in dorsal view and slightly acuminate in profile; 3) head slightly longer than wide (HL\HW=1.1–1.2); 4) small-sized tympanum (1.2–1.44 mm); 5) single, median, subgular vocal sac that does not reach the pectoral region; 6) pointed tubercles absent on the lower jaw; 7) tibia length/snout-vent length = 0.50–0.53; 8) conspicuous pointed tubercle absent on the heel; 9) webbing on the feet always reaching the base of penultimate

phalanx between toes II and V, and not surpassing, anteriorly, the proximal half of antepenultimate phalanx in Toe IV; 10) dorsum with a pale yellow, light to dark gray from dark brown, or black background, with round, irregular, and elongate darker blotches; 11) dorsal surface of the shanks with irregular and transversal darker markings; 12) posterior hidden surfaces of thighs light brown, light to dark gray, or black, with lighter, large and irregular blotches (yolk yellow in living specimens); 13) iris golden yellowish, with many darker reticulations; and 14) advertisement call composed of a single pulsed note, with 7–13 pulses per note, and a duration of 0.16–0.25 s (0.25 ± 0.04).

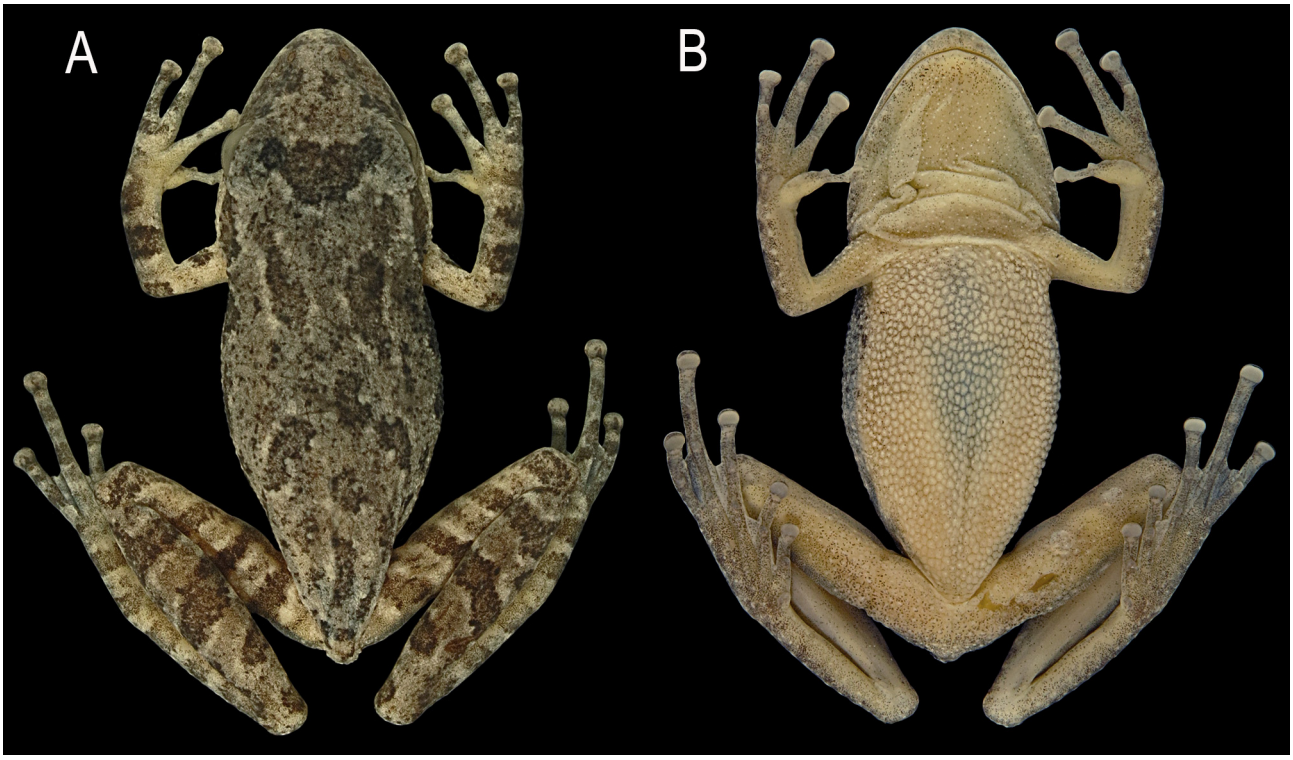

FIGURE 1. *Scinax rossaferesae* **sp. nov.** holotype (CFBH 21027; SVL 27.8). **A**: Dorsal view. **B**: Ventral view.

Description of holotype. Head slightly longer than wide HL\HW=1.1; HL 38.5% of SVL (Fig. 1). Snout subovoid in dorsal view and slightly acuminate in profile (Fig. 2A). Nostrils dorsolateral, elliptical, and slightly protruded; distance between nostrils equal to 63.3% of IOD. *Canthus rostralis* evident and convex; loreal region slightly concave. Upper lip slightly flared. Internarial region concave. Eyes protuberant; ED almost equal to IOD and END. Tympanum rounded; TD equal to 50% of ED. Tympanic annulus rounded with supratympanic fold evident, reaching from near the posterior corner of the eye to anterior margin of the insertion of the arm; covering a small portion of the posterior upper margin of the tympanic annulus (Fig. 2A). Vocal sac singular, evident, subgular, and that ventrally does not reach the pectoral region (Fig. 1B). Vocal slits longitudinal, large, and semi-ovoid; originating on the side of the tongue and ending at the corner of mouth. Tongue ovoid, attached anteriorly, laterally is barely free, and shallowly notched posteriorly. Vomerine teeth in two series: right series with four and the left with three teeth each; slightly curved and located between and slightly posterior the choanae. Choanae oval-shaped and separated by a distance slightly smaller than four times their diameter.

Axillary membrane absent. Upper arm more slender than forearm. A series of small, round, low, and enameled ulnar tubercles present (on right forearm: seven tubercles; on left forearm: six tubercles in a row). Fingers slender; relative lengths I < II ≈ IV< III (Fig. 2B). Finger discs elliptical, wider than they are long, while the disc of Finger I is smaller than the other discs. Subarticular tubercles single, rounded on fingers III and IV, conical on fingers I and II. Supernumerary tubercles single, small, and rounded. Inner metacarpal tubercle single, flat, and slightly elliptical; outer metacarpal tubercle flat, bilobed, the two parts are elliptical shaped. Webbing absent between fingers I and II; basal between fingers II, III, and IV. Thin, wide, slightly developed, light colored nuptial pad (Fig. 3A–B), so that it is possible to see some acini under skin, covering almost the entire base of Metacarpal I, and obscuring the outer margin and a small portion of the base of the inner metacarpal.

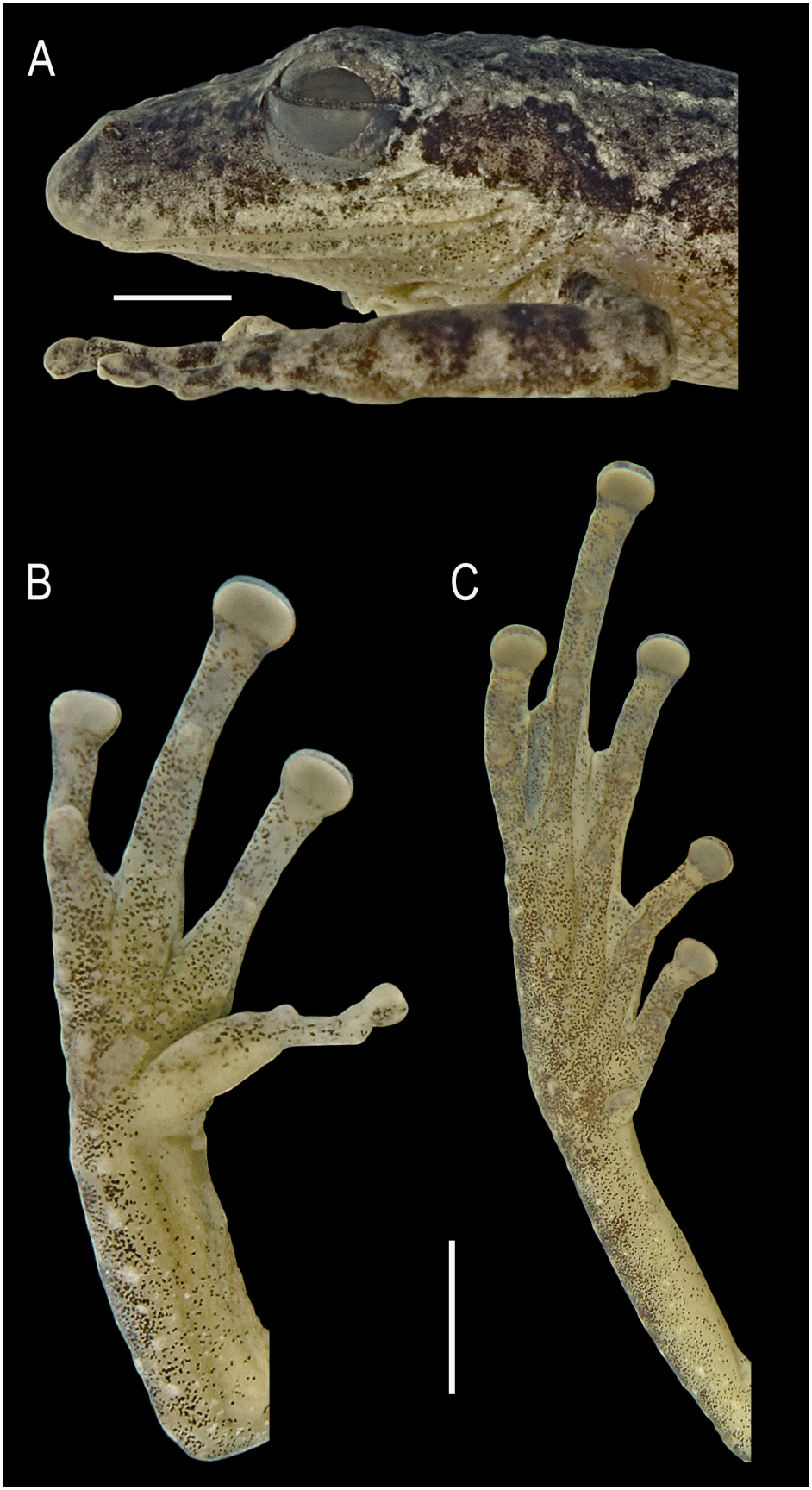

FIGURE 2. *Scinax rossaferesae* **sp. nov.** holotype (CFBH 21027). **A**: Head in lateral view. **B**: Right hand in ventral view. **C**: Right foot in ventral view. Scale bars = 2 mm.

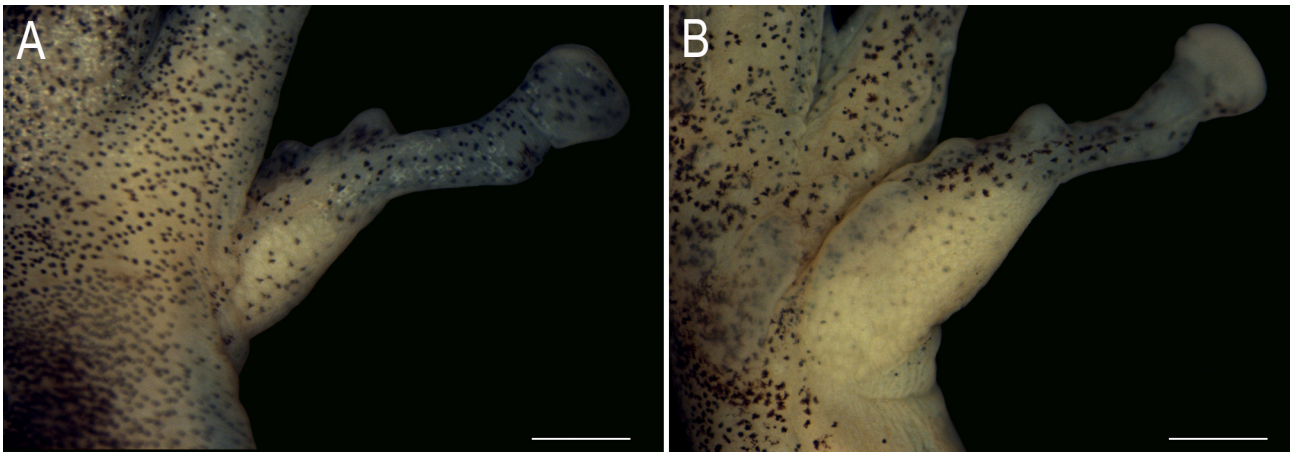

FIGURE 3. Nuptial pad of the left hand of *Scinax rossaferesae* **sp. nov.**, holotype (CFBH 21027). **A:** Dorsal view. **B:** Ventral view. Scale bar = 1 mm.

Thighs slender, TL 50.3% of SVL; tibia as wide as thighs; THL 47.8% of SVL; FL 44.2% of SVL. Toes slender, discs elliptical, wider than long. Relative toe length I< II< V≈ III<IV. Subarticular tubercles single, flat, and rounded. Supernumerary tubercles single, small, flat, and nearly rounded. Inner metatarsal tubercle single, flat, rounded, five times the size of outer metatarsal tubercle; outer metatarsal tubercle small, and rounded. Webbing formula I 2^{-}–$2^{1/2}$ II $1^{1/2}$–2^{-} III $1^{3/4}$ –3 IV 3^{-}–$1^{1/2}$ V (Fig. 2C). A series of small, round, flat, and enameled tarsal tubercles present (right forearm: six tubercles; left forearm: seven tubercles in row). Three discrete, low tubercles, next to the tibiotarsal articulation on tarsi; small, rounded and flat tubercles on heel.

Skin on dorsum densely granular, with rounded tubercles and few larger conical tubercles (twice as large as the small ones) scattered on dorsum, less frequent in the internarial region. Dorsal skin on forelimbs slightly granular, and smooth on hindlimbs. Small tubercles mainly on flanks and between the tympanum and eyes. Gular region covered with small, rounded, and enameled tubercles homogenously distributed; pectoral region, abdomen and subcloacal regions densely covered by granules. Ventral surfaces of forelimbs, tibiae and tarsi smooth; thighs covered by granules. Cloacal opening at upper level of thighs. Pectoral fold with pre- and post-axillary elements present (Fig. 1B).

Coloration in life of the holotype. There are no notes of coloration in life of the holotype.

Coloration in preservative of the holotype. Dorsal surface with a grayish background with irregular and elongate dark gray blotches; interocular region with a V-shaped dark gray blotch. Dorsal surface of fore- and hindlimbs light gray with irregular transverse dark gray markings. Dorsal surface of hands light gray with dark gray dots and dark gray blotches on fingers III and IV. Dark gray blotches on dorsum and transverse markings on limbs with white margins. *Canthus rostralis* dark gray, loreal region similar to dorsum. Upper lip whitish with dark gray blotches. Tympanic membrane conspicuously spotted. Flanks lighter with irregular dark gray blotches. Hidden posterior area of thighs dark gray, with lighter, large, and irregular blotches; hidden anterior area of thighs, shanks, and inguinal region light beige. Ventrally, soles, palms, shanks and bordering areas of forearms and tarsi light beige conspicuously spotted with dark gray dots; thighs, arms, abdomen, and gular and pectoral regions finely spotted with grayish brown dots.

Measurements of the holotype (mm). SVL 27.8; HL 10.7; HW 9.2; IND 1.9; IOD 3.0; ED 2.8; END 3.1; NSD 1.9; TD 1.4; TL 14.0; FL 12.3; THL 13.3; 3FD 1.0; 4TD 1.1.

Variation in the type series. Some measurements are presented in Table 1. Ulnar tubercles can be arranged in line (eight individuals; between four and six tubercles), or scattered (two individuals; five and seven tubercles). Tarsal and calcar tubercles are absent in one individual (MHNCI 9843). Internal tarsal fold varies from a discrete flat and ovoid tubercle on the tibiotarsal articulation to an elongate fold that reaches approximately the inner metatarsal tubercle. The skin on dorsum is slightly smooth, with small, scattered, and rounded tubercles, mainly on flanks, posteriorly to eyes, and sacral region in four individuals (MHNCI 9841, 9226; MZUSP 157141–157142). Dorsum smooth, with few small, scattered, and flat tubercles on the sacral region and tympanic fold in one individual (MNHCI 9228). Conical tubercles larger than the round tubercles are absent in four individuals (MNHCI 9226, 9228, 9841, 9843).

TABLE 1. Measurements (in mm) of the type series (including the holotype) of *Scinax rossaferesae* **sp. nov.** from Paraná, southern Brazil.

Measurements	Males (n = 11)		Females (n = 1)
	Mean ± SD	Range	
SVL	29.6 ± 1.2	27.8–31.6	33.7
HL	10.4 ± 0.3	9.9–10.8	11.5
HW	9.3 ± 0.3	8.8–9.9	10.3
IND	2.1 ± 0.1	1.9–2.3	2.1
IOD	3.1 ± 0.3	2.7–3.8	4.1
ED	3.0 ± 0.2	2.7–3.3	2.9
END	3.1 ± 0.1	3.0–3.2	3.5
NSD	1.7 ± 0.1	1.5–1.9	1.6
TD	1.3 ± 0.1	1.2–1.4	1.5
TL	15.2 ± 0.8	14.0–16.5	17.4
FL	13.3 ± 1.0	12.3–14.8	14.9
THL	14.0 ± 0.9	12.6–16.0	14.8
3FD	1.1 ± 1.0	1.0–1.3	1.1
4TD	1.1 ± 0.7	1.0–1.2	1.0

The number of vomerine teeth in males varies between three and seven on both right and left processes. In one male paratype (MHNCI 9228), the right process is absent. Webbing formulae among paratypes varies as follow: I $(2^{-} - 2) - (2^{2/3} - 2^{+})$ II $(1^{3/4} - 1^{1/2}) - (3^{+} - 2^{1/2})$ III $(1^{3/4} - 1^{1/2}) - (3^{+} - 3)$ IV $(3^{+} - 2^{1/2}) - (1^{1/2} - 1^{+})$ V. The nuptial pad bears the same pattern of the holotype in four males; but it can be either wider and thicker (MHNCI 9226, 9228) or thinner (MHNCI 9227, 9843; MZUSP 157140, 157142) than that of the holotype; and in some individuals, it covers half of the dorsal surface of Metacarpal I, whereas it does not cover the base of the inner metacarpal tubercle ventrally in two individuals (MHNCI 9227, 9841).

The only known female (SVL 33.7 mm) is larger than the males (27.8–31.6 mm), and has a snout slightly more pointed than the males in dorsal view; gular region without iridescent tubercles in life; and nuptial pad absent.

Coloration in life is based on field notes and photographs taken from paratype MHNCI 9843 (Fig. 4) and an unvouchered specimen (Fig. 9A). Dorsum with a background ranging from light yellow to yellowish brown, with irregular and elongate light to dark brown blotches; interocular region with a V-shaped light to dark brown blotch. Small light yellowish blotches on dorsum, and fore- and hindlimbs in MHCNI 9843 (Fig. 4B). Tympanic membrane finely spotted. Loreal region similar to dorsum. Upper lip light yellow with dark gray blotches (Fig. 4A). Flanks and inguinal region lighter with irregular light to dark gray blotches. Hidden areas of thighs and shanks light to dark beige, with small and irregular yolk yellow blotches. Ventrally, soles, palms, shanks and bordering areas of forearms and tarsi beige conspicuously spotted with dark gray dots (Fig. 4C–D). Abdomen light beige, with round and flat whitish tubercles. The iris is golden yellow, with many darker reticulations (Fig. 4A).

In preservative, the dorsal color pattern of head, body and limbs can be pale yellow, light to dark gray from dark brown, or black, with round, irregular, and elongate darker blotches (Fig. 5). White pigments in the margins of dark blotches on dorsum and transversal markings on limbs are either absent (Figs. 5A, D, and G) or fragmented (like small blotches; Figs. 5C, E–F). The V-shaped dark blotch in the interocular region is either smaller (Fig. 5A) or larger (reaching the upper eyelid; Fig. 5H) than the holotype. Upper lip can be pale yellow (MHNCI 9843), whitish cream with dark gray blotches (CFBH 39391) or conspicuously black pigmented (MHNCI 9228). Transversal markings on limbs are somewhat indistinct in the male paratype MHNCI 9843. Flanks and inguinal region immaculate light beige (e.g. MHNCI 9843) or with dark irregular blotches (e.g. CFBH 39391). Hidden surfaces of thighs and shanks light brown, light to dark gray, or black, with lighter, large and irregular blotches (yolk yellow in life). In some individuals, the anterior hidden surface of thighs and hidden surfaces of shanks are light beige, finely pigmented with some light brown dots (e.g. MHNCI 9228, 9843).

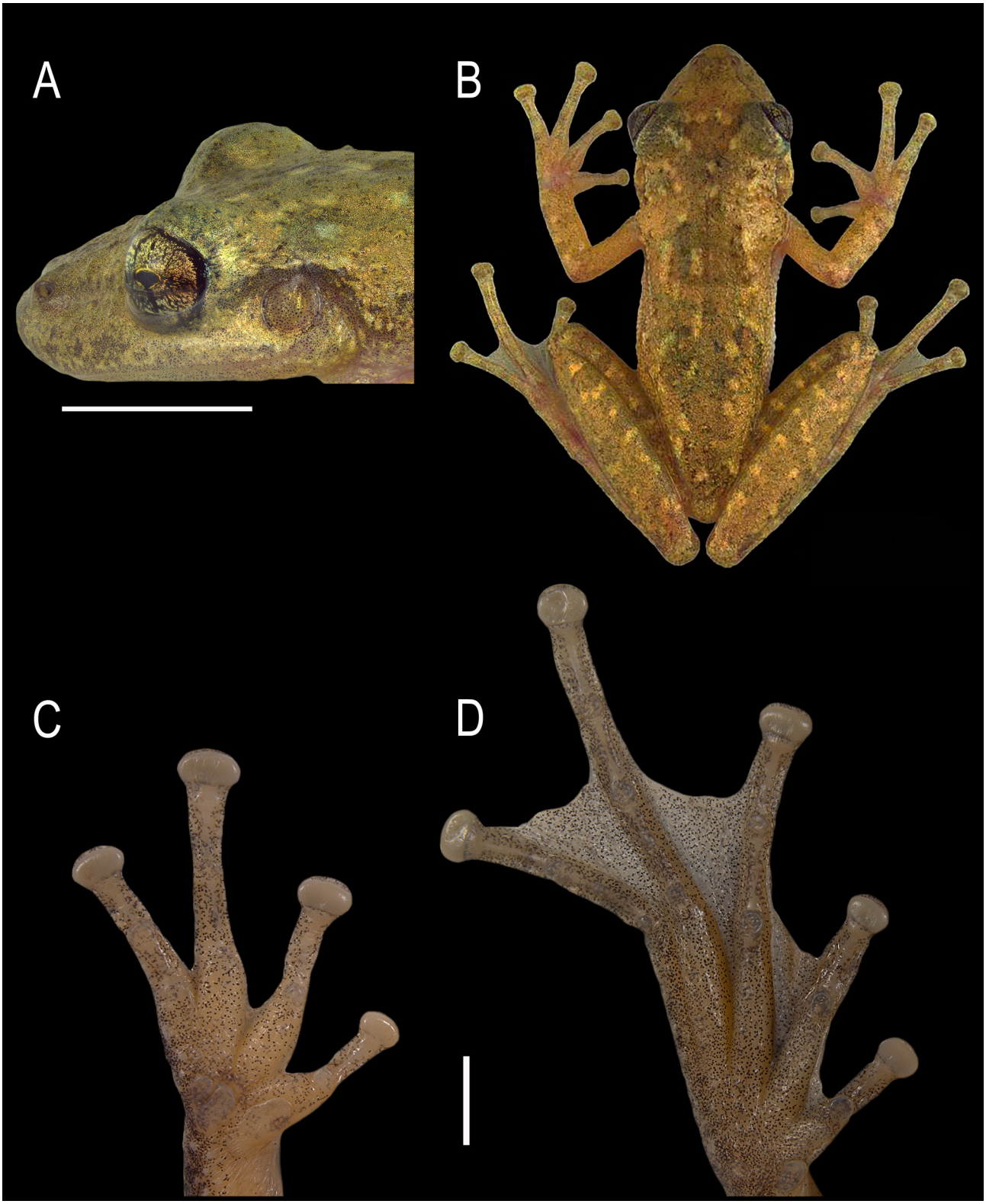

FIGURE 4. *Scinax rossaferesae* **sp. nov.** in life, male paratype (MHNCI 9843; SVL 28.7). **A:** Head in lateral view. **B:** Body in dorsal view. **C:** Right hand in ventral view. **D**: Right foot in ventral view. Scales bars = 5 mm (upper) and 2 mm (lower).

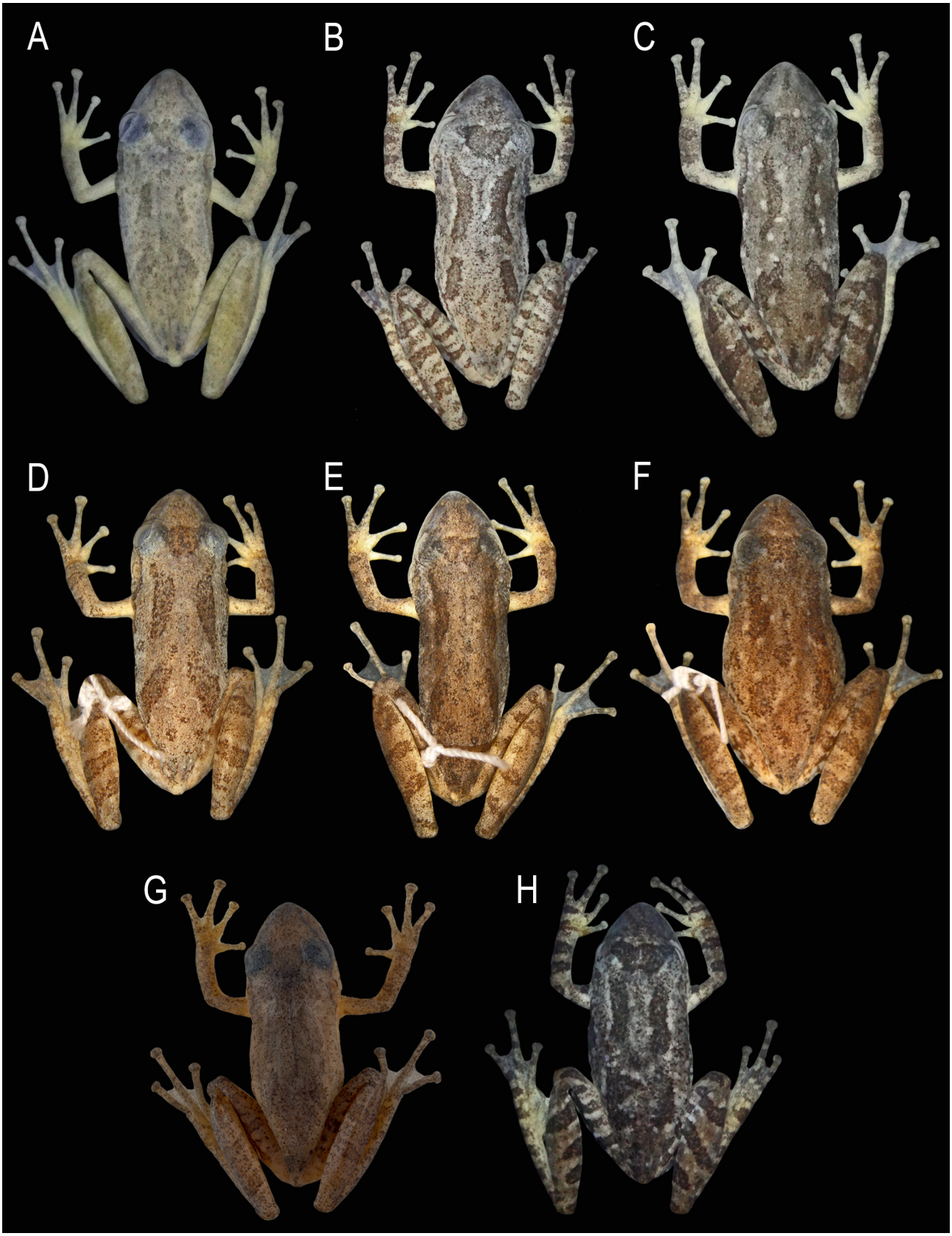

FIGURE 5. Dorsal patterns of *Scinax rossaferesae* **sp. nov. A:** MHNCI 9843; SVL 28.7. **B:** MHNCI 9226; SVL 30.4. **C:** MHNCI 9227; SVL 31.6. **D:** MZUSP 157140; SVL 29.5. **E:** MZUSP 157141; SVL 31.2. **F:** MZUSP 157142; SVL 29.4. **G:** MHNCI 9841; SVL 29.6. **H:** MHNCI 9228; SVL 28.4.

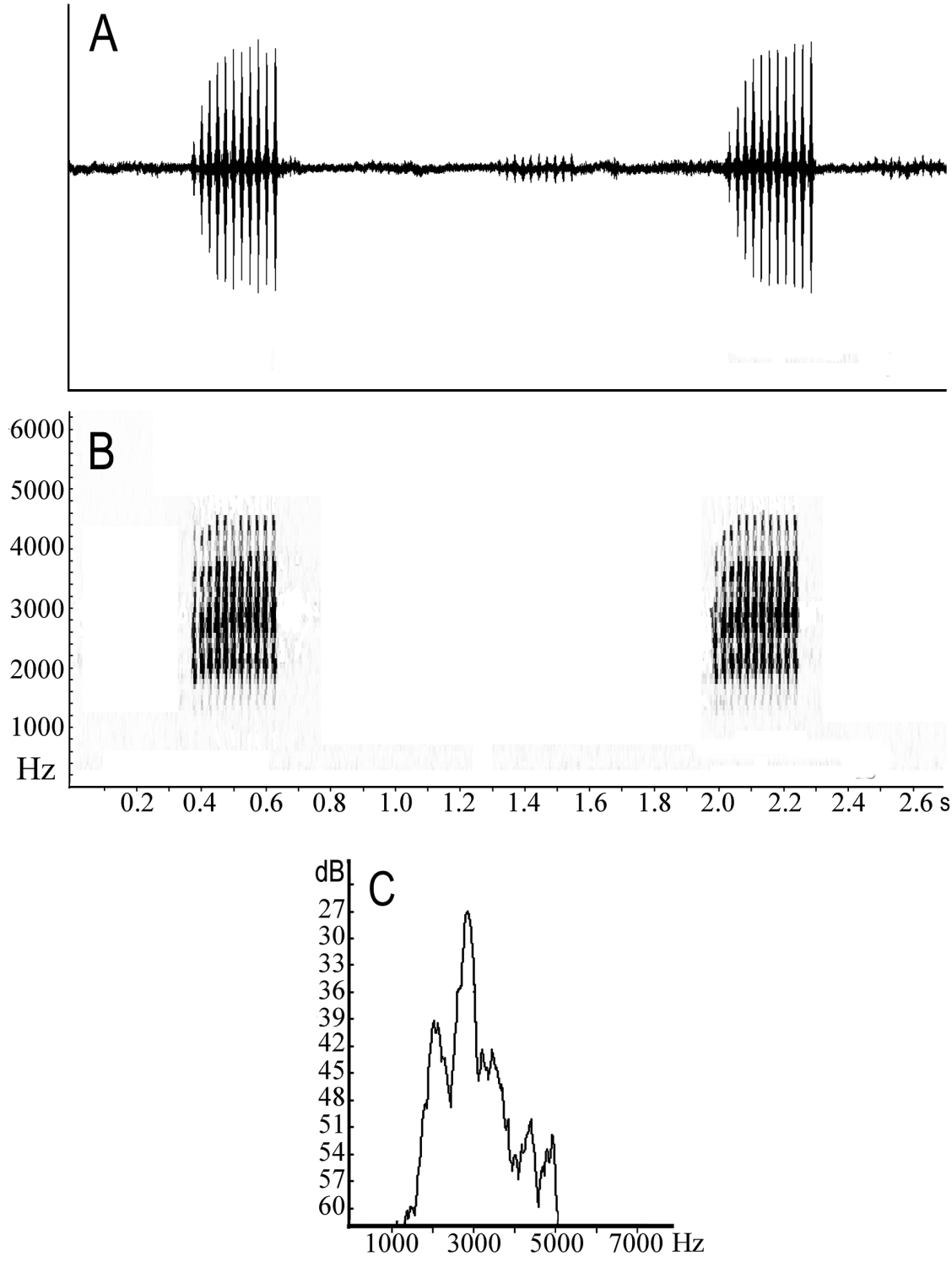

FIGURE 6. Advertisement call of *Scinax rossaferesae* **sp. nov.** (CFBH 39391) from Parque Estadual Vila Velha, Paraná, Brazil. **A:** Oscillogram. **B**: Audiospectrogram. **C**: Power spectrum. Air temperature 17°C and relative humidity 80%.

Ventrally, margins of the gular region, arm insertion, and bordering areas with the dorsal coloration can be creamy white, light to dark brown, or black. Soles and palms can be finely or conspicuously pigmented with dark brown dots. Pectoral region with small dark blotches in some individuals.

Advertisement call. Air temperature and relative humidity during recordings were 17°C and 80%, respectively. The advertisement call of *Scinax rossaferesae* **sp. nov.** [two males (MHNCI 9843, CFBH 39391), *n* = 76 calls; Fig. 6] consists of a single pulsed note with duration of 0.16–0.25 s (0.26±0.04); each note is composed of 7–13 pulses, with a duration of 0.02–0.03 s (0.02±0.0). The notes are separated by an interval of 0.61–2.49 s

(1.40±0.38). The minimum and maximum frequencies of calls are 1492–1733 Hz (1588.1±63.9) and 4461–5165 Hz (4792.4±190.0), respectively. Dominant frequency is 2702.3–3002.7 Hz (2879.0±59.1). Call rate is 0.52–1.54 call/s (0.88±0.2), and pulse rate is 32.7–52.9 pulse\s (41.1±3.0). The first pulse has duration of 0.01–0.02 s (0.01±0.0), minimum frequency of 1210–1612 Hz (1504.2±98.8), and maximum frequency of 2917–4152 Hz (3724.0±334.0).

Tadpoles. The tadpole is unknown.

Comparison with other species. Comparisons with congeneric species is first based on obvious differences in the size of adults, that is, no overlapping nor a minimal gap between size ranges, followed by more detailed comparisons with species that cannot be differentiated by size, or in case of conspicuous external morphological characters.

The SVL in males (27.8–31.6) promptly distinguishes the new species from larger species like *Scinax acuminatus*, *S. castroviejoi, S. eurydice*, *S. dolloi*, *S. fuscovarius*, *S. hayii*, *S. iquitorum*, *S. perereca*, and *S. sateremawe* (combined SVL 34.0–52.0; see Bokermann 1968; Lutz 1973; Cei 1980; De la Riva 1993; Pombal *et al.* 1995b; Moravec *et al.* 2009; Pugliese *et al*. 2009; Sturaro & Peloso 2014); and from smaller species like *S. altae*, *S. cabralensis*, *S. exiguus*, *S. fuscomarginatus*, *S. madeirae*, and *S. villasboasi* (combined SVL 15.7–26.7; see Duellman 1970; Duellman 1986; Drummond *et al.* 2007; Brusquetti *et al*. 2014).

The snout, subovoid in dorsal view and slightly acuminate in profile of *Scinax rossaferesae* **sp. nov.**, differs it from *S. crospedospilus* (elongate in dorsal view; Lutz 1973), *S. nasicus*, *S. similis* (round in dorsal view and in profile in these species), *S. squalirostris* (much more elongate in dorsal view and much more acuminate in profile; Lutz 1973), and *S. fuscomarginatus*, and *S. rogerioi* (protruding in profile in these species; Pugliese *et al*. 2009; Brusquetti *et al.* 2014). Also, it differs from *S. nasicus* and *S. similis* by having longer shanks (TL/SVL= 0.50–0.53 in the new species, *n*= 11; TL/SVL= 0.43–0.48, *n*= 20 in *S. nasicus*, and TL/SVL= 0.45–0.48 in *S. similis*, *n*= 19). The vocal sac single, median, subgular, and ventrally not reaching the pectoral region differentiates the new species from *S. baumgardneri*, *S. exiguus*, *S. fuscomarginatus*, *S. madeirae*, *S. manriquei*, *S. staufferi*, *S. villasboasi*, and *S. wandae* (large vocal sacs that reach the anterior pectoral region; Barrio-Amorós *et al.* 2004; Brusquetti *et al*. 2014); and *S. camposseabrai*, *S. karenanneae*, and *S. sateremawe* (bilobed vocal sacs; Pyburn 1993; Caramaschi & Cardoso 2006; Sturaro & Peloso 2014).

Scinax rossaferesae **sp. nov.** differs from all species in the *S. rostratus* Group (*sensu* Faivovich 2002, Faivovich *et al.* 2005) by the absence of a conspicuous pointed tubercle on the heel and pointed tubercles on the lower jaw, and also by its slightly acuminated snout in profile (elongate, pointed snout in profile; Duellman 1972).

The new species has less extensive webbing on the feet (see variation in the type series) than most species of the *Scinax ruber* Clade. Its webbing always reaches the base of penultimate phalanx between toes II and V, and not surpassing anteriorly the proximal half of antepenultimate phalanx in Toe IV (surpassing the base of penultimate phalanx between toes II and V; and surpassing the proximal half of the antepenultimate phalanx in Toe IV in the other species of the *S. ruber* Clade; e.g. *S. haddadorum*, *S. nasicus*, and *S. rogerioi*; Cope 1862; Pugliese *et al.* 2009; Araujo-Vieira *et al.* 2016). The exceptions are *S. caldarum*, *S. curicica*, *S. duartei*, *S. granulatus*, *S. maracaya*, *S. pinima*, *S. similis*, *S. squalirostris*, *S. tigrinus*, *S. uruguayus*, and *S. villasboasi* (Bokermann & Sazima 1973; Cardoso & Sazima 1980; Carvalho-e-Silva & Peixoto 1991; Pugliese *et al*. 2004; Nunes *et al.* 2010; Brusquetti *et al*. 2014).

The dorsal color pattern which consists of a pale yellow, light to dark gray from dark brown, or black background, with round, irregular, and elongate darker blotches differentiates the new species from *Scinax altae*, *S. fuscomarginatus*, *S. madeirae*, *S. pachycrus*, *S. quinquefasciatus*, *S. ruber*, *S. squalirostris*, *S. staufferi*, and *S. villasboasi* (dorsum with a variable number of dorsal and/or lateral stripes; Duellman1970; Duellman 1972; Duellman & Wiens 1993; Lutz 1973; Heyer *et al.* 1990; Carvalho-e-Silva & Peixoto 1991, Brusquetti *et al*. 2014), *S. alter*, *S. auratus*, *S. cretatus*, *S. imbegue*, *S. juncae*, and *S. tymbamirim* (light or dark continuous or broken dorsal stripes, sometimes delimiting a central darker area; Bokermann 1969; Lutz 1973; Nunes & Pombal 2010; 2011; Nunes *et al.* 2012), *S. blairi* (few brown markings and blotches, or small scattered dark dots; Fouquette & Pyburn 1972), *S. boesemani* (dorsum with or without small white and brown dots; Lescure & Marty 2000), *S. cabralensis* (dorsum with small dark spots homogeneously distributed; Drummond *et al.* 2007), *S. caldarum*, *S. curicica*, and *S. duartei* (two irregular longitudinal stripes arising from an interocular marking; Pugliese *et al*. 2004), *S. chiquitanus* (small and scattered grayish dots and marks; De la Riva 1990), *S. danae* (small scattered dark brown dots), *S. elaeochrous* (dorsum with darker markings and dots, sometimes forming irregular longitudinal stripes; Duellman

1970), *S. ictericus* (dorsum with or without dark brown interocular marking and irregular mostly transverse marks; Duellman & Wiens 1993), *S. iquitorum* (small and scattered dark brown dots and blotches; Moravec *et al.* 2009), *S. lindsayi* (a few small scattered reddish brown dots and blotches), and *S. maracaya* (large dark blotches; Cardoso & Sazima 1980).

The dorsal surface of the forelimbs and thighs with irregular, transverse darker markings; and the posterior hidden surface of thighs light brown, light to dark gray, or black, with lighter, large and irregular blotches, which are yolk yellow in live specimens, differ the new species from *Scinax montivagus* (dorsal markings absent on forelimbs and thighs; and posterior hidden surface of thighs immaculate beige without yellow coloration in live specimens; Juncá *et al*. 2015).

The yellowish gold iris, with many dark reticulations distinguishes *Scinax rossaferesae* **sp. nov.** from *S. cruentommus* (silvery bronze iris with a median horizontal red streak; Duellman 1972), *S. funereus* (greenish bronze with brown flecks; Duellman & Wiens 1993), *S. oreites* (dull bronze with median horizontal brown streak; Duellman & Wiens 1993), and the species in the *S. uruguayus* Group (bicolored iris; Bokermann & Sazima 1973; Faivovich *et al.* 2005).

The advertisement call of the new species composed of a single pulsed note differs it from *Scinax cabralensis*, *S. manriquei*, and *S. rupestris* (combined number of notes/call: 3–14; Barrio-Amorós *et al*. 2004; Drummond *et al*. 2007; Araujo-Vieira *et al.* 2015).

The number of pulses, 7–13 pulses per note, also differs it from *Scinax alter*, *S. blairi*, *S. fuscomarginatus*, *S. hayii*, *S. pachycrus*, and *S. perereca* (combined number of pulses: 14–120; see Pombal *et al*. 1995a; Fouquette & Pyburn 1972; Toledo & Haddad 2005; Brusqueti *et al*. 2014; Carneiro *et al*. 2004); and from *S. castroviejoi* and *S. juncae* (combined number of pulses: 2–5; see De La Riva *et al*. 1994; Nunes & Pombal).

Furthermore, the call has a duration of 0.16–0.25 s which differentiates *Scinax rossaferesae* **sp. nov.** from *S. cruentommus*, *S. curicica*, *S. exiguus*, *S. madeirae*, *S. tymbamirim*, and *S. wandae* (combined call duration: 0.35–4.5 s; see Duellman 1972; Duellman 1986; Pugliese *et al.*2004; Pombal *et al*. 2011; Nunes *et al.* 2012; Brusqueti *et al*. 2014); and from *S. chiquitanus*, *S. eurydice*, *S. ictericus*, and *S. lindsayi* (combined call duration: 0.01–0.10 s; Pyburn 1992; Duellman & Wiens 1993; Pombal *et al.* 1995).

Scinax rossaferesae **sp. nov.** is mainly distinguished from *S. granulatus* by its subovoid snout in the dorsal view and slightly acuminate in profile; small-sized tympanum: 1.2–1.4; head slightly longer than wide HL\HW=1.1–1.2; and slender fingers and toes (rounded in both views; medium-sized tympanum: 1.6–2.6; head as longer as wide HL\HW=1.0; and wider fingers and toes in *S. granulatus*; Figs. 7A–D; see also Kwet 2001: figs. 2A–B, 3A, and 5A–C).

Also, the snout slightly acuminated in profile; *canthus rostralis* marked; iris yellowish gold, with many darker reticulations; and posterior hidden surface of thighs light brown, light to dark gray, or black, with large and irregular yolk yellow blotches in live specimens differ *Scinax rossaferesae* **sp. nov.** from *S. tigrinus* (snout notably more acuminate than the new species in profile; well-defined *canthus rostralis*; iris golden, with few darker reticulations; and posterior hidden surface of thighs with irregular flash orange-yellowish blotches in live specimens of *S. tigrinus*; Figs. 7C–F; see also Nunes *et al.* 2010: figs. 2A and 4).

The holotype *Scinax x-signatus* Spix is considered destroyed (Hoogmoed & Gruber 1983; Glaw & Franzen 2006), and a neotype has still not been designated (type locality: "Provinciae Bahiae", meaning the current state of Bahia east of the river San Francisco; Spix 1824; Vanzolini 1981; see Pombal et al. 1995b). We consider that a snout, subovoid in the dorsal view and slightly acuminate in profile, and less extensive webbing on the feet (always reaching the base of penultimate phalanx between toes II and V, and not surpassing the proximal half of antepenultimate phalanx in Toe IV) in *S. rossaferesae* **sp. nov.** are character states that allows us to differentiate it from several species to which the name *S. x-signatus* could be applied in the state of Bahia (with a round snout in both dorsal and lateral views, toe webbing surpassing the base of penultimate phalanx between toes II and V, and webbing on the feet surpassing the proximal half of the antepenultimate phalanx in the Toe IV; Lutz 1973; Appendix 1 for examined specimens).

Natural history and geographic distribution. All localities where *Scinax rossaferesae* **sp. nov.** occurs are present in natural grasslands associated with Araucaria forests of the Southern Brazilian Plateau and in the northernmost limit of *Campos cerrados* (*sensu* Maack 1948). This landscape is recognized by open fields and gallery forests of shallow and sandy soils. *Scinax rossaferesae* **sp. nov.** is known from the eastern-central limit between the states of São Paulo and Paraná, both in Brazil, covering an area known as the Guartelá Canyon, which extends to the grasslands in the municipality of Ponta Grossa, Paraná. The new species has been recorded as *Scinax*

sp. gr. *ruber* for the municipalities of Sengés, Tibagi, and Ponta Grossa, all in the state of Paraná (Fig. 8; see also Guerra & Bastos 2014; Crivellari *et al.* 2014).

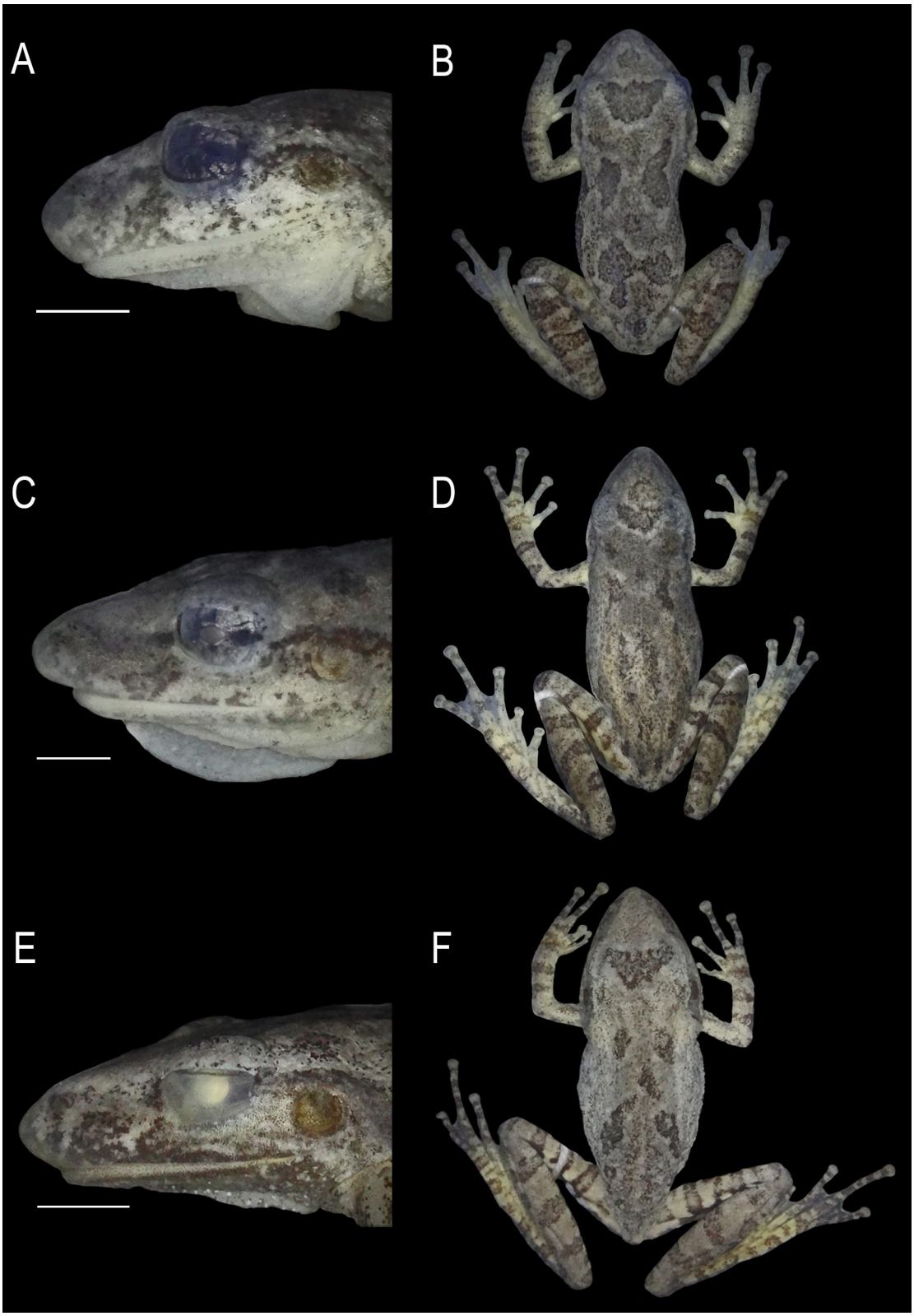

FIGURE 7. A: Head in lateral view, and **B:** dorsal view of *Scinax granulatus* (CFBH 39389; SVL 27.0) from Parque Estadual Vila Velha, municipality of Ponta Grossa, state of Paraná, Brazil. **C:** Head in lateral view, and **D:** dorsal view of *S. rossaferesae* **sp. nov.** (CFBH 39391; SVL 28.1) from Parque Estadual Vila Velha, municipality of Ponta Grossa, state of Paraná, Brazil. **E:** Head in lateral view, and **F:** dorsal view of *S. tigrinus* (CFBH 22799; SVL 31.0) from Fazenda Água Limpa, Brasília, Distrito Federal, Brazil.

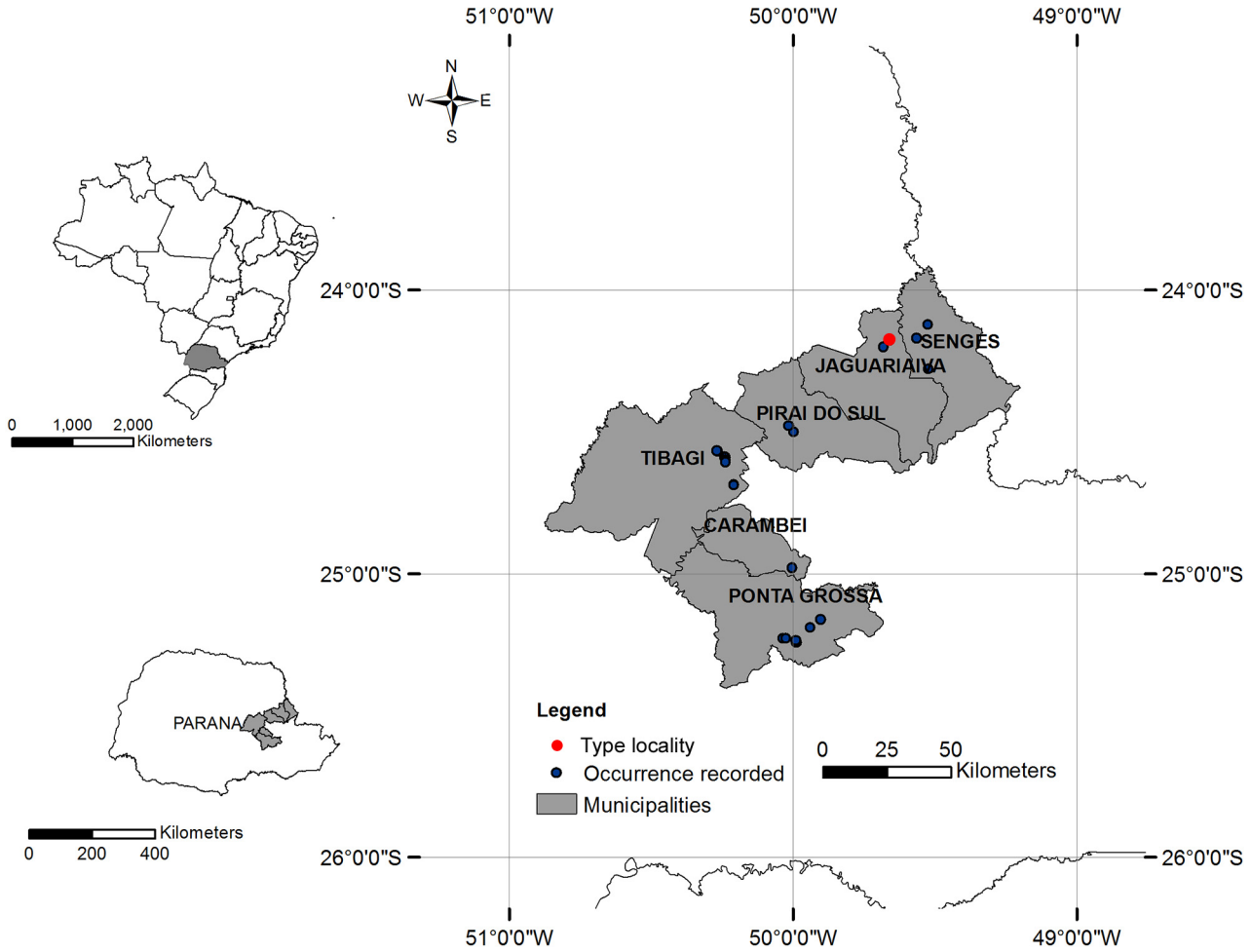

FIGURE 8. Geographic distribution of *Scinax rossaferesae* **sp. nov.** in the Southern Brazilian Plateau, showing its type-locality (**red circle**) and referred records (**blue circles**).

Calling males can be found all over year. However, the call activity is concentrated from September to March, when several males were found at the same breeding site. Males generally call from the ground or perched on vegetation (e.g. Poaceae) near or inside water. Some males can be found calling from terrestrial Phytotelmatas (e.g. *Eriocaulon* sp. and *Eryngiun* sp.). No males were found perched above 0.13 m high. The new species occurs in lentic, temporary or permanent waters in open fields or forest edges (Fig. 9 B–C). We observed six other species of *Scinax* sympatric to *S. rossaferesae* **sp. nov.**: *S. aromothyella* Faivovich, *S. fuscovarius*, *S. granulatus*, *S. perereca*, *S. rizibilis* (Bokermann), *S. squalirostris*, and *S. uruguayus*.

Etymology. The specific epithet used is dedicated to our colleague Dr. Denise Rossa-Feres, in recognition of her pioneering in the field of zoology. Denise has been extremely dedicated to her work, specifically to the study of tadpoles, natural history, and community ecology of amphibians, in which she has made notable contributions.

Remarks. Duellman *et al*. (2016) have partitioned *Scinax* as it has been recognized since the early 2000's (see Faivovich 2002; Faivovich *et al*. 2005; Wiens *et al*. 2010) in three genera: *Julianus* (for the *S. uruguayus* Group as defined by Faivovich *et al*. 2005), *Ololygon* (for the *S. catharinae* Clade as defined by Faivovich 2002 and Faivovich *et al*. 2005), and *Scinax* (for all remaining species of the *S. ruber* Clade as defined by Faivovich *et al*. 2005). Nevertheless, we agree with Lourenço *et al*. (2016) in that the resurrection of *Ololygon* and the assembly of *Julianus* are unnecessary at this stage because these taxonomic changes are strictly optional, since they are not required for preserving the monophyly of *Scinax*, and do not stem from an actual revisionary study with substantial new data or discussions of their utility or implications. That is, the *S. ruber* Clade in this study comprises its two monophyletic groups currently recognized (*S. rostratus* and *S. uruguayus* groups; Faivovich 2002; Faivovich *et al.* 2005).

TABLE 2. Advertisement call parameters studied (Mean ± standard deviation, and range into parenthesis). **Sros**= *Scinax rossaferesae* **sp. nov**. (MHNCI 9843, CFBH 39391 recorded at the type locality; T= 17 °C), **Sgra**= *S. granulatus* (DZSJRP 13106, 13407–13408 recorded at the municipality of General Carneiro, Paraná, Brazil; T= 16–21 °C), **Simb=** *S. imbegue* (DZSJRP 13499,13570 recorded at the municipality of Rio Negro, Paraná, Brazil; T= 21 °C), **Smar**= *S. maracaya* (CBUFM 667–671), **Stig**= *S. tigrinus* (parameters obtained from the calls of the two unvouchered males described by Nunes *et al.* 2010), and **Stym**= *S. tymbamirim* (parameters obtained from the calls described by Kwet, 2001:Son. 37; T= 23–28 °C*)*. Temporal and spectral parameters in seconds and Hertz, respectively.

	Advertisement call					
	Call duration	Minimum frequency	Maximum frequency	Dominant frequency	Pulse per call	Pulse duration
Sros	0.26±0.04 (0.16–0.25) *n* =76	1492±63.9 (1492–1733)	4792.3±190 (4461–5165)	2879±59.1 (2702.3–3002)	10.6±1.5 (7–13)	0.02±0.0 (0.02–0.03)
Sgra	0.23±0.0 (0.17–0.29) *n* =106	806.9±95.2 (623–956)	4197.6±264.6 (3346–5252)	1355.1±86.8 (1124–1571)	9.18±1.2 (6–11)	0.02±0.0 (0.02–0.03)
Simb	0.41±0.0 (0.30–0.55) *n* = 106	635.2±71.9 (519–794)	5657.8±375 (4973–6496)	1295.3±11.0 (1206–1307)	12.5±1.4 (9–16)	0.03±0.0 (0.03–0.05)
Smar	0.27±0.0 (0.10–0.37) *n* = 76	870.3±24.5 (832–983)	6051±39.2 (5903–6130)	1452.4±18.2 (1341–1478)	11.8±2.5 (7–16)	0.02±0.0 (0.01–0.02)
Stig	0.23±0.0 (0.12–0.33) *n* = 38	929.5±57.2 (802–1039)	5305±226.9 (4996–5671)	3167.7±263.7 (2657–3504)	9.5±2.4 (5–14)	0.02±0.0 (0.01–0.03)
Stym	0.87±0.1 (0.67–1.07) *n* = 38	1245.7±104.4 (1160–1496)	8422.9±381.6 (7722–8826)	4128.7±10.1 (4118–4150)	21.9±2.7 (17–27)	0.03±0.0 (0.02–0.04)

continued.

	Advertisement call			First pulse		
	Call repetition rate	Pulse repetition rate	Int. betw. calls	Duration pulse	Minimum frequency	Maximum frequency
Sros	0.88±0.2 (0.52–1.54)	41.1±3 (32.7–52.9)	1.40±0.3 (0.61–2.49)	0.01±0.0 (0.01–0.02)	1504.2±98.8 (1210–1612)	3724.0±342.4 (2917–4152)
Sgra	1.01±0.3 0.15–1.89)	38.9±5.7 (42.7–60.7)	1.35±0.4 (0.74–2.89)	0.03±0.0 (0.01–0.02)	869.2±89.9 (1022–1694)	2968.8±427.0 (2917–4152)
Simb	1.01±0.1 (0.72–1.48)	30.6±3 (20.1–39.2)	0.78±0.1 (0.38–1.23)	0.03±0.0 0.02–0.04)	946.0±102.5 (718–1084)	3372.4±585.8 (2932–5028)
Smar	1.30±0.2 (0.89–1.86)	44.1±2.9 (21.9–25.6)	0.74±0.1 (0.51–1.21)	0.01±0.0 (0.01–0.02)	1036.2±81.5 (832–1180)	5115.6±205.7 (4869–5600)
Stig	1.29±0.3 (0.64–1.92)	41.5±7.6 (20.4–68)	1.01±.04 (0.47–2.09)	0.01±0.0 (0.03–0.02)	984.9±61.3 (875–1200)	4339.1±587.1 (3246–5370)
Stym	0.29±0.0 (0.25–0.35)	25.1± 0.0 (21.9–25.6)	3.05±0.5 (2.09–4.76)	0.03±0.0 (0.03–0.04)	1431.7±153.4 (1173–1676)	7947.9±557.5 (6057–8656)

We compared the advertisement call of the new species with those of some species of the *Scinax ruber* Clade that have similar dorsal pattern color (*S. granulatus*, *S. maracaya*, and *S. tigrinus*) and occur near the type locality of the new species (*S. imbegue* and *S. tymbamirim*), from which we have available recordings (Table 2; Fig. 10). The set of acoustic parameters demonstrated that the advertisement calls of *S. rossaferesae* **sp. nov.** differs from those of these previously mentioned species mainly due to its dominant frequency (2702.3–3002 Hz in the new species; combined dominant frequency of 1124–1571 Hz in *S. granulatus*, *S. imbegue*, and *S. maracaya*; and 4118–4150 Hz in *S. tymbamirim*). Most call parameters from the new species showed a great similarity with those of the

recordings from *S. tigrinus*, from which the new species acoustically differs only by its higher minimum frequency (1492–1733 Hz in the new species, 802–1039 Hz in *S. tigrinus*).

The known occurrence area of *Scinax rossaferesae* **sp. nov.** is approximately 5.000 km^2. Nevertheless, the new species was recorded only in protected areas (as Parques Estaduais Vila Velha, Guartelá, do Cerrado, and Parque Nacional Campos Gerais). Therefore, we suggest the conservation status of *S. rossaferesae* **sp. nov.** as being "Least Concern" (IUCN 2008). *Scinax rossaferesae* **sp. nov.** shares habitat preferences with *S. granulatus*, *S. tigrinus*, *S. maracaya*, and *S. rogerioi*. These species commonly occur in open fields in Brazil (Bokermann & Sazima 1973; Nunes *et al.* 2010).

The recognition of a new species has implications on developing and proposing strategies for the conservation of open fields in the Atlantic Forest of Brazil, an ecosystem which is poorly understood especially when compared with other forest areas. For example, the Parque Estadual Vila Velha is classified as an area of "extreme biological importance" (MMA 2002). However, despite its acknowledged importance, these Southern Brazilian grasslands have less than 0.5 % of their area conserved as parklands or other conservation statuses. These areas are mostly used for agriculture or livestock and practices such as the burning of pastures is commonly applied (Overbeck *et al.* 2007).

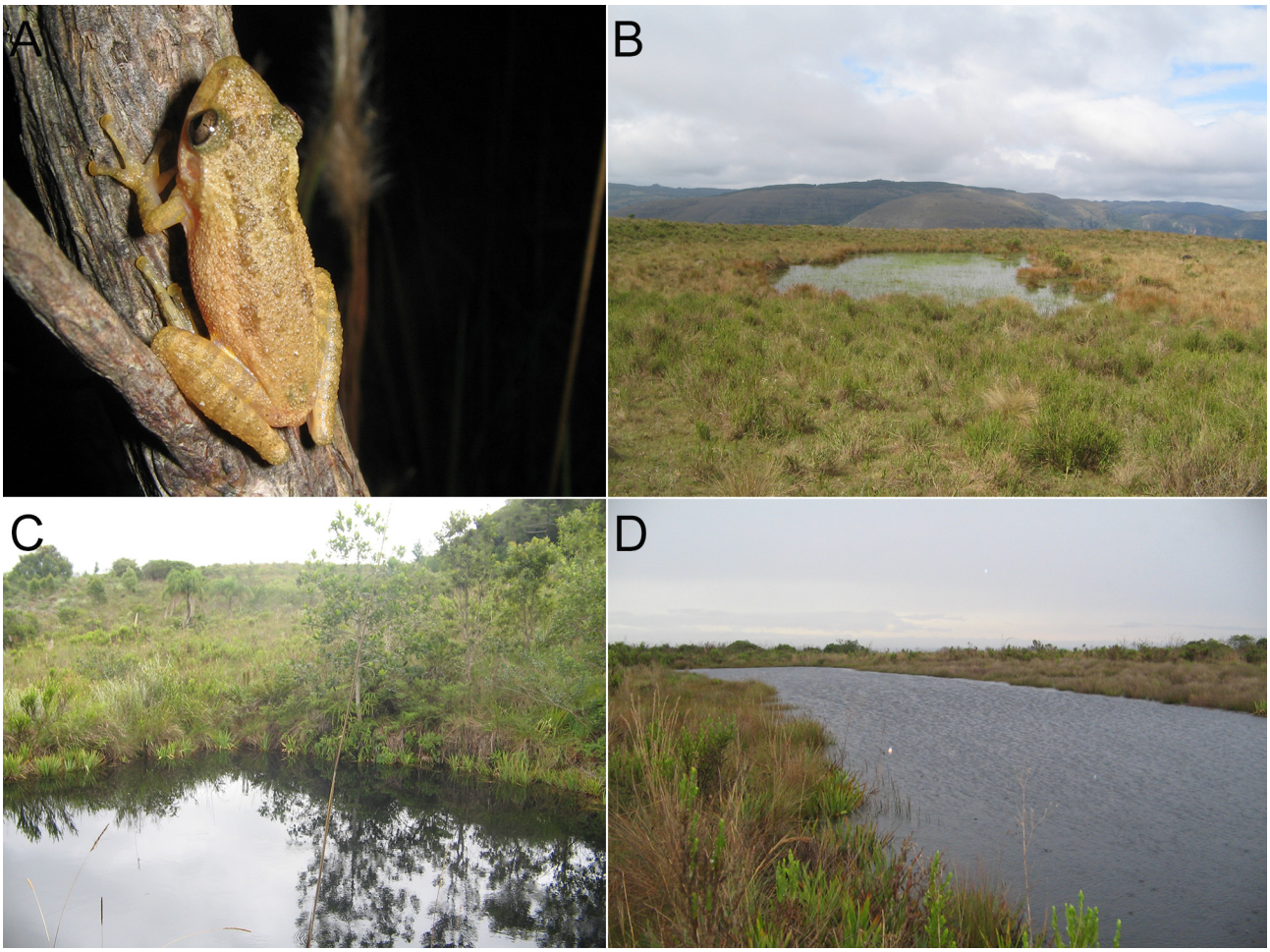

FIGURE 9. A: Dorsal color pattern of *Scinax rossaferesae* **sp. nov.** in life (unvouchered specimen). **B**, **C**, and **D**: Habitats of *S. rossaferesae* **sp. nov.**

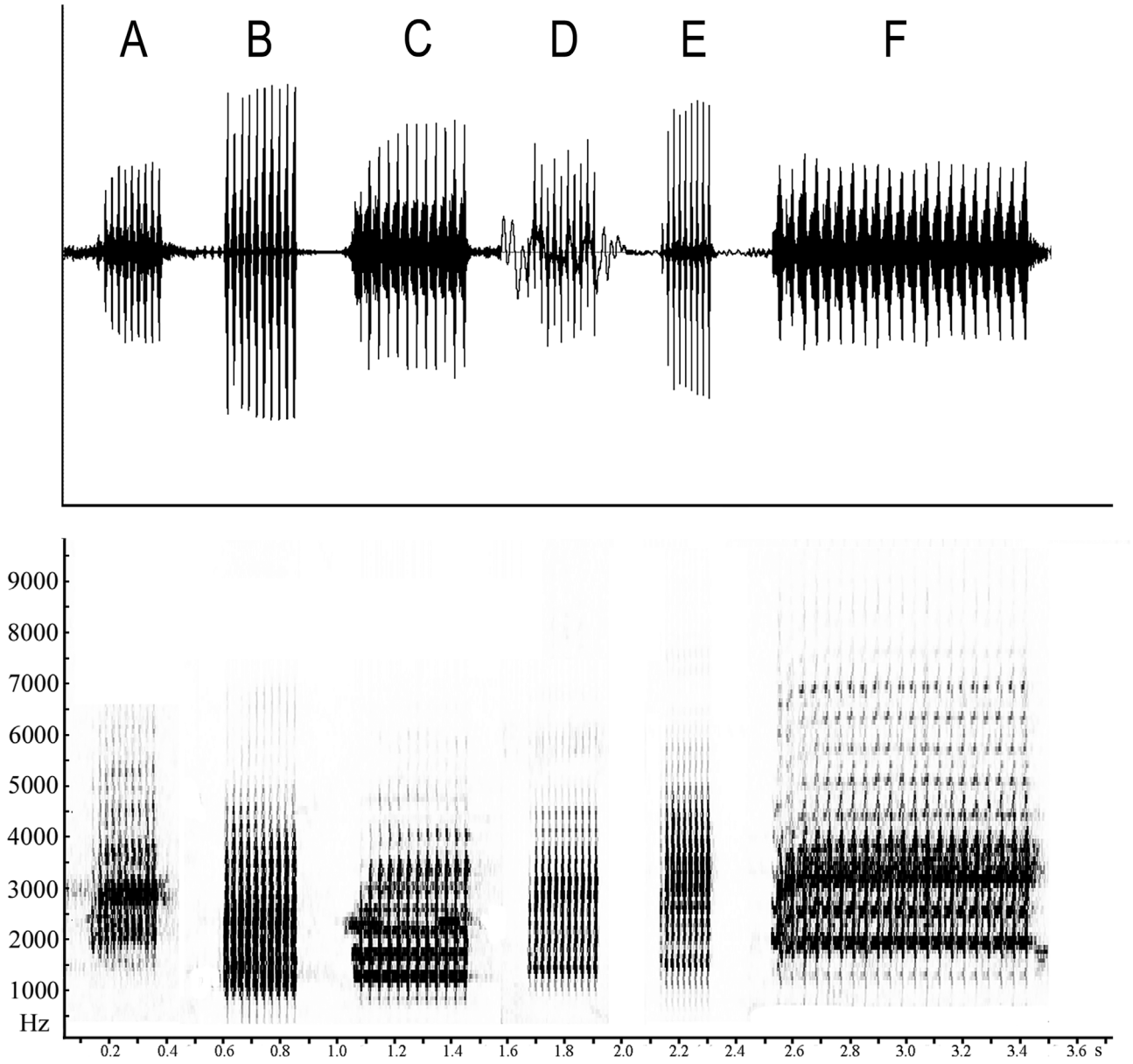

FIGURE 10. Oscilograms (above) and audiospectrograms (below) of the advertisement calls from different species of the *Scinax ruber* Clade described in the Table 2. **A**: *S. rossaferesae* **sp. nov.**. **B**: *S. granulatus*. **C**: *S. imbegue*. **D**: *S. maracaya*. **E**: *S. tigrinus*. **F**: *S. tymbamirim*.

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APPENDIX 1. Specimens examined.

Institutional abbreviations follow Sabaj Pérez (2014).

Scinax alter. Brazil, state of Espírito Santo, municipality of Santa Leopoldina, Alto Crubixá-Mirim: CFBH 1350–1351. Municipality of Serra, Sítio Gasparini, Carapebus: CFBH 1442, 1484. Área de Proteção Ambiental do Mestre Álvaro: CFBH 10838. Municipality of Aracruz, Olho D´Água: CFBH 33149. ***S. acuminatus***. Brazil, state of Mato Grosso do Sul, municipality of Corumbá, Passo do Lontra: CFBH 3330, 4328. Pantanal study base: CFBH 8642. ***S. auratus***. Brazil, state of Bahia, municipality of Maracás: MZUSP 95458–95493, 95593–95599. Municipality of Uruçuca: CFBH 14629, municipality of Ilhéus: CFBH 21097. Municipality of Jequié: CFBH 23662, 27833. ***S. boesemani***. Surinam, Zanderij: MZUSP 73649–73650 (paratypes). Brazil, state of Roraima, Missão Catrimani: MZUSP 68696–68713. State of Pará, municipality of Itaituba, Parque Nacional da Amazonia: MZUSP 146897–146899, 58187–58192. Parque Rio Tapajos: MZUSP 56925–56927. State of Amazonas, municipality of Manaus, Colosso Reserve, km 32: CFBH 37169–37170. ***S. baumgardneri***. Venezuela, Territorio Amazonas, Casa de Julián, between Tabana and Caño Chana: KU 129753 (paratype). Puerto Ayacucho: MZUSP 73702 (paratype). ***S. boulengeri***. Ecuador. Esmeraldas. Cachavi: MZUSP 105074–105077. Peru, Loreto, Estirón, Rio Ampiyacu: MZUSP 32947, 32856, 34763. Brazil, state of Amazonas, Igarapé Belém, Rio Solimões: MZUSP 34693. ***S. cabralensis***. Brazil, state of Minas Gerais, municipality of Joaquim Felício: MNRJ 42884, 42888 (paratypes). ***S. caldarum***. Brazil, state of Minas Gerais, municipality of Poços de Caldas, Morro do Ferro: CFBH 14, 6385, 6388, 17545, MZUSP 101565–101566, 117912. Retiro Branco: MZUSP 132582–132587. ***S. camposseabrai***. Brazil, state of Bahia, Fazenda Cana Brava, 10 km E Maracás: MZUSP 74202 (holotype), 73739–73741, 73755, 74203 (paratypes). ***S. constrictus***. Brazil, state of Góias, municipality of Montes Claros de Goias: MZUSP 140832–140834. Municipality of Campo Limpo de Goiás: Fazenda Conceição: CFBH 12514. State of Tocantins: Municipality of Taguatinga: CFBH 20983–20984. Municipality of Porto Nacional: 28294, 28904. ***S. cretatus***. Brazil, state of Alagoas, municipality of Passo do Camaragibe: CFBH 7348. Fazenda Morro: MZUSP 141283–141286. ***S. crospedospilus***. Brazil, state of São Paulo, municipality of Mogi das Cruzes, Parque Natural: MZUSP 138830–138833. Municipality of Queluz: CFBH 7210, 7224–7225. State of Rio de Janeiro, municipality of Resende: MZUSP 143887–143888. Brejo da Lapa: MZUSP 102416. Municipality of Petrópolis: MZUSP 143. Municipality of Itatiaia, Maringá: CFBH 5737. ***S. cruentommus.*** Peru, Loreto, Estirón, Rio Ampiyacu: MZUSP 34872–34880. ***S. curicica***. Brazil, state of Minas Gerais, Serra do Cipó: MZUSP 77103, 56883–56887, 109440–109441. Municipality of Santana do Riacho, Serra do Cipó: CFBH 30904. Municipality of Catas Altas, Serra do Caraça: CFBH 38110. Municipality of Ouro Preto: CFBH 24379. ***S. cuspidatus***. Brazil, state of Rio de Janeiro, municipality of Barra de São João: MZUSP 119824–120157. Rio das Ostras: MZUSP 30912–30959, 56126–56174. Tijuca: MZUSP 110701–110702, 118682–118794. Municipality of Maricá, Restinga de Maricá: CFBH 24626. State of Espírito Santo, municipality of Conceição da Barra, Vila de Itaúnas: CFBH 35362. Municipality of Marataízes, Gomes pond: CFBH 19480. Municipality of Linhares, Floresta Nacional de Goytacazes: CFBH 26498. ***S. danae***. Venezuela, Estado de Bolívar, km 127 on El Dorado-Santa Elena de Uiarén Road: KU 167089–167090 (paratypes). ***S. dolloi***. Brazil, state of Rio de Janeiro, municipality of Itatiaia, Mantiqueira Mountain Range: IRSNB 1.017 (syntypes, 2 specimens). ***S. duartei***. Brazil, state of Rio de Janeiro, municipality of Itatiaia, Brejo da Lapa: CFBH 140–141, 872, 9896. ***S. elaeochrous***. Costa Rica, Cartago, Turrialba: MZUSP 101179–101181. Alajuela, 2mi NE muelle de Arsenal: MZUSP 101182–101183. ***S. eurydice***. Brazil, state of Bahia, Fazenda Santo Onofre 10 km E of municipality of Maracás: MZUSP 74213 (holotype), 74214–74215 (paratypes), 73732–73733 (paratypes). Fazenda Santo Onofre e Canabrava: CFBH 23660. Municipality of Maracás: MZUSP 14048–14052 (paratypes), 59912–59914. Municipality of Ihéus: MZUSP 117827, 117835. Municipality of Uruçuca: MZUSP 33890. Municipality of Salvador: MZUSP 8338. Municipality of Porto Seguro, Fazenda Lafranchini: CFBH 36878. State of Espírito Santo, municipality of São Mateus: CFBH 35116. Municipality of Conceição da Barra, Vila de Itaúnas: CFBH 35372. ***S. exiguus***. Venezuela, Estado de Bolívar, km 144 on the El Dorado-Santa Elena de Uairén Road in the Gran Sabana: KU 167118, 167121 (paratypes). Brazil, state of Roraima, municipality of Pacaraima, BV8 area: MZUSP 157397–157403. Municipality of Tepequém, Avião caído trail: MZUSP 157404–157406. Municipality of Boa Vista, Estação Ecológica Maracá, Lateral aterro trail: MZUSP 157407. ***S. funereus***. Brazil, state of Roraima, municipality of Porto Velho, UHE Jirau, left margin of Rio Madeira: MZUSP 146109–146111, 152478–152479, 143316–143317, 152850. ***S. fuscomarginatus***. Brazil, state of Minas Gerais, municipality of Lagoa Santa, marsh in the Lagoa Santa-Fernão Dias Road: CFBH 24357–24358, 24360, 24363. State of Mato Grosso, Chapada dos Guimarães: MZUSP

117768–117770. Municipality of Jaciara: MZUSP 117773–117790. ***S. fuscovarius***. Brazil, state of Minas Gerais, municipality of Lassance: MZUSP 74154 (paralectotype). Municipality of Fama: CFBH 1869. Municipality of Jaboticatubas: CFBH 24367. Municipality of Sacramento: CFBH 34338. State of Goiás, municipality of São João D'Aliança: CFBH 6794. ***S. garbei***. Brazil, state of Amazonas, Rio Juruá: MZUSP 277 (holotype). State of Roraima, municipality of Porto Velho, UHE Jirau, left margin of Rio Madeira: MZUSP 153299–153300. State of Amazonas, Rio Solimões, Igarapé Belém: CFBH 51, 58, 34283, 37081, MZUSP 33261–33263. Peru, Loreto, Estirón, Rio Ampiyacu: MZUSP 32966–32967, 34747–34759. ***S. granulatus***. Brazil, state of Santa Catarina, municipality of Florianopolis: MZUSP 136363–136368. Municipality of Campo Alegre, Fazenda Sequoia: MZUSP 142261. Municipality of Chapecó: CFBH 3867–3869. Municipality of Campos Novos, CFBH 24297–24298. State of Paraná, municipality of Marmeleiro: CFBH 33374. Municipality of Ponta Grossa, Parque Estadual Vila Velha: CFBH 39388–39389. State of Rio Grande do Sul, Estação Ecológica do Taim: MZUSP 57535–57539. ***S. haddadorum***. Brazil, state of Mato Grosso, municipality of Barra do Garças, Fazenda Água Limpa: MZUSP 152328 (holotype), MZUSP 152188, 152190–152192, 152326–152327, 152329–152331 (paratypes), CFBH 39054–39056 (paratypes). ***S. hayii***. Brazil, state of Rio de Janeiro, municipality of Teresopolis: MZUSP 53479–53484, 116492–116493. Parque Nacional Serra dos Orgãos: MZUSP 116484, CFBH 18820, 35543–35544. Municipality of Nova Friburgo: CFBH 137. ***S. imbegue***. Brazil, state of Santa Catarina, municipality of São Bento do Sul, CEPA pond, Distrito do Rio Vermelho: CFBH 36433–36434. State of Paraná, municipality of Guaraqueçaba: CFBH 37503–37504, 37507, 37513, 37522. ***S. juncae***. Brazil, state of Bahia, municipality of Uruçuca, Fazenda Triunfo: CFBH 32425. Fazenda Bom Fim: CFBH 35739–35740, 39443. ***S. lindsayi***. Brazil, state of Amazonas, north side of the Vaupés River about 3 km. NW of Yapíma, Vaupés, Colombia: UTA-A 4301, 4303 (paratypes). ***S. madeirae***. Brazil, state of Roraima, municipality of Porto Velho: MZUSP 73663 (holotype), 73658 (alotype), 73954–73962 (paratypes), 74487–74490 (paratypes). ***S. maracaya***. Brazil, state of Minas Gerais, municipality of Alpinopolis, Fazenda Salto: MZUSP 73696 (paratype), CFBH 16. Municipality of Itabirito: CFBH 18425. Municipality of São Roque de Minas: MZUSP 59550. ***S. montivagus***. Brazil, state of Bahia, municipality of Mucugê: CFBH 30117–30118. ***S. karenanneae***. Colombia, Department of Vaupés: UTA-A 3768–3769 (paratypes). ***S. nasicus***: Brazil, state of Mato Grosso, municipality of Rosario Oeste: MZUSP 124532–124533. Municipality of Santo Antonio de Leverger: MZUSP 121597. State of Rio Grande do Sul, municipality of Três Lagoas: CFBH 14612. Municipality of Santa Maria: CFBH 21898–21900. Argentina, Buenos Aires, Ciudad Autonoma de Buenos Aires: MACN 45072–45074, 45082–45083. Santa Fe, Departamento de Garay y 9 de Julio: MACN 45243–45251. Entre Rios, Departamento de Villaguay, Villa Dominguez, Establecimento 116: MACN 45299–45304. ***S. nebulosus***. Brazil, state of Pará, municipality of Canaã: CFBH 3644–3646. State of Roraima, municipality of Espigão D'Oeste: CFBH 5112. State of Tocantins, municipality of Darcinópolis: CFBH 25920. ***S. pachycrus***. Brazil, state of Bahia, municipality of Jeremoabo: MZUSP 76908–76913, 77686–77692. Municipality of Maracás: MZUSP 76979–76981, 105474–105489. Municipality of Maracás, Fazendas Santo Onofre e Cana Brava: CFBH 18798, 19518–19519. State of Sergipe, municipality of Itabaiana: CFBH 13314. Serra de Itabaiana: MZUSP 72521–72524. ***S. pedromedinae***. Brazil, state of Roraima, municipality of Porto Velho, UHE Jirau, left margin of Rio Madeira: MZUSP 146181–146184, 151253–151255, 151837. Caiçara: 151546–151548, 153077–153079, 15330. ***S. perereca***. Brazil, state of São Paulo, municipality of Ribeirão Branco: MZUSP 69637–69639, CFBH 37727. Municipality of Ribeirão Branco, Fazenda São Luis: MZUSP 103320, 103322, CFBH 2225, 2335, 2501, 30918. Municipality of Eldorado, Fazenda Tiatá: MZUSP 152921–152922. Parque Estadual Jacupiranga, Nucleo Cedro-Barra: MZUSP 135485. Municipality of Ibiuna, Parque Estadual Jurupará: MZUSP 141682–141685, 141676–141678. Municipality of São Miguel do Arcanjo, Parque Estadual de Carlos Botelho: MZUSP 136120–136123. ***S. pinima***. Brazil, state of Minas Gerais, Serra do Cipó km 132: MZUSP 73668 (holotype), 73859–73863 (paratypes). Municipality of Santana do Riacho, Serra do Cipó: CFBH 35054, 39978. ***S. proboscideus***. Brazil, state of Amapá, Serra do Navio: MZUSP 105084. ***S. quinquefasciatus***. Ecuador, Pichincha, Centro Científico Rio Palenque: MZUSP 55806–55811, 55792–55800. ***S. rostratus***. Panamá, Canal Zone: MZUSP 107765. ***S. ruber***. Surinam, Langamankondre: MZUSP 31588–31818, 31829–31957, 32859. Brazil, state of Acre, municipality of Cruzeiro do Sul: CFBH 26214–26215. ***S. rupestris***: Brazil, state of Goiás, Chapada dos Veadeiros: MZUSP 112877 (holotype); MZUSP 112859–112876, 112878, 112880 (paratypes), CHUNB 72964–72965, 73653 (paratypes). ***S. similis***. Brazil, state of Rio de Janeiro, municipality of Manguinhos: MZUSP 73688 (paratype), USNM 97319, 97324, 97351 (paratypes), MZUSP 3899–3918, 9876–9884. Ilha do Governador: MZUSP 20907. Municipality of São João da Barra, Grussaí: CFBH 5018–5019. State of Espírito Santo, municipality of Aracruz: CFBH 4030–4031. Municipality of Conceição da Barra: CFBH 4156. ***S. staufferi***. Panamá, Canal Zone: MZUSP 113238. Mexico, Tamaulipas, Old Morelos: MZUSP 113237. Campeche, Escarrega: MZUSP 113239. Campeche, Encarnación: MZUSP 5311–5314. Guerrero, La Venta: MZUSP 5315. ***S. sugillatus***. Ecuador, Pichincha, Scientific Center Rio Palenque: MZUSP 55608–55615. ***S. squalirostris***. Uruguay, Maldonado, 15 km NE São Carlos: MZUSP 6482 (paratype). Brazil, state of São Paulo, municipality of São José do Barreiro, Serra da Bocaina: CFBH 21982, 28780, 30886, 35249. ***S. tigrinus***. Brazil, Distrito Federal, Brasília, Fazenda Água Limpa: CFBH 22799 State of Minas Gerais, municipality of Buritis: UFMG-A 11565–11567. ***S. uruguayus***. Brazil, state of Santa Catarina, municipality of Campos Novos: CFBH 23842–23843. ***S. x-signatus***. Brazil, state of Bahia, municipality of Brumado: CFBH 27782, 33979, 35751, 35757. Municipality of Brejinho das Ametistas: CFBH 37920. Municipality of Manoel Vitorino: CFBH 28140. Municipality of Catinga do Moura: 57489–57499. Municipality of Cachoeira: MZUSP 57573–57574. Municipality of Mucugê: MZUSP 65216–65226. Municipality of Morro do Chapeu: MZUSP 58007. Municipality of Campo Formoso: MZUSP 38841. Municipality of Guarajuba: MZUSP 58000–58001. Municipality of Cocorobó: MZUSP 38330–38424. Municipality of Itiuba: MZUSP 38659-38749. State of Ceará, municipality of Ubajara: CFBH 15874. ***S. wandae***: Colombia, Departamento Meta, 2 km NNE of Villavicencio: KU 131717 (paratype).