A new *Scinax* Wagler (Amphibia, Anura, Hylidae) from the Atlantic Rain Forest remains of southern State of Bahia, North-eastern Brazil

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**Abstract.** A new species of *Scinax* from the lowlands of the Atlantic Rain Forest remains in the southern region of the State of Bahia, North-eastern Brazil, similar to the *S. auratus* Wied-Neuwied, is described. This species is characterized by the following combination of characters: moderate size (males 23.0-27.1 mm SVL); snout rounded in dorsal view; dorsal colour pattern with dorsolateral yellowish stripe above greenish-brown background, with an interocular yellow transversal bar; vocal sac smooth; presence of a tubercle and dermal fold on tarsus advertisement call with four to five notes; call duration 0.17-0.24 s, dominant frequency 2.07-3.79 kHz. The advertisement call description and informations on natural history are provided.

**Keywords:** Anura, Atlantic Rain Forest, Hylinae, North-eastern Brazil, *Scinax juncae*, *Scinax ruber* clade.

**Introduction**

Faivovich et al. (2005) performed a molecular phylogenetic analysis of the family Hylidae, in which genus *Scinax* Wagler was recognized as monophyletic. Two major clades were diagnosed within this new hypothesis to the family Hylidae: *Scinax catharinae* clade and *S. ruber* clade. In this study, the *Scinax ruber* clade was recognized as paraphyletic, and composed by *S. rostratus* and *S. uruguayus* species groups, and by many species not assigned to any species group. Currently, the tree frog genus *Scinax* comprises 98 recognized species that occur from south Mexico to north-eastern Argentina (Drummond, Baêta and Silvério-Pires, 2007; Silva and Alves-Silva, 2008; Frost, 2009; Pugliese, Baêta and Pombal, 2009).

During fieldwork in lowland of Atlantic Rain Forest of southern State of Bahia we found an undescribed species of *Scinax* morphologically related to *Scinax auratus* (Wied-Neuwied). Herein, we present this lowland new species of the *Scinax ruber* species group (sensu Pom- bal, Haddad and Kasahara, 1995) belonging *Scinax ruber* clade (sensu Faivovich et al., 2005) from the Atlantic Rain Forest of southern State of Bahia, North-eastern Brazil. We also provide its advertisement call and natural history notes.

**Material and methods**

We compared the new species with the species of the *Scinax ruber* species group recorded from lowland of the Atlantic Rain Forest, *Scinax alter* (B. Lutz), *S. auratus* (Wied-Neuwied), *S. cuspidatus* (A. Lutz), *S. eurydice* (Bokermann), *S. fuscovarius* (A. Lutz), and *S. similis* (Cochran) (see Frost, 2009). We cannot compare the new species with *Scinax x-signatus* for the reasons explained in Pombal, Had- dad and Kasahara (1995) and Pugliese, Baêta and Pombal (2009).

The specimens examined are housed in the following Brazilian collections: AL-MN (Adolpho Lutz collection, Museu Nacional, Rio de Janeiro), CFBH (Célio F.B. Haddad collection, Departamento de Zoologia, Universidade Estadual Paulista, Rio Claro), MNRJ (Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro), MZUEFS (Museu de Zoologia da Universidade Estadual de Feira de Santana, Feira de Santana), and UFBA (Museu de Zoologia da Universidade Federal da Bahia, Salvador). Specimens examined are listed in the Appendix.

We used the 14 measurements described in Duellman (2001) as modified by Napoli (2005): SVL (snout-vent length), HL (head length), HW (head width), ED (eye diameter), TD (tympanum diameter), UEW (upper eyelid width), IOD (interorbital distance), IND (internarial distance), END (eye-nostril distance), NSD (nostril to tip of snout distance), TL (tibia length), and FL (foot length including tarsus), 3FD (third finger disk diameter), 4TD (four toe disk diameter). The other remaining measurements are THL (thigh length; following Heyer et al., 1990), FAL (forearm length: straight line distance between the elbow and the.

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wrist), HAL (hand length: straight line distance between the wrist and the tip of the third finger). SVL, HL, HW, FAL, HAL, THL, TL, and FL were measured with calipers (precision 0.05 mm); all other measurements were taken with an ocular micrometer in a Zeiss stereomicroscope. Standards for dorsal outline and profile of the snout follow Heyer et al. (1990). Webbing formulae follow Savage and Heyer (1967) as modified by Myers and Duellman (1982).

The advertisement calls were recorded on 31 August 2007, by Flora A. Juncá and Felipe C.A. Guimarães, from two adult males (SUEFS 23.5/unvolchered record; SUEFS 23.6/MZUEFS 2827), with a SONY WM-D6 Digital Audio Tape (DAT) coupled to a SONY ECM-MS907 Electret Condenser Microphone. We analysed the tape with Avisoft-SASLab Light for Windows, version 3.74. The vocalizations were digitized with a sampling frequency of 11.025 kHz and 16 Bits. The waveforms and audiospectrogram were made with Fast Fourier Transform length (FFT) of 256 points, overlap 93.75%, frame 100%, and window Flat Top.

Results

*Scinax juncae* sp. nov.


**Holotype (figs 1, 2)**

MNRJ 54400, adult male, from Reserva Ecológica da Michelin (13°50′S, 39°14′W; sea level), Municipality of Igrapiúna, State of Bahia, North-eastern Brazil, collected on 22 September 2007 by Ivan Nunes, Flora A. Juncá, and Felipe C.A. Guimarães.

**Paratopotypes**

MZUEFS 2882, 2886-88, 2890, and MNRJ 53912-14, adult males, all collected with the holotype; MZUEFS 2818, 2821, and 1823, adult males, collected on 31 August 2007 by Flora A. Juncá and Felipe C.A. Guimarães; MNRJ 51504-05, adult males, collected on 08 November 2007 by Mirco Solé.

**Referred specimens**

Brazil, State of Bahia, Municipality of Jussari: (MNRJ 44941; 15°11′S, 39°29′W), Municipality of Boa Nova (MNRJ 46530; 14°21′S, 40°12′W).

**Diagnosis**

A medium sized species (males 23.0-27.1 mm SVL) of the *Scinax ruber* species group (sensu Pombal, Haddad and Kasahara, 1995) belonging to the *Scinax ruber* clade (sensu Faivovich et al., 2005) diagnosed by the following combination of characters: snout rounded in dorsal view and protruding in profile; dorsal pattern with dorsolateral yellowish stripes in greenish-brown background, with interocular yellow transversal stripe; vocal sac smooth; presence of a tubercle and dermal fold on tarsus; advertisement call.

**Figure 1.** *Scinax juncae* sp. nov. Dorsal and ventral views of holotype, MNRJ 54400, adult male, SVL 24.3 mm.
Figure 2. Holotype of *Scinax juncae* sp. nov., MNRJ 54400, adult male. Dorsal and lateral views of head; ventral view of hand, and foot. Scale 0.5 mm.

with four to five notes; call duration 0.17-0.24 s, dominant frequency 2.07-3.79 kHz.

**Comparison with other species**

*Scinax juncae* is promptly distinguished from *S. alter*, *S. auratus*, *S. cuspidatus*, *S. eurydice*, *S. fuscovarius*, and *S. similis* by its dorsal colour pattern, which consists of dorsolateral yellowish stripes in darker greenish-brown background, with interocular yellow transversal stripe (dorsum with dorsal background olivaceous brown, presence of two pairs of longitudinal dark stripes separated by a lighter interval in *S. alter* [see Lutz, 1973]; dorsum with brown-yellowish or yellow-greenish background, presence of an interocular + two longitudinal dorsolateral + one longitudinal sacral golden lines in *S. auratus* [see Bokermann, 1969; Lutz, 1973]; dorsum with olivaceous-greenish background with brown irregularly stripes or inverted parenthesis in *S. cuspidatus* [see Lutz, 1973]; dorsum with brown-greyish background with two pairs of inverted dorso-lateral brown parenthesis, and a few additional large brown dots in *S. eurydice* [see Lutz, 1973]; dorsum with light-brown background with numerous dots and a network of dark-brown blotches containing lighter points in *S. fuscovarius* [see Lutz, 1973]; dorsum with tree-bark gray irregular pattern in *S. similis* [see Lutz, 1973]; see colour photos in Lutz, 1973; Izecksohn and Carvalho-e-Silva, 2001; Juncá, 2006). By the absence of yellow flash colour on the posterior surfaces of the thighs and hidden portions of shanks, *Scinax juncae* differs from *S.
eurydice and S. fuscovarius. The smaller SVL of adult males (SVL 23.0-27.1 mm) differs Scinax juncae from S. eurydice (SVL 39.6-51.2 mm; 21 males in the present study), S. fuscovarius (SVL 38.7-47.9 mm; 22 males in the present study), and S. similis (27.0-40.0 mm; Lutz, 1973). The snout rounded in dorsal view distinguishes Scinax juncae from S. auratus and S. alter (all with snout subovoid in dorsal view). The dorsal skin texture is smooth in Scinax juncae and granulose in S. auratus. The presence of dermal fold on tarsal region distinguishes Scinax juncae from S. alter, S. auratus, S. cuspidatus, S. eurydice, S. fuscovarius, and S. similis (absent in these species). The number of notes (4-5) distinguishes Scinax juncae from S. alter (1 note; Pombal, Bastos and Haddad, 1995), S. auratus (9 notes; Nunes, Santiago and Juncá, 2007), S. cuspidatus (1 note; Pombal, Bastos and Haddad, 1995), and S. fuscovarius (9-10 notes; Pombal, Bastos and Haddad, 1995). Scinax juncae is distinguishable from S. similis by its longer call (0.17-0.24 in S. juncae and 0.14-0.15 in S. similis/11 calls analysed in Haddad et al., 2005).

Description of holotype

Body moderately slender; medium sized (24.3 mm SVL); head larger than the body, longer than wide; snout rounded in dorsal view and protruding in profile; nostrils dorsolateral, elliptical, above small protuberance; canthus rostralis slightly marked and slightly curved; loreal region slightly concave; eyes protuberant; tympanum visible, rounded; supratympanic fold slightly evident, from the posterior corner of the eye to the shoulder; vocal sac single, median, subgular and well developed; vocal slights laterally on mouth floor; tongue large, cordiform, notched posteriorly, barely free; vomerine teeth in two straight series closer to each other, below to the choanae; choanae oval. Pectoral fold present. Arm slender, forearm moderately robust; fingers slender, medium-sized, poorly fringed, without evident nuptial asperities, relative lengths I ≤ II < IV < III; disks of the finger I and II nearly elliptical; disks of the fingers III and IV nearly rounded; finger disks medium-sized; inner metacarpal tubercle single, medium sized, elliptical; outer metacarpal tubercle divided, both elongated; subarticular tubercles simple, small and rounded, except on fingers IV and III, which is divided; supranumerary tubercles rounded and small. Legs moderately robust; toes slender and long, relative lengths I < II < V < III ~ IV; toes disks nearly rounded, medium-sized; webbing formula I 2-2 II 1-2+ III 1 1/2-2 IV 2+1 V; foot with inner metatarsal tubercle single, oval, and medium-sized; outer metatarsal tubercle simple, conic, and rounded; subarticular tubercles single and rounded; supranumerary tubercles small and rounded. Skin on dorsum smooth, with scattered granules; gular region, undersurfaces of arms, and tibia regions smooth; skin on venter and thigh strong granulated.

Measurements of holotype (in mm)

SVL 24.3; HL 9.3; HW 8.6; IND 1.8; NSD 1.2; END 2.8; UEW 2.3; ED 2.8; IOD 3.1; TD 1.2; FAL 4.9; HAL 7.5; 3FD 1.2; THL 11.0; TL 12.8; FL 16.8; 4TD 1.2.

Colour of the holotype

Greenish-brown background; a dorsolateral yellowish stripe, with interocular yellow transversal stripe; small black blotches and dots irregularly distributed on dorsal region; thighs and foot with uniform black blotches and dots. Hidden portions of the thigh and inguinal region black marbled. Ventral region cream. Iris brownish-beige. In preservative, the colour became faded.

Variation

The morphology of the specimens of the type series is very similar. This subtle variation is related to males because we did not collect females. Some paratypes have the nostrils upon a smaller elevation than that of the holotype; the shape of finger disks can be more rounded; there
is a short variation in the number of supranumerary tubercles. The shape of the dorsolateral bars can be more fragmented and coloration can be paler than that of the holotype. The variation of the measurements as “mean ± standard deviation (range)” of 15 males was SVL 24.1 ± 1.1 (23.0-27.1); HL 8.9 ± 0.5 (8.3-9.8); HW 8.2 ± 0.4 (7.7-8.8); IND 1.7 ± 0.1 (1.6-1.9); NSD 1.2 ± 0.1 (1.1-1.4); END 2.7 ± 0.1 (2.5-2.9); UEW 2.2±0.2 (2.0-2.5); ED 2.7±0.2 (2.4-3.0); IOD 2.9±0.1 (2.8-3.1); TD 1.3±0.1 (1.2-1.5); FAL 4.9±0.4 (4.2-5.5); HAL 7.3±0.4 (6.8-8.0); 3FD 1.2±0.1 (1.1-1.5); THL 11.3±0.4 (10.6-12.2); TL 12.9±0.4 (12.4-13.8); FL 17.2±0.7 (15.7-18.5); 4TD 1.2±0.1 (1.1-1.4).

Advertisement call

The following description is based on calls from two specimens (MZUEFS 2887, SVL 25.10 MM, and an unvolchered specimen) from the type locality. The males were recorded calling perched in a bush on the pond margins; about approximately twenty centimetres from the water (air temperature 18°C). The advertisement call is a multipulsed note with four to five pulses (fig. 3A, B). The call duration ranges from 0.17 to 0.24 s (0.22 ± 0.02; n = 18 calls), being emitted in short intervals from 1.04 to 2.34 (1.39 ± 0.43; n = 16 intervals). The first pulse is shorter than the others and the last one is longer; pulse duration ranges from 0.02 to 0.08 s (0.04 ± 0.02; n = 68 pulses), emitted in intervals from 0.01 to 0.02 s (0.01 ± 0.005; n = 50 intervals). The dominant frequency has two peaks, which was analysed in all calls, one of them ranging from 2.07 to 2.24 kHz (2.16 ± 0.05; n = 18 calls) and the other from 3.57 to 3.79 kHz (3.66 ± 0.10; n = 18 calls).

Habitat

Scinax juncae inhabits the forest edge in the Atlantic Forest remnant in the southern State of Bahia, North-eastern Brazil. The type-locality - Reserva Michelin, Municipality of Igrapiúna – includes 10 thousand hectares covered by arbo-

Figure 3. (A) Waveform and (B) audiospectrogram of the advertisement call of Scinax junca sp. nov. (SUEFS 23.6/MZUEFS 2887), from the Municipality of Igrapiúna (type-locality), State of Bahia, North-eastern Brazil. Air temperature 18°C.

real vegetation, in which occur springs, streams, freshwater and brackish rivers, lakes, ponds, areas without bodies of water with few terrestrial bromeliads. Specimens of S. junca were captured during the activity of vocalization, at night, roosted at shrubs on pond margins.

Geographic distribution

Scinax junca is known from three localities (Municipalities of Boa Nova, Igrapiúna, and Jussari) of the southern State of Bahia, North-eastern Brazil, and one locality (Municipality of Salto da Divisa) of the north-eastern State of Minas gerais, South-eastern Brazil (see Santana et al., 2009) (fig. 4). These areas are comprised in the Atlantic Forest Domain (sensu Ab’Sáber, 1977), and, except Boa Nova and Salto da Divisa, are very close to “Restingas”, a coastal habitat (sensu Araújo, 1992).

Etymology

The specific epithet is a patronym in honor of the Dr. Flora Acuña Juncá, in recognition to her
contributions to the study of amphibians from Brazil.

Remarks

Santana et al. (2009) reported a geographic distribution extension for *Scinax auratus*. According to their map, the geographic distribution at the Municipality of Salto da Divisa in the north-eastern State of Minas Gerais is a disjunct distribution 290 km southwards far from the type-locality (Municipality of Maracás, State of Bahia) and other localities, all up to that. This new and disjunct distribution is close to other records of *Scinax juncaea*, and the examination of diagnostic characters in photographs shows that these specimens probably belong to *S. juncaea*.

*Scinax juncaea* is associated with open areas closer to the Atlantic Forest remains in the southern State of Bahia. The division of environments of the Atlantic Forest Biome by geological formations may be the cause of the great diversity of species and high degree of endemism, like the high latitudinal, longitudinal and altitudinal variation that create, together, a unique landscape mosaic (Silva and Casteleti, 2003). Due to this view, forest corridors were designated as a way to connecting protected areas, always looking for alternatives for developing a little impact in the areas of interstices (Brasil, Ministério do Meio Ambiente, 2006). One of these corridors, the “Central Corridor of the Atlantic Forest”, which is embedded in the distribution of *S. juncaea*, has about 8.5 million hectares and covers the regions of southern Bahia, Espírito Santo, and northeast of Minas Gerais States (Brasil, Ministério do Meio Ambiente, 2006). Another associated environment, the Restingas constitute one of component habitats of the Atlantic forest, and are coastal strips located in coastal lowlands, formed by strings of beaches and sand dunes covered by herbaceous and arbustive-arboreal vegetation (Araújo, 1992). The Atlantic Forest, consequently the Restingas, of southern State of Bahia, although very small in relation to the original coverage, still has a great biodiversity showed by the large number of anuran amphibians described in recent years to this region (12 species; see Frost, 2009). This view shows that much more work is still to be done for the wildlife knowledge and conservation of this Brazilian “hotspot”.

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References


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Appendix

Comparative material examined


Scinax auratus: Brazil, Bahia, Amargosa: (UFBA 6481-87), Cachoeira: (UFBA 7582-83), Camaçuari: (UFBA 897-901), Entre Rios: (UFBA 5970, 6138), Maracás: (MNRJ 31991-95, 35977-99 paratypes), Mata de São João: (UFBA 3004-05, 4024-25, 4074, 4324-29, 4623-24, 4917, 4966-69), Salvador: (UFBA 6060).


Scinax eurydice: Brazil, Bahia, Maracás: (MNRJ 4050 Paratype, MNRJ 16021-34, 22656-60, UFBA 2360-76, 2916-18, 48669 topotypes), Feira de Santana: (MZUEFS 1743), Morro do Chapéu: (MZUEFS 1811-12, 1833).

Scinax fuscovarius: Brazil, Minas Gerais, João Pinheiro: (MNRJ 38834-35), Juiz de Fora: (AL-MN 76 holotype, MNRJ 34957-60 paratypes), Roça Grande (MNRJ 34961-65), São João Nepomuceno (MNRJ 30093-98, 32342-51).