

## A NEW SPECIES OF THE GENUS *PHYSALAEEMUS* FITZINGER, 1826 (ANURA, LEIUPERIDAE) FROM SOUTHERN BRAZIL

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**ABSTRACT.** A new species of the genus *Physalaemus* is described from Serra da Pedra Branca do Araraquara, Municipality of Guaratuba, State of Paraná, southern Brazil. Belonging to the *P. olfersii* species group, *Physalaemus insperatus* sp. nov. is closely related to *P. aguirrei* and presents well-developed vocal sacs expanded laterally to the supratympanic fold, digits very thin, and large inguinal glands.

**KEYWORDS.** Anura, Leiuperidae, *Physalaemus insperatus* sp. nov., Serra da Pedra Branca do Araraquara, Paraná.

### INTRODUCTION

The Neotropical genus *Physalaemus* Fitzinger, 1826 currently contains 41 valid species (Frost, 2007) distributed from northern to southern South America, east of Andes. Among the seven species groups currently recognized (Nascimento *et al.*, 2005), the *P. olfersii* species group is characterized by its small to large size (20.0-48.9 mm snout-vent length); head as long as or longer than wide; texture of dorsal skin smooth or rugose; presence or absence of inguinal glands, if present small to medium sized, not associated with a dark ocellus; presence of tarsal fold; presence or absence of tarsal tubercle; external and internal metatarsal tubercles conical, without horned distal margin and the base length of the internal longer than of the external; and vocal sac developed. This group is distributed along the Atlantic Rain Forest Domain (*sensu* Ab'Sáber, 1977), from the northeastern Brazilian State of Bahia to Santa Catarina, in southern Brazil, and is currently composed of four species: *P. aguirrei* Bokermann, 1966, *P. maximus* Feio, Pombal and Caramaschi, 1999, *P. olfersii* (Lichtenstein and Martens, 1856), and *P. soaresi* Izecksohn, 1965 (Nascimento *et al.*, 2005).

While reviewing the *P. olfersii* species group, we examined specimens deposited at the collection of the Museu Nacional, Rio de Janeiro, where we found specimens identified as *P. olfersii* from "Serra da Pedra Branca do Araraquara", Municipality of Guaratuba, State of Paraná, southern Brazil, that appear to be a separate and distinct. Herein, we describe these specimens as a new species.

### MATERIAL AND METHODS

Comparisons of specimens of the new species with those of known species were based on observations of

museum material and on literature information from Bokermann (1966), Heyer *et al.* (1990), Izecksohn (1965), and Feio *et al.* (1999).

Specimens used in the description or examined for comparisons are deposited in, AL-MN (Coleção Adolpho Lutz, Museu Nacional, Universidade Federal do Rio de Janeiro, RJ); EI (Coleção Eugenio Izecksohn, Universidade Federal Rural do Rio de Janeiro, Seropédica, RJ); MNRJ (Museu Nacional, Rio de Janeiro, RJ); MCNAM (Museu de Ciências Naturais, Pontifícia Universidade Católica de Minas Gerais, Belo Horizonte, MG); MZUFV (Museu de Zoologia João Moojen de Oliveira, Universidade Federal de Viçosa, MG); and ZMB (Museum für Naturkunde Zentralinstitut der Humboldt-Universität zu Berlin). Specimens examined are listed in the Appendix 1.

Abbreviations used for the measurements of adult specimens are: 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), THL (thigh length), TBL (tibia length), and FL (foot length, including tarsus). The measurements SVL, HL, HW, THL, TBL, and FL were taken with callipers, whereas other measurements were made with an ocular grid. Morphological terminology follows Heyer *et al.* (1990), with exception of tibial length (instead of shank length).

### RESULTS

*Physalaemus insperatus* sp. nov.  
(Fig. 1)

*Holotype*: MNRJ 10332, adult male, collected at Área de Proteção Ambiental Guaratuba (25°21'S, 49°09'W), Serra da Pedra Branca do Araraquara,

Municipality of Guaratuba, State of Paraná, Brazil, September 1951, by Gustavo Gilgen.

*Paratypes*: MNRJ 1917 and MNRJ 10331, adult females, and MNRJ 10328-10330 and MNRJ 10332, adult males, collected with the holotype.

*Diagnosis*: A species belonging to the *Physalaemus olfersii* group, most similar to *P. aguirrei*, characterized by: (1) relatively small size (SVL males 22.2-25.3 mm, females 26.6-26.7 mm); (2) skin smooth; (3) head longer than wider; (4) snout sub-elliptical in dorsal view, protruding in lateral view; (5) inferior margin of the mandible outlined by a white line; (6) supratympanic fold distinct; (7) vocal sac well developed, expanded laterally to the supratympanic fold; (8) digits very thin; (9) supranumerary tubercles present on hands and feet; (10) tarsal tubercle weakly developed; (11) tarsal fold present; (12) inguinal gland large.

*Comparison with other species*: By the smaller size of the males (SVL 22.2-25.3 mm) *Physalaemus insperatus* sp. nov. differs from *P. maximus* and *P. olfersii* (SVL 43.3-48.5 mm and 26.2-35.8 mm, respectively); by the absence of a white oblique line from the posterior corner of the eye to the shoulder, the new species differs from *P. maximus* and *P. olfersii* (white line present); by the presence of large inguinal glands, *P. insperatus* sp. nov. differs from *P. maxi-*

*mus*, *P. olfersii*, *P. aguirrei*, and *P. soaresi* (inguinal glands small); by the tarsal tubercle weakly developed, the new species differs from *P. maximus* and *P. olfersii* (tarsal tubercle absent), and from *P. aguirrei* and *P. soaresi* (tarsal tubercle developed); the absence of tarsal fold differentiates the new species from *P. maximus* and *P. olfersii* (tarsal fold weakly developed), and from *P. aguirrei* and *P. soaresi* (tarsal fold developed); the very thin digits of the new species differs from *P. maximus*, *P. olfersii*, and *P. aguirrei* (digits more robust); by the head longer than wide, the vocal sac and supratympanic fold well developed, *P. insperatus* sp. nov. differs from *P. soaresi* (head as long as wide, vocal sac and supratympanic fold weakly developed); furthermore, the vocal sac expanded laterally to the supratympanic fold differentiates *P. insperatus* sp. nov. from the other four species (vocal sac not extended laterally to the supratympanic fold). The new species is most similar to *P. aguirrei* in its relatively small size and possessing smooth skin, snout sub-elliptical in dorsal and protruding in lateral views, and inferior margin of the mandible outlined by a white line.

*Description of holotype*: Body robust (Fig. 1); head longer than wide; snout sub-elliptical in dorsal view, protruding in lateral view (Fig. 2A, B); nostrils elliptical, not protuberant, located and oriented laterally, closer to tip of snout than to eye; canthus rostralis distinct; loreal region almost vertical; eyes slightly

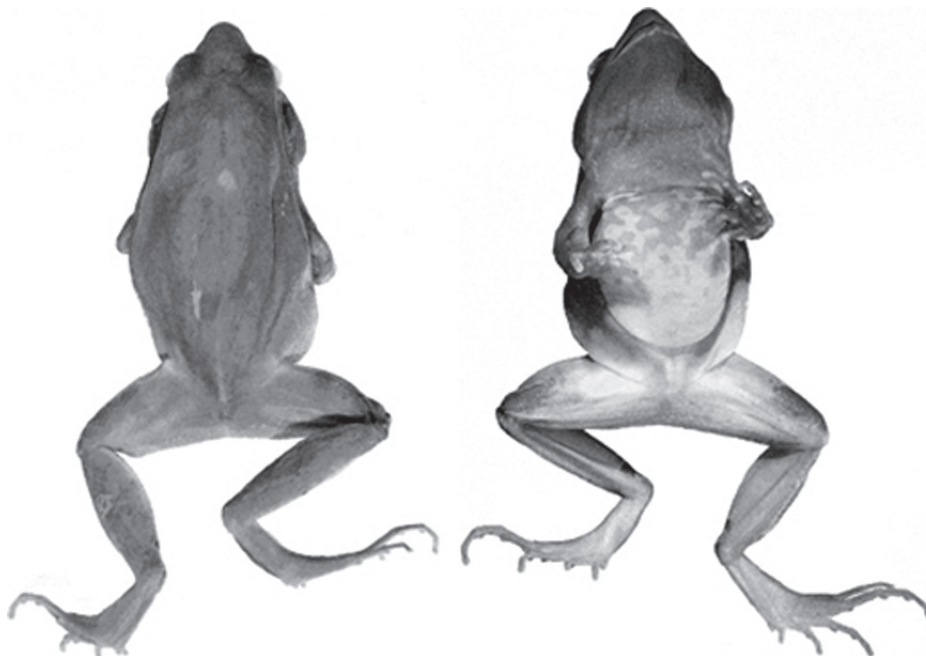


FIGURE 1. *Physalaemus insperatus* sp. nov. (holotype, MNRJ 10332, SVL 25.3 mm), dorsal and ventral views.

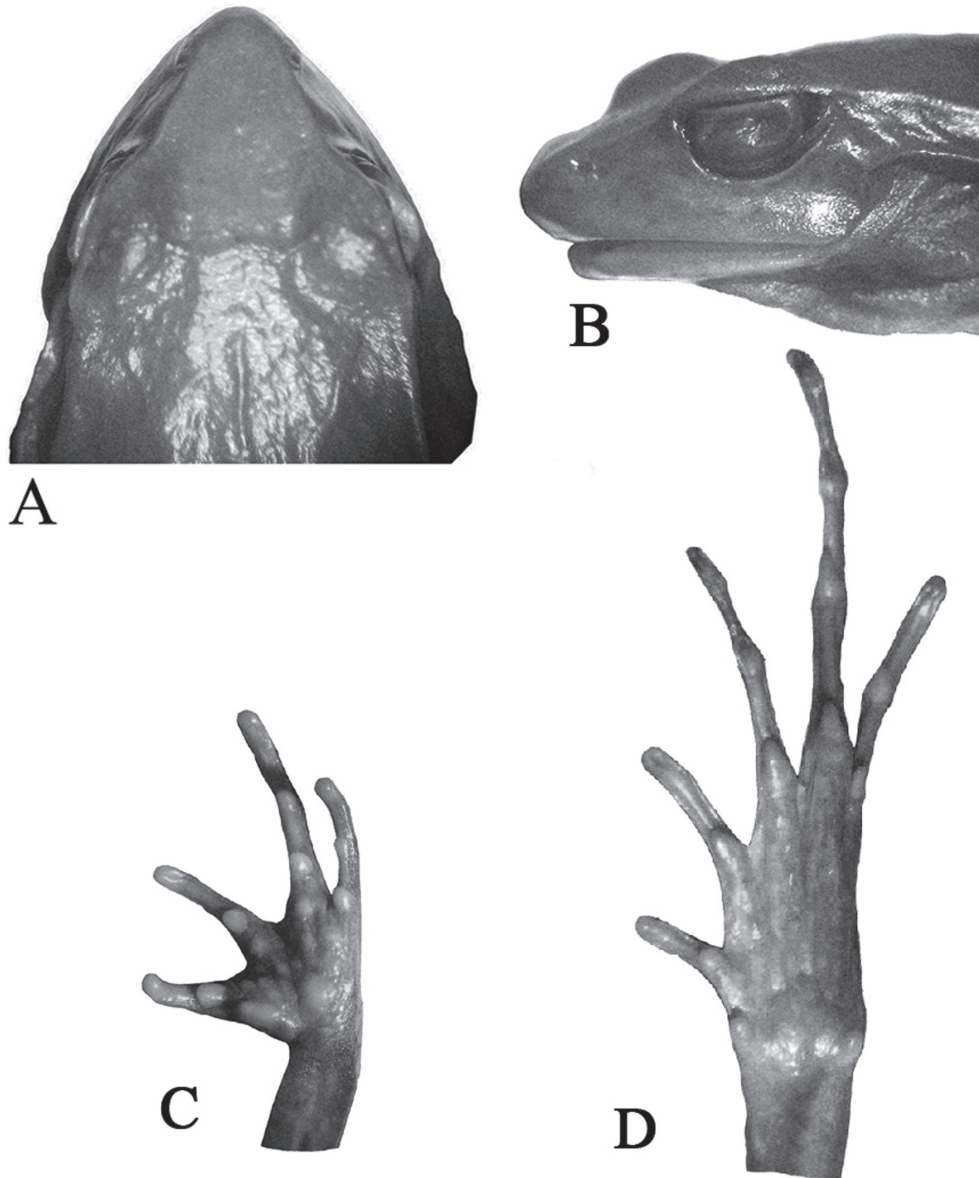


FIGURE 2. *Physalaemus insperatus* sp. nov. (holotype, MNRJ 10332): dorsal view of head (A), lateral view of head (B), hand (C), and foot (D).

protuberant; tympanum distinct, its diameter approximately 33% of eye diameter; anterior margin of annulus tympanicus close to the eye; distinct supratympanic fold, arched from the posterior corner of the eye to shoulder; presence of a dorsolateral fold starting on the posterior corner of eye, immediately above the supratympanic fold, delimiting the dorsal region from the flank, and ending at the anterior margin of the inguinal gland; presence of a vertebral fold extending from the interorbital to the sacral region, and an arched fold transversally on the interorbital region, extending to the upper eyelids; vocal sac subgular, well-developed, extending to the border of chest with belly and laterally to the supratympanic

fold; choanae small, elliptical, well separated from each other; tongue narrow, long, free posteriorly; maxillary and premaxillary teeth visible; vomerine teeth absent. Arms short, slender, forearms slightly more robust and as short as arms; fingers very thin and long, not fringed, except finger II; finger lengths  $I = II < IV < III$  (Fig. 2C); extensive nuptial asperities, covering  $2/3$  of the inner metacarpal tubercle and enclosing all the thumb, except the inner side; subarticular tubercles single, large, protruding; outer metacarpal tubercle large, rounded, covering  $1/3$  of carpal region; inner metacarpal tubercle very large and elliptical, approximately twice the size of outer metacarpal tubercle; presence of small supernumer-

TABLE 1. Measurements of adult males and females of *Physalaemus insperatus* sp. nov.

Measurements	Males (n = 4)				Females (n = 2)	
	MNRJ 10328	MNRJ 10329	MNRJ 10330	MNRJ 10332	MNRJ 10331	MNRJ 1917
SVL	24,8	22,2	23,4	25,3	26,6	26,7
HL	8,6	8,9	8,5	8,5	9,3	9,2
HW	6,6	6,7	7,1	6,8	8,0	7,7
ED	2,8	2,8	3,0	3,0	3,1	3,4
TD	0,8	1,1	1,0	1,0	1,1	1,0
UEW	1,8	1,7	1,8	1,8	2,2	2,2
IOD	3,1	2,6	2,7	3,0	3,1	3,1
IND	2,2	1,9	2,2	1,8	2,3	2,2
END	3,0	3,1	3,1	3,0	2,7	3,0
THL	11,7	10,0	11,6	11,5	11,6	12,3
TBL	11,5	10,5	11,9	11,8	12,0	12,9
FL	17,2	16,0	18,3	17,6	18,0	19,6

ary tubercles; finger tips slightly expanded. Legs moderately robust; tibia slightly longer than thigh, the sum of their lengths slightly shorter than SVL; tarsal fold absent; toes very thin, long, weakly fringed; toe lengths  $I < II < V < III < IV$  (Fig. 2D); subarticular tubercles large, single, protruding; inner metatarsal tubercle medium-sized, elliptical; outer metatarsal tubercle medium sized, ovoid, approximately same size as the inner metatarsal tubercle; supernumerary tubercles small; toe tips slightly expanded. Dorsal and ventral surfaces smooth. A distinct ventral disc present.

*Color in preservative:* Dorsum light brown with scattered brown dots; a light brown middorsal fold well marked on the sacral region; brown line from the tip of snout to eye; dispersed brown dots on the loreal region; brown stripe on flanks, extending from post-orbital region to groin; an irregular brown blotch on dorsum of forearms; transversal brown bars on dorsum of legs; an irregular dark brown blotch on internal and external sides of tibia; gular region brown with light brown dots; light brown line edging the mandible; irregular light brown sinuous stripes on chest; uniform light brown on belly and ventral surfaces of arms and legs; nuptial asperities light brown; inguinal gland with the same color pattern of dorsum.

*Measurements of holotype (mm):* SVL 25.3, HL 8.5, HW 6.8, ED 3.0, TD 1.0, UEW 1.8, IOD 3.0, IND 1.8, END 1.9, THL 11.5, TBL 11.7, FL 17.6.

*Variation in the type series:* All specimens of the type-series agree very well in morphology and color. The specimens MNRJ 1917 and MNRJ 10329 do not present the vertebral fold extending from the interor-

bital to the sacral region, and specimen MNRJ 1917 does not present the arched fold transversally on the interorbital region. Females are slightly larger, with the color pattern of gular region lighter than males, and present light brown blotches on chest and anterior region of belly. Table 1 shows measurement variation of four males and two females.

*Etymology:* The specific epithet, “*insperatus*”, is a Latin adjective meaning unexpected, surprising, in allusion to the fortuitous finding of these old, unnamed specimens.

## DISCUSSION

The *Physalaemus olfersii* species group is associated with the Atlantic Rain Forest Domain (*sensu* Ab’Sáber, 1977), from the State of Bahia to Santa Catarina. *Physalaemus aguirrei* ranges from southern State of Bahia, northern State of Espírito Santo to northeastern State of Minas Gerais; *P. insperatus* sp. nov. is known only from the type locality, at “Serra da Pedra Branca do Araraquara”, Municipality of Guaratuba, southeastern of the State of Paraná; *P. maximus* occurs in southeastern and central regions of the State of Minas Gerais; *P. olfersii* is broadly distributed on the mountains of the states of Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo, Paraná, and Santa Catarina; and *P. soaresi* is only known from the type locality at Municipality of Seropédica, southeastern State of Rio de Janeiro. The extensive distribution of *P. olfersii* associated with morphological feature variation (see Feio *et al.*, 1999) suggests that *P. olfersii* probably represents a complex of species.



## RESUMO

Uma nova espécie do gênero *Physalaemus* é descrita da Serra da Pedra Branca do Araraquara, Município de Guaratuba, Estado do Paraná, sul do Brasil. *Physalaemus insperatus* sp. nov., pertencente ao grupo de *P. olfersii*, é próximo de *P. aguirrei* e apresenta saco vocal bem desenvolvido, expandido lateralmente até a prega supratimpânica, dedos muito finos e glândulas ingüinais grandes.

## ACKNOWLEDGMENTS

We are grateful to Luciana Barreto Nascimento (MCN) for loan of specimens. This work was partially supported by grants from the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq).

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Submitted 15 February 2008

Accepted 04 October 2008

## APPENDIX

Additional specimens examined.

*Physalaemus aguirrei*: Bahia: MNRJ 19275-19282, Mucuri; MNRJ 18917-18919, Nova Viçosa; MCNAM 3311-3315, Parque Nacional do Descobrimento, Prado; Espírito Santo: MNRJ 22753-22800, MNRJ 28490-28494, Linhares; MNRJ 28431, MNRJ 39862-39864, Itaúnas; Minas Gerais: MCNAM 3316-3324, Nanuque.

*Physalaemus maximus*: Minas Gerais: MNRJ 18810 (holotype), MNRJ 18811, MNRJ 21736-21738 (paratypes), Parque Estadual Serra do Brigadeiro, Araponga; MNRJ 46692-46693, Ouro Preto.

*Physalaemus olfersii*: Brasil: ZMB 3375 (photo of the holotype); Rio de Janeiro: MNRJ 2428, Parati; MNRJ 482, MNRJ 12826-12827, MNRJ 2098, MNRJ 33117, MNRJ 44567-44568, MNRJ 5520, MNRJ 5525, MNRJ 50309-50314, AL-MN 2098, AL-MN 12836, Teresópolis; MNRJ 2414, Nova Iguaçu, Tinguá; São Paulo: MNRJ 18812-18813, Botucatu; AL-MN 28200-28203, Ribeirão Grande; MNRJ 41741, MCNAM 4807, MCNAM 7308-7313, Parque Estadual Carlos Botelho, São Miguel Arcanjo; Paraná: MCNAM 4805-4806, MZUFV 4805-4807, Cerro Azul; MNRJ 35098, Guaratuba; MNRJ 31804, Morretes; MNRJ 2964, Santa Luzia; Santa Catarina: MNRJ 49766-49768, Mina Rocha, Adrianópolis; MNRJ 12823, AL-MN 12824-12825, São Bento do Sul.

*Physalaemus soaresi*: Rio de Janeiro: EI 1943-1944 (paratypes); MNRJ 17837-17848, Horto Florestal Mário Xavier, Seropédica.