

A NEW SPECIES OF *DENDROPHRYNISCUS*, JIMÉNEZ DE LA ESPADA, 1871 (AMPHIBIA, ANURA, BUFONIDAE) FROM THE ATLANTIC RAIN FOREST OF RIO GRANDE DO SUL, BRAZIL

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ABSTRACT. A new species of the genus *Dendrophryniscus* is described from Reserva Biológica da Serra Geral, Municipality of Maquiné, and Parque Nacional dos Aparados da Serra, Municipality of Cambará do Sul, State of Rio Grande do Sul, Brazil. *Dendrophryniscus krausae* sp. nov. is associated to the *D. brevipollicatus* group and is characterized by its medium size for the genus (snout-vent length 19.2-21.2 mm in males, 20.4-24.0 mm in females); body robust, slightly enlarged posteriorly; finger I short, robust, and in males with moderate nuptial pad of minuscule dark brown horny asperities; presence of few small granules, dispersed on upper eyelid surfaces; and external margin of upper eyelid weakly prominent.

KEYWORDS. Anura, Bufonidae, *Dendrophryniscus krausae* sp. nov., Atlantic Rain Forest Domain, Rio Grande do Sul.

INTRODUCTION

The Neotropical genus *Dendrophryniscus* Jiménez de la Espada, 1871, currently comprises seven recognized species; two species are associated to the Amazon Basin: *D. minutus* Melin, 1941, distributed in Brazil, Bolivia, Colombia, Ecuador, Peru, and southern Guianas, and *D. bokermanni* Izecksohn, 1994 "1993", from the states of Amazonas and Pará, Brazil. Five species are associated to the Atlantic Rain Forest Domain (*sensu* Ab'Sáber, 1977) in Southeastern and Southern of Brazil: *D. brevipollivatus* Jiménez de la Espada, 1871, *D. leucomystax* Izecksohn, 1968, *D. carvalhoi* Izecksohn, 1994, *D. berthalutzae* Izecksohn, 1994, and *D. stawarskyi* Izecksohn, 1994 (Frost, 2007).

Izecksohn (1994 "1993") indicated that it is possible to distinguish two groups based on reproductive behavior: one group breeding and with tadpoles developing in ponds, includes *D. minutus*, *D. leucomystax*, and *D. bokermanni*, and the other group breeding and with tadpoles developing in bromeliads includes *D. brevipollicatus*, *D. carvalhoi*, *D. berthalutzae*, and *D. stawarskyi*.

Herein, we describe a new species of the genus *Dendrophryniscus* associated to the *D. brevipollicatus* group from Reserva Biológica da Serra Geral, Municipality of Maquiné, and Parque Nacional dos Aparados da Serra, Municipality of Cambará do Sul, State of Rio Grande do Sul, Southern Brazil.

MATERIAL AND METHODS

Examined specimens are deposited in Museu Nacional, Rio de Janeiro (MNRJ), Coleção Eugenio Izecksohn, Universidade Federal Rural do Rio de Janeiro (EI), Museu de Zoologia, Universidade de São Paulo (MZUSP), Museu de Ciências Naturais, Fundação Zoobotânica do Rio Grande do Sul (MCN), and Museu de Ciências e Tecnologia, Pontifícia Universidade Católica do Rio Grande do Sul (MCP). Specimens examined are listed in the Appendix. Measurements of the specimens were obtained with a dial caliper. Abbreviations of the measurements (in millimeters) are: SVL (snout-vent length); HL (head length); HW (head width); IND (internarial distance); ESD (eye snout distance); END (eye to nostril distance); ED (eye diameter); IOD (interorbital distance); UEW (upper eyelid width); THL (thigh length); TL (tibia length); TAL (tarsal length); FL (foot length). All measurements, except for FL, follow Duellman (1970).

RESULTS

Dendrophryniscus krausae sp. nov.
(Fig. 1)

Dendrophryniscus brevipollicatus (non Jiménez de la Espada, 1871) Braun and Braun, 1979, 1980.

Dendrophryniscus sp. Garcia and Vinciprova, 2003.
Dendrophryniscus berthallutzae (non Izecksohn, 1994
 “1993”): IUCN *et al.*, 2006 (partim).

Holotype – MCN 13809, adult male, collected at Reserva Biológica da Serra Geral (29°35'S, 50°10'W; 870 m above sea level), Municipality of Maquiné, State of Rio Grande do Sul, by Patrick Colombo, Caroline Zank, Luis Fernando Marin da Fonte, and Luciana Ardenghi Fusinatto, on 07 March 2005.

Paratypes – MCN 13808 (female), 13810 (juvenile), and 13812 (juvenile), MNRJ 50290 collected with the holotype; MCN 11028 and 11029 (females), and 11030 (juvenile), collected at Itaimbezinho Canyon (29°12'S, 50°09'W, 800 m above sea level), Parque Nacional dos Aparados da Serra, Municipality of Cambará do Sul, State of Rio Grande do Sul, by S. Scherer and A. Lise, on 21-22 December 1976.

Diagnosis – The species is characterized by: (1) size medium for the genus (SVL 19.2-21.2 mm in males, 20.4-24.0 mm in females); (2) body robust, slightly enlarged posteriorly; (3) dorsal pattern with the following dark brown markings: a transverse interorbital bar extending on the upper eyelids, a “X” shaped blotch on the scapular region, and two bars inclined behind “/” on the sacral region extending to the inguinal region; (4) ventral pattern yellow with few dispersed dark brown stains, limbs dark brown; (5) dorsal and lateral surfaces of the body covered by spinulose granular tubercles; (6) ventral surface of body covered by shallow granular tubercles, more developed on the limbs; (7) finger I short, robust; (8) male with moderate nuptial pad of minuscule dark brown horny asperities on finger I; (9) forearm robust in males; (10) presence of few small granular tubercles, dis-

persed on upper eyelid surfaces; (11) external margin of upper eyelid weakly prominent; and (12) tarsus about 23% of the snout-vent length.

Comparisons with other species – *Dendrophryniscus krausae* sp. nov. is distinguished from *D. berthallutzae*, *D. carvalhoi*, and *D. brevipollicatus* by its robust and slightly enlarged posterior body, (slender in *D. berthallutzae*, *D. carvalhoi*, and *D. brevipollicatus*). *Dendrophryniscus krausae* sp. nov. is distinguished from *D. berthallutzae* by finger I short and robust (finger I longer and slender in *D. berthallutzae*), males forearm robust and with a dark brown nuptial pad on finger I (forearm slender and absence of nuptial pad in *D. berthallutzae*), and tarsus approximately 23% of the snout vent length (29% in *D. berthallutzae*). *Dendrophryniscus krausae* sp. nov. is larger than *D. carvalhoi* (combined male and female SVL = 19.2-24.0 mm in *D. krausae* sp. nov., 14.0-19.0 mm in *D. carvalhoi*), granular tubercles on dorsal surfaces less developed (more developed in *D. carvalhoi*), finger I short and robust (reduced and very robust in *D. carvalhoi*), and a brown pigmented nuptial pad over two thirds of dorsal surface of finger I (unpigmented nuptial pad completely covering finger I in *D. carvalhoi*). *Dendrophryniscus krausae* sp. nov. is smaller than *D. brevipollicatus* (combined male and female snout-vent length 19.2-24.0 mm in *D. krausae* sp. nov., 20.0-27.6 mm in *D. brevipollicatus*), granular tubercles on dorsal surfaces less numerous and less developed (granular tubercles on dorsal surfaces numerous and more developed in *D. brevipollicatus*), upper eyelid with few small granular tubercles and a weakly developed external margin (upper eyelid with numerous large granular tubercles and external margin of the upper eyelid prominent in *D. brevipollicatus*), finger I short (finger I long in *D. brevipollicatus*), and a dark brown nuptial pad on finger I (absence of nuptial pad in *D. brevipollicatus*). *Dendrophryniscus krausae* sp. nov. is distinguished from *D. stawiarskyi* by the presence of granular tubercles on dorsal surfaces (almost absent in *D. stawiarskyi*), upper eyelid with few small granular tubercles (almost smooth in *D. stawiarskyi*), forearm robust in males (strongly robust in *D. stawiarskyi*), finger I short and robust (reduced and very robust in *D. stawiarskyi*), and a dark brown nuptial pad on finger I (absence of nuptial pad in *D. stawiarskyi*). Furthermore, *Dendrophryniscus krausae* sp. nov. is promptly distinguished from the other Atlantic Rain Forest species, *D. leucomystax*, by the less numerous and less developed granular tubercles on its dorsal surfaces (numerous and well

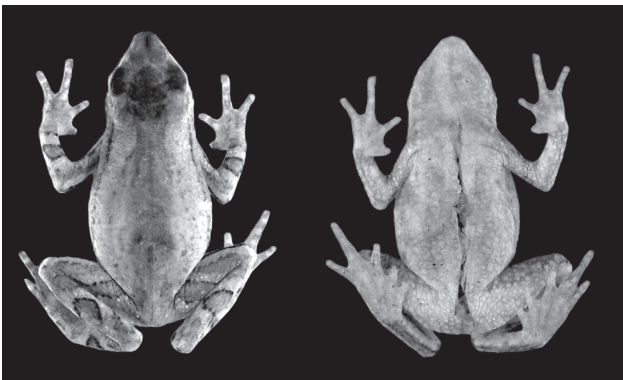


FIGURE 1. *Dendrophryniscus krausae* sp. nov. (holotype, MCN 13809, SVL 21.2 mm), dorsal and ventral views.

developed in *D. leucomystax*), by the truncate snout in dorsal view and acute in lateral view (sub-elliptical in dorsal view and strongly acute in lateral view in *D. leucomystax*), and lack of a white stripe extending from the snout to near the insertion of the arm (present in *D. leucomystax*). The new species differs from the Amazonian species, *D. bokermanni* and *D. minutus*, by the enlarged distal tip of finger III (not enlarged in *D. bokermanni* and *D. minutus*), pale coloration on ventral surfaces (bright coloration in *D. bokermanni* and *D. minutus*), subarticular tubercles of fingers smaller than their distal tips (equal or larger than the distal tips in *D. bokermanni* and *D. minutus*), and finger I shorter than finger II (finger I longer than finger II in *D. bokermanni*).

Description of holotype – Body robust, slightly enlarged posteriorly (Fig. 1); head triangular, wider than long; snout truncate in dorsal view, acute in lateral view (Fig. 2A and B); nostrils located laterally near the tip of snout, slightly below the *canthus rostralis*, and not protuberant; internarial distance smaller than eye-to-nostril distance, eye diameter, and interorbital distance, about the same size of the upper eyelid width; eye-to-nostril distance slightly

larger than eye diameter and larger than the upper eyelid width; eye diameter two thirds of interorbital distance; tympanum absent; eyes slightly protuberant, upper eyelid width about 60% of interorbital distance; *canthus rostralis* straight; loreal region vertical; choanae small, circular, and very far from one to another; tongue long, narrow, adherent by three fourths of the anterior portion. Forearms more robust and longer than arms. Hand (Fig. 2C) with fingers slender, not fringed and only basally webbed, distal end slightly enlarged; relative lengths of fingers $I < II < IV < III$; subarticular tubercles single, rounded; the second subarticular tubercle of finger III of right hand is bifid; outer metacarpal tubercle large, rounded; inner metacarpal tubercle rounded, of the same size of subarticular tubercles; supernumerary tubercles present, small. Thigh length slightly larger than tibia length; sum of thigh and tibia lengths about 84% of snout-vent length. Tarsal length about 23% of the snout vent length. Foot (Fig. 2D) with toes slender, not fringed, half webbed, distal end slightly enlarged; relative lengths of toes $I < II < III < V < IV$; subarticular tubercles single, rounded, larger than those of the fingers; inner metatarsal tubercle large, approximately elliptical; outer metatarsal tubercle small, rounded; supernumerary tubercles present. Dorsal and lateral surfaces covered by spinulose granular tubercles; ventral surface of body covered by shallow granular tubercles, more developed on the limbs.

Measurements of holotype – SVL 21.2; HL 6.5; HW 5.8; IND 1.6; END 2.4; ESD 3.4; ED 1.9; UEW 1.7; IOD 2.9; THL 8.7; TL 9.2; TL 4.6; FL 8.5.

Color of the holotype – In life (Fig. 3), the holotype had dorsum brownish red, with a transverse bar on interorbital region extending on the upper eyelids, “X” shaped blotch on the scapular region, and two bars

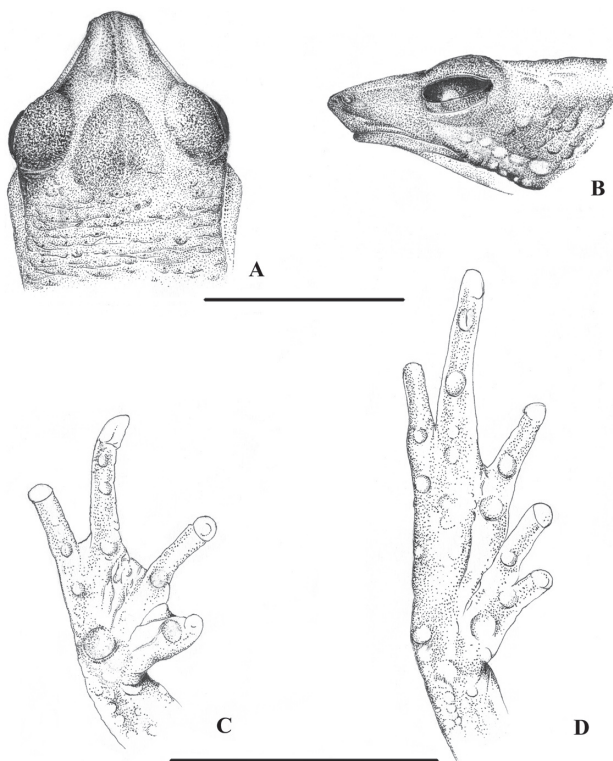


FIGURE 2. *Dendrophryniscus krausae* sp. nov. (holotype, MCN 13809): dorsal view of head (A), lateral view of head (B), hand (C), and foot (D). Scale bars = 5 mm.



FIGURE 3. *Dendrophryniscus krausae* sp. nov. (in life) from Reserva Biológica da Serra Geral.

TABLE 1. Measurements (in millimeters) of the specimens of *Dendrophryniscus krausae* sp. nov. (SD = standard deviation).

Measurements	Female (n = 3)		Male (n = 2)	
	$\bar{X}$	SD	Range	Range
SVL	22.6	1.92	20.4-24.0	19.2-21.2
HL	7.3	0.7	6.5-7.9	6.3-6.5
HW	6.3	0.67	5.5-6.7	5.2-5.8
IND	1.59	0.14	1.48-1.75	1.58-1.45
ESD	3.6	0.22	3.3-3.7	3.0-3.4
END	2.5	0.15	2.3-2.6	2.0-2.4
ED	2.0	0.09	1.9-2.1	1.9
IOD	3.1	0.11	3.0-3.2	2.4-2.9
UEW	1.7	0.31	1.4-1.9	1.5-1.7
THL	10.1	0.75	9.3-10.6	8.6-8.7
TL	9.9	0.6	9.2-10.2	8.3-9.2
TAL	5.3	0.42	4.8-5.6	4.3-4.6
FL	9.0	0.38	8.6-9.2	8.0-8.5

inclined behind “/” on the sacral region extending to the inguinal region, all of them dark brown; on arms and legs, three transversal dark brown bars; laterally a dark brown stripe extending from the snout to the inguinal region, interrupted by the eye; small vertical stripe under the anterior portion of the eye; light yellow area extending under the eye to the arm insertion; ventral pattern yellow with few dispersed dark brown stains, limbs predominantly dark brown; iris golden. In preservative, dark colors are maintained almost as described in life. Yellow markings become whitish. Iris becomes silvered.

Variation – There is little variation among the type specimens. Specimens MCN 13808, MCN 13810, and MCN 13812 are slightly more granulated on dorsal surfaces. Variation in measurements is presented in Table 1. The second subarticular tubercle of finger III is single, except on the right hand of the holotype. Sexual dimorphism can be observed on SVL (longer in females), on arms (more robust in males), finger I (shorter and robust in males), and nuptial pad (on finger I of males). In life, some specimens presented the dorsal pattern brownish green.

Distribution – *Dendrophryniscus krausae* sp. nov. is known from Reserva Biológica da Serra Geral, Barra do Ouro, Municipality of Maquiné, and Itaimbezinho Canyon, Parque Nacional dos Aparados da Serra, Municipality of Cambará do Sul, localities in the Atlantic Rain Forest Domain in the State of Rio Grande do Sul.

Etymology – The specific epithet honors Dr. Ligia Krause, herpetologist from Universidade Federal

do Rio Grande do Sul, Brazil, in gratitude for her friendship.

Natural history – The specimens from Parque Nacional de Aparados da Serra were found on rocks near the Itaimbezinho Canyon, far from bromeliads. The specimens from Reserva Biológica da Serra Geral were collected during the day from the forest interior, one was seen on the leaf litter and the others hidden inside bromeliads about 1.5 meters high. These two geographic localities are within well preserved and protected areas in the northeastern of the State of Rio Grande do Sul. In both, the landscape consists of Atlantic Rain Forest formations like Dense Ombrophylous Forest, Araucaria Forest, and Grasslands (Veloso, 1991).

Remarks – There is a longitudinal incision on the chest and belly of the holotype. It was made for observation of the gonads. The distal tips of fingers and toes of specimens from Reserva Biológica da Serra Geral are dehydrated, making their enlargement observation difficult.

DISCUSSION

Carvalho (1949) suggested that *Dendrophryniscus brevipollicatus* ranges from the State of Espírito Santo to Santa Catarina. Subsequently, Braun and Braun (1979, 1980) considered specimens from Itaimbezinho, State of Rio Grande do Sul, as *D. brevipollicatus*. Izecksohn (1994 “1993”) described three new species and recognizes specimens of *D. brevipollicatus* from Santa Teresa, State of Espírito Santo, as *D. carvalhoi*, specimens from Bituruna, State of Paraná, as *D. stawianskyi*, and specimens from Joinville and Rio dos Cedros, State of Santa Catarina, as *D. berthallutzae*. Garcia and Vinciprova (2003), upon examination of the specimens used by Braun and Braun (1979), suggested these specimens are more similar to *D. berthallutzae*, although they did not confirm the species identity. Based on Garcia and Vinciprova (2003), the distribution of *D. berthallutzae* was extended to the northeastern of State of Rio Grande do Sul (IUCN *et al.*, 2006). Here we consider the specimens referred by Braun and Braun (1979), Garcia and Vinciprova (2003) and part of IUCN *et al.* (2006) as *D. krausae* sp. nov. Consequently the distribution of *D. brevipollicatus* is restricted to the states of Rio de Janeiro and São Paulo, and *D. berthallutzae* to the states of Paraná and Santa Catarina.

Although the *D. krausae* sp. nov. tadpole and the breeding site are unknown, the morphological similarities with the *D. brevipollicatus* species group and the encounter of specimens hidden inside bromeliads, lead us to include this new species in the *D. brevipollicatus* species group (sensu Izecksohn, 1994 “1993”)

RESUMO

Uma nova espécie do gênero *Dendrophryniscus* é descrita da Reserva Biológica da Serra Geral, Município de Maquine, e do Parque Nacional dos Aparados da Serra, Município de Cambará do Sul, estado do Rio Grande do Sul, Brasil. *Dendrophryniscus krausae* sp. nov. é associado ao grupo de espécies de *D. brevipollicatus* e é caracterizada pelo seu tamanho médio para o gênero (comprimento rostro-cloacal nos machos 19.2-21.2 mm, nas fêmeas 20.4-24.0 mm); corpo robusto, ligeiramente alargado posteriormente; primeiro dedo da mão curto, robusto e, nos machos, com calo nupcial formado por minúsculos espinhos córneos marrons na superfície dorsal; presença de poucos grânulos diminutos dispersos sobre a pálpebra superior; e margem externa da pálpebra superior pouco proeminente.

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APPENDIX

Specimens examined

Dendrophryniscus brevipollicatus – Rio de Janeiro: MNRJ 22065-22067, EI 1963-1967, EI 4016-4022, EI 4193-4194, EI 4203, EI 4948-4949, Parque Nacional da Floresta da Tijuca, Rio de Janeiro.

Dendrophryniscus minutus – Amazonas: MNRJ 22076, Reserva Ducke, Manaus. Pará: MNRJ 47924, Porto Trombetas, Oriximiná.

Dendrophryniscus leucomystax – Rio de Janeiro: MNRJ 22063, EI 4047-4067, EI 4068-4069, EI 5425-5433, Tinguá, Nova Iguaçu.

Dendrophryniscus bokermanni – Pará: MNRJ 21863-21874, EI 9035-9036, Igarapé Periquito, Oriximiná.

Dendrophryniscus carvalhoi – Espírito Santo: MNRJ 1287 (2 specimens), MNRJ 38364-38365, Santa Teresa.

Dendrophryniscus berthallutzae – Paraná: MCP 7690, Guaratuba. Santa Catarina: MNRJ 31809, Itapoá, MZUSP 55851, Pirabeiraba; MNRJ 2131 (holotype), Joinville; MCP 8273, Santo Amaro da Imperatriz; MZUSP 35450-35458, Novo Horizonte.

Dendrophryniscus stawiarskyi – Paraná: MNRJ 2650 (holotype), Bituruna.