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A new species of *Physalaemus* (Anura, Leptodactylidae) from the Atlantic rain forest of northeastern Brazil

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A new species of leptodactylid frog is described from Passo de Camaragibe, State of Alagoas, northeastern Brazil. The new species is a member of the *Physalaemus signifer* group, and is characterized by its medium size, snout protruding in lateral view, dorsolateral light fold extending from the posterior corner of the eye to the inguinal region, and large outer metatarsal tubercle. Description of the tadpole is provided.

INTRODUCTION

The genus *Physalaemus* is known from Mexico to southern South America, with 37 recognized species (FROST, 1985; DUELLMAN, 1993). Four species groups are currently recognized in the genus: *P. biligonigerus* group, *P. cuvieri* group, *P. pustulosus* group and *P. signifer* group (LYNCH, 1970); however, *P. deimaticus* Sazima & Caramaschi, 1986 and *P. rupestris* Caramaschi, Carcerelli & Feio, 1991 are not presently placed in any species group (SAZIMA & CARAMASCHI, 1986; CARAMASCHI et al., 1991). The *P. signifer* group is characterized by its small to moderate size (15-35 mm SVL), slender body, smooth skin, first finger shorter than the second, no inner tarsal tubercle, small, non-compressed metatarsal tubercles, small to large inguinal glands, and parotoid glands absent (LYNCH, 1970). The species presently allocated to the *P. signifer* group are *P. bokermanni* Cardoso & Haddad, 1985, *P. crombiei* Heyer & Wolf, 1989, *P. maculiventris* (A. Lutz, 1925), *P. moreirae* (Miranda-Ribeiro, 1937), *P.*

nanus (Boulenger, 1888), *P. obtectus* Bokermann, 1966, *P. olfersii* (Lichtenstein & Martens, 1856), *P. signifer* (Girard, 1853) (Frost, 1985; Duellman, 1993), and *P. spiniger* (Miranda-Ribeiro, 1926) (see Haddad & Pombal, in press). *Physalaemus franciscae* Heyer, 1985 is a synonym of *P. moreirae* (Caramaschi & Caramaschi, 1991). Herein, we describe a new species of the *P. signifer* group from northeastern Brazil.

Material and methods

Specimens used in the description or examined for comparisons are deposited in AL-MN (Adolpho Lutz Collection, deposited in Museu Nacional, Rio de Janeiro, Brazil), CFBH (Célio F. B. Haddad Collection, deposited in Departamento de Zoologia, Universidade Estadual Paulista, Rio Claro, Brazil), MNRJ (Museu Nacional, Rio de Janeiro, Brazil), ZUEC (Museu de História Natural, Universidade Estadual de Campinas, Brazil). Additional specimens examined are listed in app. 1.

Abbreviations used in the measurements of the adults are SVL (snout-vent length), HL (head length), HW (head width), ED (eye diameter), IOD (interorbital distance), THL (thigh length), TBL (tibia length), and FL (foot length). All measurements are in millimeters. The measurements of the adults followed Duellman (1970) and Cei (1980). Measured adult specimens were fixed in 10 % formalin and preserved in 70 % ethyl alcohol. The tadpoles were preserved in 5 % formalin. For measurements we used an ocular micrometer in a Zeiss stereomicroscope, except for SVL that was measured with a caliper. Drawings of the holotype and tadpole were made using a Zeiss stereomicroscope with a drawing tube. Tooth row formula of tadpoles is given according to Altig (1970).

Results

Physalaemus caete sp. nov.

Holotype. – MNRJ 9803, adult male (fig. 1), collected at Fazenda Santa Justina, Municipality of Passo de Camaragibe (approximately 9°13'S 35°31'W; 45-90 m elevation), State of Alagoas, Brazil, on 26-30 June 1988 by Dante M. Teixeira.

Paratopotypes. – MNRJ 9801-02, 9804-05, 9848-50, adult males, collected with the holotype.

Diagnosis. – A medium-sized species (males 23.3-25.8 mm SVL) belonging to the *Physalaemus signifer* group (sensu Lynch, 1970), characterized by: (1) short and wide head; (2) snout nearly rounded in dorsal view and protruding in lateral view; (3) canthus rostralis weakly distinct; (4) dorsolateral light fold extending from the posterior corner of the eye to the inguinal region; (5) two or three black spots on the tibia; (6) large outer metatarsal tubercle.

Physalaemus caete is distinguished from *P. olfersii* by its smaller size (*P. olfersii* 28.5-34.5 mm SVL; Heyer et al., 1990) and by the presence of dark inverted V-shaped marks on the back (absent in *P. olfersii*). By its larger size, the new species differs from *P. bokermanni*, *P. crombiei*, *P. maculiventris*, *P. nanus*, *P. signifer* and *P. spiniger* (combined SVL ranging 15.0-22.3 mm; Bokermann, 1962; Cardoso & Haddad, 1985; Heyer & Wolf, 1989; Heyer et al., 1990; Haddad & Pombal, in press; personal observations). Further, the new species differs from *P. crombiei*, *P. maculiventris* and *P. signifer* by its broader head. From *P.*

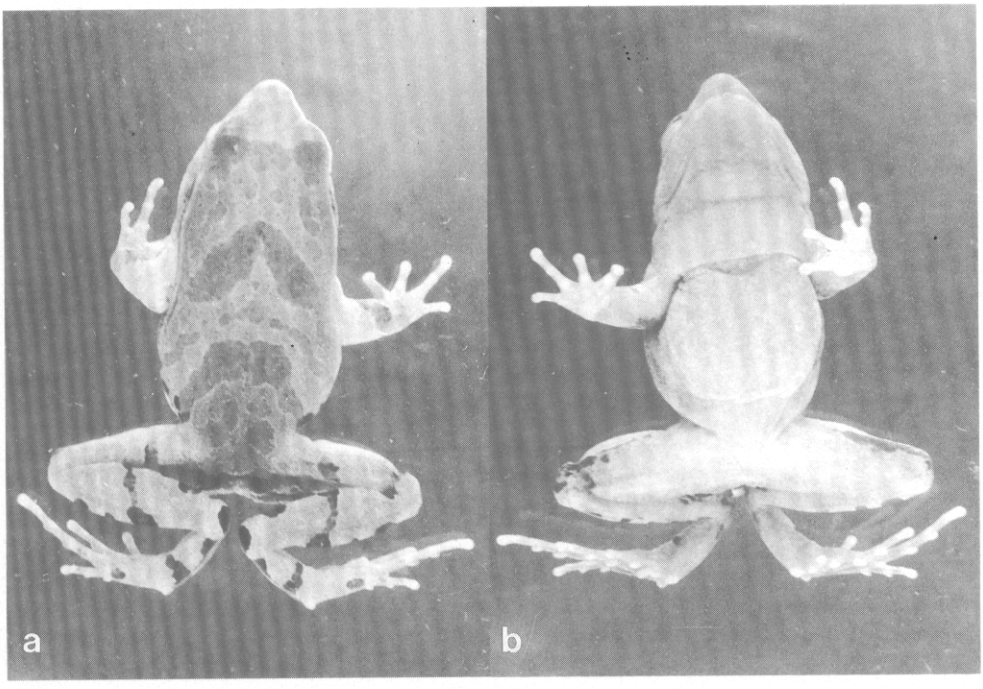

Fig. 1. – *Physalaemus caete*, holotype MNRJ 9803. (a) Dorsal view; (b) ventral view.

bokermanni and *P. signifer*, *P. caete* also differs in having a snout protruding in lateral view (see *P. signifer* and *P. bokermanni* figures in BOKERMANN, 1962 and CARDOSO & HADDAD, 1985, respectively). *Physalaemus caete* is distinguished from *P. maculiventris* and *P. moreirae* by its relatively uniformly colored belly (boldly dark and light mottled posterior belly in *P. moreirae* and *P. maculiventris*; HEYER, 1985; personal observations). From *P. obtectus*, *P. caete* is distinguished by its larger outer metatarsal tubercle and its smaller head (in *P. obtectus* head length 31-32 % SVL, in *P. caete* head length 22-24 % SVL).

Description of holotype. – Body nearly slender; head wider than long; snout nearly rounded in dorsal view, protruding in lateral view (fig. 2a-b); nostrils slightly protuberant, directed laterally; canthus rostralis weakly distinct; eye slightly protuberant; tympanum weakly distinct, large; distinct supratympanic fold from tympanum to shoulder; narrow dorsolateral fold extending from the posterior corner of the eye to the inguinal region; vocal sac distinct, subgular, slightly expanded externally, extending to the border of chest with belly; vocal slits present; choanae large, nearly round; tongue narrow, long; vomerine teeth absent; maxillary teeth not visible, but discernible by probe. Arms slender, forearms moderately robust; fingers short, no prepollex; brown nuptial pad on each thumb; subarticular tubercles single, protrud-

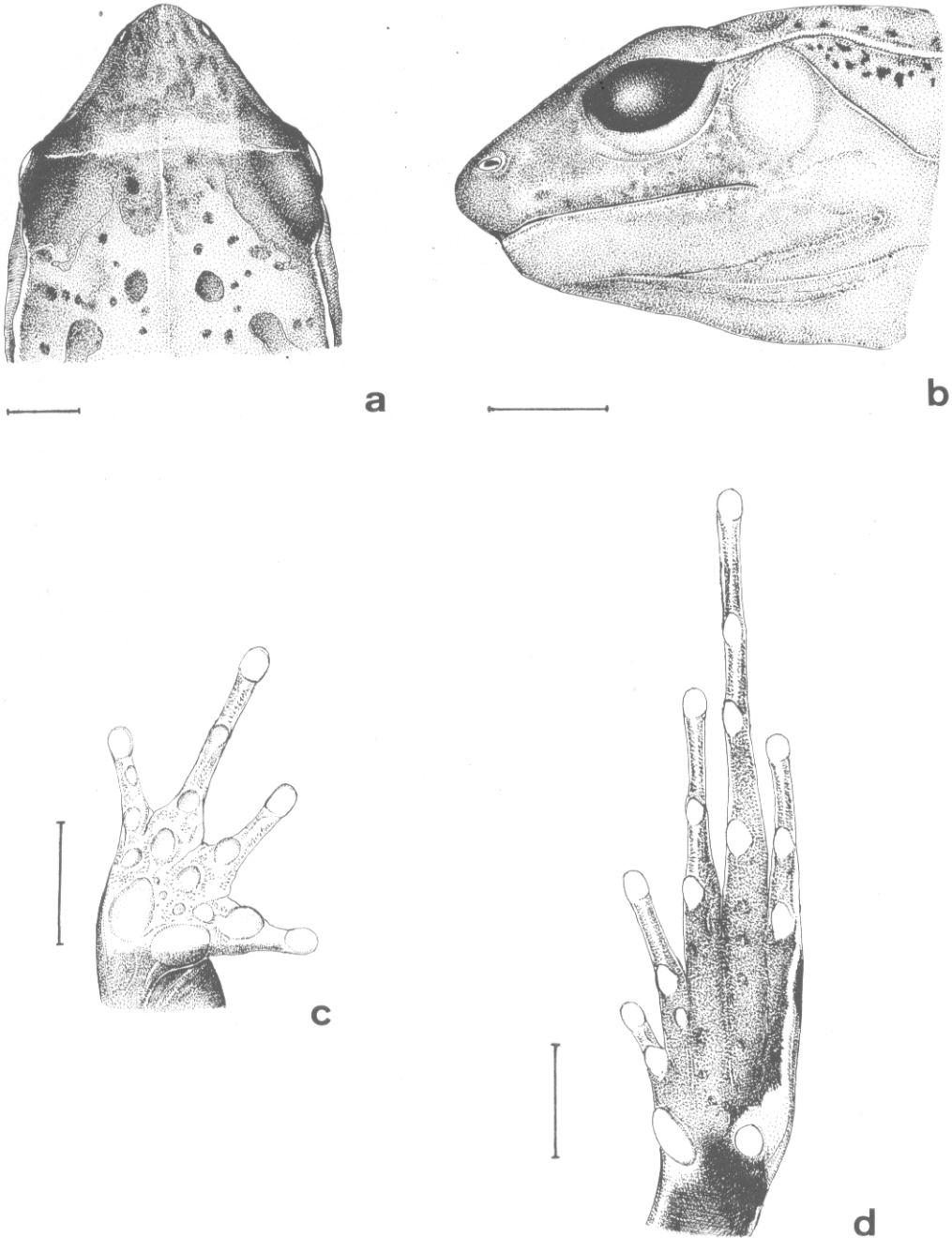

Fig. 2. – *Physalaemus caete*, holotype, MNRJ 9803. (a) Dorsal and (b) lateral views of head; ventral views of (c) hand and (d) foot (scale = 2 mm).

ing and round; outer metacarpal tubercle large, ovoid; inner metacarpal tubercle large, nearly elliptical; small supranumerary tubercles; finger tips slightly expanded; finger lengths I = IV < II < III (fig. 2c). Legs moderately robust; tibia length longer than thigh length; foot with a protruding, elliptical inner metatarsal tubercle; outer metatarsal tubercle small, protruding and round; well-developed subarticular tubercles, single, protruding and round; small supranumerary tubercles; toe tips slightly expanded; toe lengths I < II < V < III < IV (fig. 2d). Inguinal glands small; dorsum skin and venter smooth.

Color of holotype. – In preservative, dorsum brown with three dark brown inverse V-shaped marks with a fine light border, and also with dark brown dots with a fine light border; a white line on the dorsolateral fold; flanks below the dorsolateral fold dark brown; inguinal gland with a black spot on its right side and three black spots on the left side; forearm light brown with a dark brown transverse bar; a dark brown spot below the elbow; thigh, tibia and foot light brown; thigh and tibia with a dark brown transverse bar, foot with a dark brown spot; black marks on the knee and upperparts of thigh; three black spots on the tibia and tarsus; posterior tarsus and anal region black; sole of foot gray; palm cream; throat dark gray; belly gray with small light gray dots.

In life, the inguinal region was orange-reddish (D. M. TEIXEIRA, personal communication).

Measurements of the holotype. – SVL 24.5; HL 5.3; HW 8.7; ED 2.8; IOD 4.2; THL 11.2; TBL 12.3; FL 11.7.

Variation. – In preservative, dorsum brown to dark brown; in some specimens the dorsal pattern is less evident or without the fine light borders of the inverse V-shaped marks; in one individual the dorsum is rugose; inguinal glands well or poorly developed; the black spots on the inguinal glands are distinct in all individuals, but sometimes are small. Measurements (mean ± standard deviation, range) of seven males (females unknown) are as follows: SVL 24.54 ± 0.85, 23.5-25.8; HL 5.74 ± 0.40, 5.3-6.2; HW 9.10 ± 0.44, 8.5-9.6; ED 2.67 ± 0.17, 2.4-2.0; IOD 4.26 ± 0.20, 4.0-4.6; THL 11.93 ± 0.64, 11.2-12.7; TBL 12.31 ± 0.21, 12.0-12.6; FL 11.64 ± 0.41, 11.0-12.2.

Tadpoles. – A foam nest where males of *P. caete* were in calling activity was found in the type locality. Larvae were obtained by development of the eggs of this nest (D. M. TEIXEIRA, personal communication). The following description is based on a tadpole in developmental stage 28 (GOSNER, 1960). Body depressed-globular in lateral view (fig. 3a), ovoid in dorsal and ventral views (fig. 3b-c); body wider than high; snout rounded; eyes small, dorsolateral; nostrils dorsal, small and rounded, about midway between the eyes and the tip of snout; spiracle sinistral, its opening past middle of body; cloacal tube median, medium sized; caudal musculature slender; dorsal fin originating on body; ventral fin wider than dorsal. Oral disc (fig. 3d) directed ventrally and bordered by papillae, with a large gap on the anterior labium; tooth row formula 2(2)/3(1); jaw sheath strongly developed and serrate; posterior sheath V-shaped. In preservative, body gray; caudal musculature with scattered melanophores, concentrated on the upper first third; fins translucent with scattered melanophores.

Measurements: total length 14.9; body length 8.9; body heigth 2.4; body width 3.7; internarial distance 0.4; interorbital distance 1.0; eye-nostril distance 0.5; eye diameter 0.5.

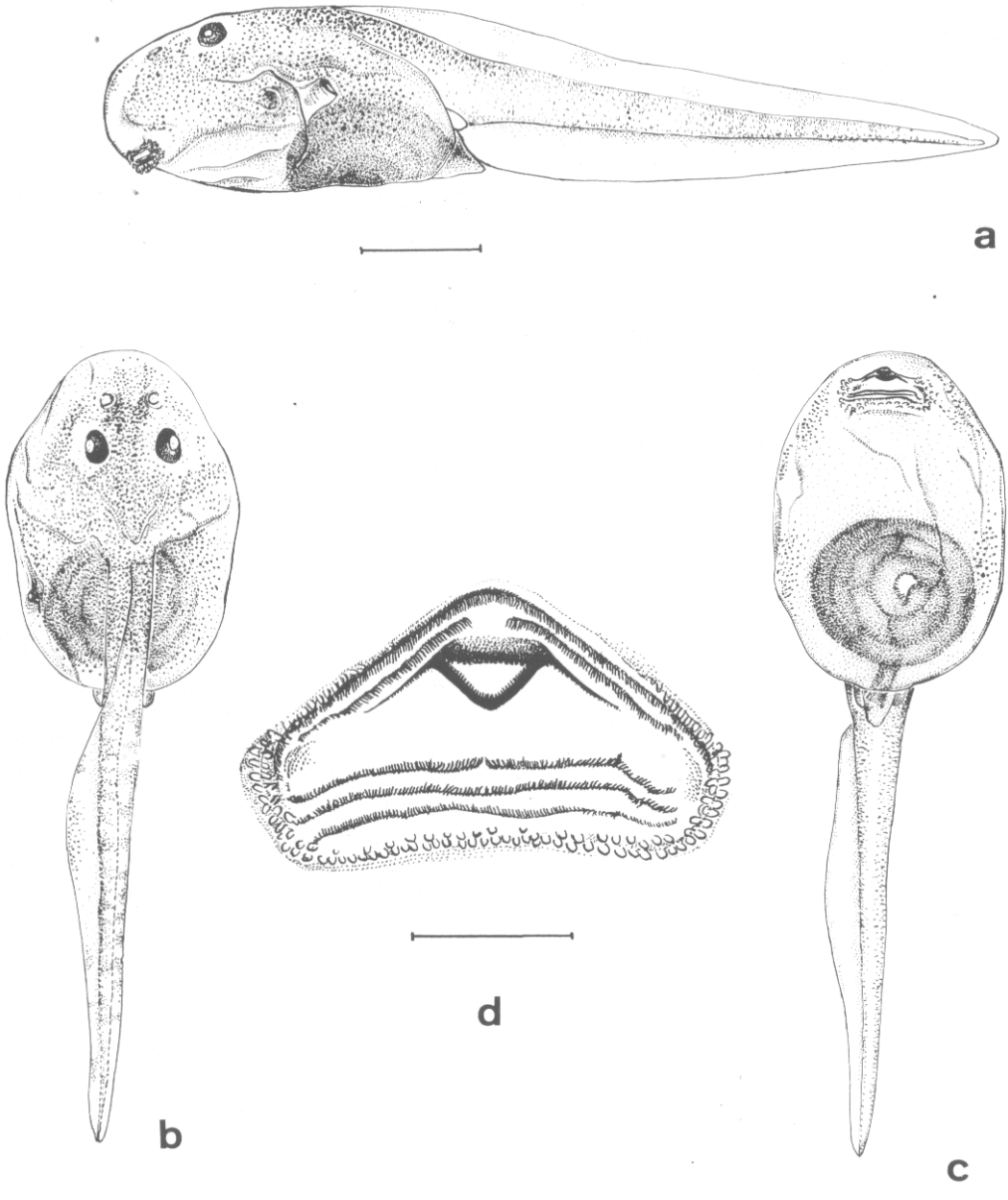

Fig. 3. – Tadpole of *Physalaemus caete*, stage 28; (a) lateral, (b) dorsal and (c) ventral views (scale = 2 mm); (d) oral disc (scale = 0. 5 mm).

Distribution. – The new species is known only from the type locality, and from the municipality of Murici (approximately 9°47′S 36°50′W; 650 m elevation), both in the State of Alagoas, northeastern of Brazil. The other species of the *Physalaemus signifer* group are known from the States of Rio Grande do Sul to Espírito Santo (FROST, 1985; DUELLMAN, 1993). The new species represents the northernmost record for the *P. signifer* group.

Natural history. – *Physalaemus caete* was collected by day on the leaf litter around ponds in the Atlantic Rain Forest. The eggs, in foam nests, were observed in the water of ponds and in the water of tree holes, near the ground.

Etymology. – *Caetê* is a Tupi indigenous name, here used as a noun in apposition. The specific name is an allusion for the forest habitat (*caá*, forest; *etê*, true), where *P. caete* and most of the species of the *P. signifer* group are collected. *Caeté* was also the name of the extinct Indians from the region of the type locality.

RÉSUMÉ

Une nouvelle espèce de grenouille leptodactyle est décrite de Passo de Camaragibe, commune de l'état de Alàgoas, nord-est du Brésil. La nouvelle espèce, qui appartient au groupe de *Physalaemus signifer*, est caractérisée par sa taille moyenne, son museau proéminent en vue latérale, ses plis dorsolatéraux clairs s'étendant de l'extrémité postérieure de l'oeil jusqu'à la région inguinale, et son tubercule métatarsien externe développé. Une description du têtard est fournie.

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APPENDIX 1

ADDITIONAL SPECIMENS EXAMINED

Physalaemus caete. MNRJ 9712-17 (Murici, AL); MNRJ 18280 (lot of tadpoles, Passo de Camaragibe, AL).

Physalaemus bokermanni. – ZUEC 4520-21 (paratypes, Santo André, SP).

Physalaemus crombiei. – MNRJ 17694-745 (Aracruz, ES).

Physalaemus maculiventris. – AL-MN 684 (syntype, "Alto da Serra de Cubatão"); MNRJ 4228-30 (Paranapiacaba, SP); MNRJ 1797, 9975-10020 (Serra de Araraquara, PR).

Physalaemus moreirae. – MNRJ 464 (holotype, Paranapiacaba, Santos, SP).

Physalaemus nanus. – CFBH 081 (Sao José, SC); MNRJ 12827-32 (Florianópolis, SC).

Physalaemus obtectus. – MNRJ 4025, 14206-07 (paratypes, Linhares, ES).

Physalaemus olfersii. – MNRJ 2428 (Parati, RJ); MNRJ 0482, 5525-26, 12826 (Teresópolis, RJ).

Physalaemus signifer. – MNRJ 1123, 6616-35 (Duque de Caxias, RJ); MNRJ 2753, 12461-62 (Barro Branco, Duque de Caxias, RJ); MNRJ 2766, 12477-80 (Pendotiba, Niterói, RJ); MNRJ 12837-42 (topotypes, Jacarepaguá, Rio de Janeiro, RJ).

Physalaemus spiniger. – CFBH 312-17, 319-21, MNRJ 18474, ZUEC 6878, 6881-82 (Cananéia, SP); ZUEC 9333-43 (Caraguatatuba, SP); CFBH 2479 (Eldorado, SP); MNRJ 18475-76 (Guaraqueçaba, PR); CFBH 307-10, 410, 835, MNRJ 18470-72, 18473, ZUEC 6876-77 (topotypes, Iguape, SP); ZUEC 3250 (Jacupiranga, SP).

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