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New Species of *Aparasphenodon* (Anura: Hylidae) from Southeastern Brazil

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***Aparasphenodon bokermanni* is described from the coastal rainforest of southern São Paulo, Brazil. The new species is characterized by its ridged and straight canthus rostralis and large finger and toe disks.**

TREEFROGS of the genus *Aparasphenodon* occur in the coastal region of southeastern Brazil and the upper Orinoco Basin of Venezuela (Trueb, 1970a; Frost, 1985). The genus is characterized by the following features: skull longer than broad; snout narrow and acuminate in dorsal view; canthal ridges distinct, anteriorly concave; surface configuration of dermal roofing bones consisting of a reticulate network of ridges in low relief and prominent patterns of radial ridges (Trueb, 1970a). The species presently allocated to *Aparasphenodon* are *A. venezolanus* (Mertens) and *A. brunoi* Miranda-Ribeiro (Trueb, 1970a; Frost, 1985). Herein, I describe a new species of *Aparasphenodon* from southeastern Brazil.

Specimens used for the description or examined for comparisons are in Museu Nacional do Rio de Janeiro, Brazil (MN); Museo Nacional de Historia Natural, Uruguay; (MNHN); Museu de História Natural, Universidade Estadual de Campinas, Brazil (ZUEC), and Werner C. A. Bokermann Collection, Brazil (WCAB). Webbing formula notation follows Savage and Heyer (1967). Measurements are in millimeters.

Abbreviations used in the description are SVL (snout–vent length), HL (head length), HW (head width), IND (internarial distance), ED (eye diameter), IOD (interorbital distance), END (eye-nostril distance), TD (tympanum diameter), THL (thigh length), TBL (tibia length), and FL (foot length).

Fig. 1. *Aparasphenodon bokermanni* n. sp., holotype, ZUEC 6604, dorsal view.

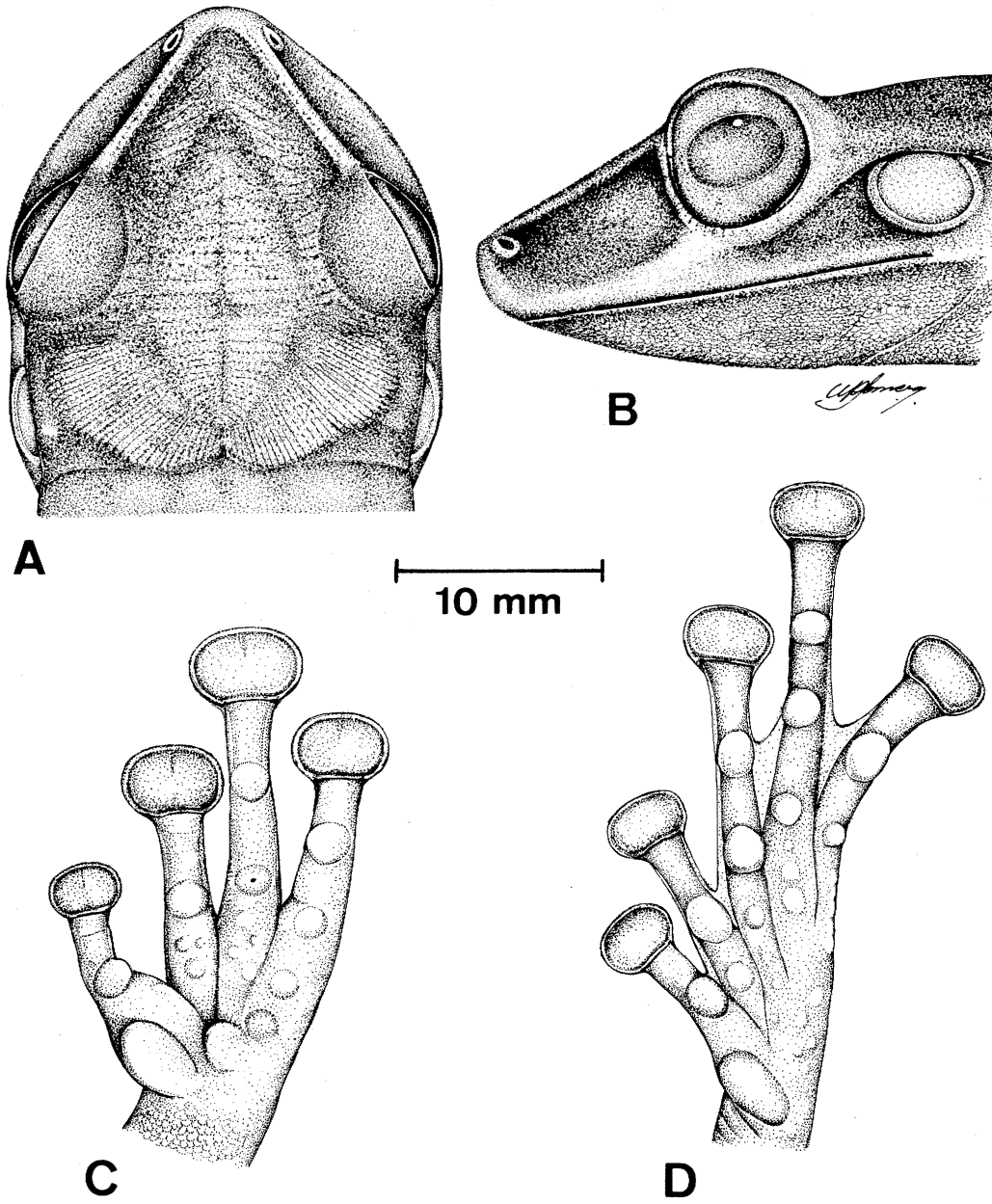

Fig. 2. *Aparasphenodon bokermanni* n. sp., holotype, ZUEC 6604. (A) Dorsal and (B) lateral views of head; ventral view of (C) hand and (D) foot.

Aparasphenodon ***bokermanni*** n. sp.

Holotype.—ZUEC 6604, adult female, collected at the Rio Verde, Estação Ecológica da Juréia-Itatins (approximately 24°30'S, 47°15'W, at sea level), Município de Iguape, Estado de São Paulo, Brazil, 4 Jan. 1988, by C. Ramos-Azevedo.

Diagnosis and comparison with other species.—A large, robust species (holotype 71.1 mm SVL; Fig. 1) with a straight, ridged canthus rostralis; vomerine tooth row straight; choanae oriented obliquely; large finger and toe disks.

The straight canthus rostralis of *Aparasphenodon bokermanni* distinguishes this species from *A. brunoi, A. venezolanus, Argenteohyla siemersi* (Mertens) and *Corythomantis greeningi* Boulenger, all of which have concave canthi rostralis (Carvalho, 1941; Trueb, 1970a, 1970b). The

new species differs further from *C. greeningi* by the presence of ridges on the canthus rostralis; although present, the ridges are indistinct in *C. greeningi*. *Aparasphenodon bokermanni* differs from *Trachycephalus atlas* and *T. nigromaculatus* in having a head that is longer than broad, rather than broader than long or as long as broad, as it is in *Trachycephalus* (Trueb, 1970a). *Aparasphenodon bokermanni* is uniform in color, whereas *A. venezolanus* is mottled (Paolillo and Cerda, 1981). Last, the new species differs from *Argenteohyla siemersi* and *Aparasphenodon brunoi* by having proportionally larger adhesive digital disks (Trueb, 1970b; pers. obs.).

Description of holotype.—Body robust; head longer than broad; snout long, its shape slightly rounded in dorsal view and truncate in lateral view (Fig. 2A–B); nostrils directed laterally; canthus rostralis with straight ridges; loreal region concave; eye large; tympanum large, nearly rounded; distinct supratympanic fold; skin of dorsal surfaces of the skull co-ossified with underlying bone; tongue small, notched behind; vomerine tooth row straight, between and anteromedial to the choanae; choanae small, slightly elliptical and oblique. Forearm robust, arm slender; fingers long and robust, each bearing a single, rounded subarticular tubercle; palmar tubercle single, large and nearly elliptical; numerous small supernumerary tubercles; fingers lacking webbing; finger disks large, nearly elliptical; thumb disk smaller than those of other digits, the diameter of disks of digits II and III nearly equal to diameter of tympanum (Fig. 2C). Legs moderately slender; foot with large, elliptical inner metatarsal tubercle; single, rounded subarticular tubercle on each toe; small supernumerary tubercles; webbing formula, $I2^{+}-2^{-}II2^{-}-3^{+}III2^{-}-3^{+}IV3^{+}-2^{-}V$; toe disks large, nearly elliptical and slightly smaller than finger disks (Fig. 2D). Dorsal texture smooth; belly, underfaces of thighs, and anal region glandular, throat weakly grained.

Color in preservative of the holotype.—Dorsum dark brown, head blackish-brown; arms and legs brown; disks dark brown; sides of body with cream spots; belly and throat grayish-brown; throat with grayish-brown spot.

Measurements of the holotype.—SVL 71.1; HL 22.5; HW 21.2; IND 3.9; ED 6.0; IOD 9.2; END 11.3; TD 4.3; THL 34.1; TBL 34.0; FL 29.7.

Etymology.—The specific name honors W. C. A. Bokermann for his contribution to the knowledge of the Brazilian anuran fauna.

Remarks.—The new species represents the southern-most record for the genus *Aparasphenodon*. Sazima and Cardoso (1980) recorded *A. brunoi* at Ubatuba on the northern coast of the State of São Paulo (approximately 23°30′S, 45°07′W). The Estação Ecológica da Juréia-Itatins was visited monthly during 1988; in about 240 h of field work, only one specimen of this frog was found at night, on a rock in the margin of the Verde River. The area is at sea level, in the southern coast of São Paulo State. The coastal rainforest (Atlantic Forest), mangroves, and the scrubby "restinga" vegetation are found in the area of the Rio Verde. The area also harbors a high density of terrestrial and epiphytic bromeliads. Although the water of the Rio Verde is frequently clear, brackish waters may move upstream during tidal floods (Guix and Lopes, 1989).

Additional Specimens Examined

Aparasphenodon brunoi: MN 247 (holotype); WCAB 12446 (juv.); ZUEC 1969, 2758-2759, 2767, 3724-3725, 8167. *Argenteohyla siemersi*: MNHN 5425; WCAB 3379, 3389. *Corythomantis greeningi*: ZUEC 3907, 4004, 4124. *Trachycephalus atlas*: WCAB 30711, 33939 (paratype); ZUEC 3747, 3915. *T. nigromaculatus*: ZUEC 2892-2894.

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Effect of Sexual Behavior on Oocyte Development and Steroid Changes in *Trichogaster trichopterus* (Pallas)

GAD DEGANI

The development of oocytes and plasma steroid level in the asynchronic (male-dependent), multispawning female *Trichogaster trichopterus*, and steroid levels in the plasma of the male, were studied through the five stages of the reproductive cycle: prebreeding, nest building, courtship, spawning, and nursing. Before sexual behavior began, 30% of the oocytes were in vitellogenic stages, and no mature oocytes were found. During nest building, 25% of the oocytes underwent maturation, and a further 3% did so after ovulation.

Levels of testosterone (T) and estradiol-17β increased in females after spawning. In males, the level of T increased during nest building, decreased during fertilization, and increased again during nursing. 17α-hydroprogesterone remained low in both sexes, though detectable in the plasma of the female during spawning, and the male during nest building. The level of 17α,20β-dihydroxy-4-pregnen-3-one was very low during the prebreeding and nest building periods and rose significantly during spawning.

The study shows that the maturation of the oocytes and ovulation are correlated to male behavior. The relationship between hormonal control of reproduction and sexual behavior in this species is discussed.

THE seasonal spawners in teleosts are classified into two categories in terms of spawning frequency: annual spawners and multiple spawners. Among cyprinids and salmonids, the most intensively studied groups (Dodd and Sumpter, 1984), salmonid fish are usually annual spawners; and in some cases, reproduction occurs only once during the lifetime. Cyprinid fish, however, are both annual and multiple spawners, spawning several times within a spawning period and possessing an ovary of the asynchronic type (Matty, 1985). *Trichogaster trichopterus*, which was examined in this study, is an asynchronic (male-dependent), multiple, year-round spawner, under certain conditions (Degani, 1989).

Oocytes in their first four stages are found simultaneously in the ovaries of mature females, but maturation occurs only when a high percentage of the oocytes are in vitellogenesis and when male courtship has brought the female into reproductive condition (Degani and Boker, 1992a). The male is territorial and builds a nest of mucus bubbles at the water/air interface, which serves as a depository for fertilized eggs. During courtship, when the female is ready to spawn, the male circles and nudges her until she is under the nest, envelops her body with his, and turns her over until her eggs are expelled. He fertilizes the eggs and tends the brood, retrieving eggs and fry that drift from the nest (Miller, 1964).

In order to study hormone correlation in reproduction, the plasma hormone levels have been examined in different teleost species (Kobayashi et al., 1988; Aida, 1988). The general hormone changes during the sexual cycle have been studied in detail in some fish (Matty, 1985). In fish, the secretion of gonadotropin-releasing hormones (GnRH) and a gonadotropin (GtH)