

***Brachyhypopomus jureiae*, a new species of freshwater Neotropical electric fish (Teleostei: Gymnotiformes: Hypopomidae) from a coastal stream of Southeastern Brazil**

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Abstract

Brachyhypopomus jureiae, new species, is described from a tributary of Rio Una do Prelado, which flows into the Atlantic Ocean, State of São Paulo, Southeastern Brazil. It differs from all other *Brachyhypopomus* species by the absence of dark transversal bars, replaced by a horizontal series of dark circular to oblique spots, ventro-laterally on the body, among other characters.

Keywords: Teleostei, Gymnotiformes, *Brachyhypopomus*, electric fish, new species, coastal stream, Brazil.

Introduction

Brachyhypopomus was erected by Mago-Leccia (1994) for the short snouted species previously included in *Hypopomus* Gill, namely *B. brevirostris*, *B. occidentalis*, *B. beebei*, *B. diazi*, *B. pinnicaudatus* and *B. janeiroensis*, freshwater Neotropical electric fishes that belong to the Hypopomidae. Albert & Campos-da-Paz (1998) assigned four derived characters to the genus: (1) premaxilla small, its anterior margin curved; (2) dentary gracile; (3) body cavity short and (4) a single transitional vertebrae. Albert (2001) assigned the same derived characters to define the genus, but in a more accurate description: (1) premaxilla gracile with a curved anterior margin and forming a distinct angle with the maxilla in lateral view; (2) dentary gracile; (3) body cavity with 16-17 precaudal vertebrae and (4) a single transitional vertebrae.

According to Campos-da-Paz (1997), *B. beebei* occurs from Venezuela to the Río de la Plata, *B. brevirostris* occurs in the high Rio Paraguay basin and northern South America, *B. janeiroensis* occurs in the Rio Paraíba do Sul basin and adjacent drainages and *B. pinnicaudatus* occurs from the northern rivers of South America to the Río de la Plata. According to Mago-Leccia (1976), *B. diazi* is a junior synonym of *B. occidentalis*, which occurs from Costa Rica to the Pacific slope of Ecuador to Colombia, Peru and Suriname (Corantijn River drainage), according to Triques (1994).

The single species of *Brachyhypopomus* described from the coastal streams of Southeastern Brazil is *B. janeiroensis* (Costa & Campos-da-Paz, 1992). This species occurs in the Rio São João and Rio Paraíba basins, two separate drainages

flowing independently into the Atlantic Ocean, at the State of Rio de Janeiro.

During an ecological study of the Rio do Descalvado, a small river and its surrounding aquatic environments, specimens of a new species of *Brachyhypopomus* were collected. The study area belongs to a protected coastal and forest environment in the State of São Paulo, Brazil, the “Estação Ecológica da Juréia”. The description of a new species, from a preserved area, raises awareness of environmental protection among the general public of the State of São Paulo and Brazil.

The aim of this work was to describe a new form of hypopomid electric fish.

Material and Methods

The type specimens were compared with information available in the taxonomic literature concerning *Brachyhypopomus* and with specimens of other species belonging to the genus. Measurements and counts follow Triques (1996) but standard length is now named “length to the end of anal fin (LEA)”, as in Mago-Leccia et al., (1985). Regenerated parts were not measured and their meristic data were not recorded. Study of squamation was performed on a vertical passing near the middle of the body cavity region. Specimens of other *Brachyhypopomus* species, used for comparison with the new species, are listed in Appendix and include institutional acronyms and numbers, simplified geographic localities and number of studied specimens in parentheses. All localities are in Brazil, except otherwise noted. Part of the type specimens was deposited in the ichthyological collection of the Departamento de Zoologia da Universidade Federal de Minas Gerais in Belo Horizonte, Brazil, and numbered under the acronym DZUFMG.

Received 27.08.2002
Accepted 09.05.2003
Distributed 23.06.2003

Table 1 - Morphometric data of *Brachyhypopomus jureiae*, sp. n.. Length to the end of anal fin (LEA) in millimeters. Data numbered from 2 to 10 and 21 are percentages of LEA. Data numbered from 11 to 20 are percentages of head length. Pectoral fin base (22) as a proportion of 21. Data of holotype in bold-faced type.

Measurements	Specimens			
1. Length to the end of anal fin (LEA)	194,0	105,0	96,0	99,2
2. Head length	9,1	10,9	11,1	11,4
3. Pre-pectoral distance	10,1	12,3	12,4	12,7
4. Preanal distance	13,1	18,9	18,2	19,4
5. Oculo-anal distance	10,5	15,4	14,7	16,2
6. Anal fin length	86,6	81,9	81,2	81,6
7. Caudal filament	50,0	45,7	36,5	41,3
8. Greatest body depth	9,6	11,0	10,4	11,0
9. Body width	3,7	3,3	4,0	4,5
10. Total length	151,0	146,7	141,7	141,1
11. Snout	32,2	32,2	32,7	31,7
12. Ocular diameter	13,0	11,3	11,2	10,6
13. Postocular distance	61,0	64,3	59,8	62,8
14. Opercular opening	25,4	27,8	29,0	28,3
15. Mouth-to-eye distance	22,6	20,0	20,6	18,6
16. Interocular	23,72	26,1	23,4	23,0
17. Internasal 1	-	11,3	13,1	11,5
18. Internasal 2	24,9	26,9	25,2	26,0
19. Opercular width	60,4	62,6	61,7	61,0
20. Greatest head depth	81,4	79,1	81,3	77,0
21. Pectoral fin length	4,8	4,6	5,3	4,4
22. Pectoral fin base	26,6	31,2	31,4	34,1

Brachyhypopomus jureiae sp. n.

Holotype. DZUFMG 010, 195 mm LEA. Rio do Descalvado, tributary of Rio Una do Prelado, Juréia Ecological Station, State of São Paulo, Brazil. Collector: Daniel Kalil Khamis, 01.06.1999.

Paratypes. DZUFMG 011 (02 specimens), 96 to 105 mm LEA. Collected with the holotype. MZUSP 67491 (01 specimen), regenerated posteriorly. Collected with the holotype. MZUSP 70004 (01 specimen), 99 mm LEA. Collected with the holotype.

Diagnosis. Large specimens (at least 128 mm LEA) with body uniformly dark brown above the lateral line; below lateral line, with a series of nearly circular to oblique spots, roughly aligned longitudinally. Small specimens (up to 105 mm LEA) uniformly dark dorsally, with a series of dark brown circular to horizontally elongated spots over the lateral line region; another series of nearly circular to oblique spots, roughly aligned longitudinally, is present below lateral line. All specimens have a longitudinal line of dots posteriorly in the anal fin (lacking in the smallest specimen). All specimens present anal fin hyaline distally, without chromatophores; cephalic lateral line pore above the posterior nostril located behind a vertical line through the middle to rear margin of the nostril; mouth terminal; caudal filament brown with darker brown transversal bars and other marks; caudal filament about 30 to 50% of total length.



Figure 1 - Lateral view of *Brachyhypopomus jureiae* sp. n., MZUSP 67491, paratype, 14.1 mm head length; body regenerated posteriorly. (Photograph by Volney Vono).

Description. Morphometric data are in Table 1.

Body elongated and compressed, uniformly covered with cycloid scales. Head and fins naked. Shape of scales varies strongly. Dorsal scales nearly circular; lateral line scales circular anteriorly and pointed posteriorly or vertically elongated, with detached lateral line canal, not included inside lamellar portion but fused to it; scales surrounding lateral line circular anteriorly and pointed posteriorly or nearly circular; ventral scales vertically (dorso-ventrally) elongated, circular or oblique. Diameter of lateral line scales twice as large as diameter of dorsal scales. Depth of ventral scales as long as one half of lateral line scale diameter. Presence of 10 to 12 rows of scales above lateral line. Dorsal body profile slightly convex. Ventral body profile convex on the body cavity region, from where it is straight backward. Dorsal and ventral body profiles convergent backward, ending in an elongate tapering caudal filament.

Dorsal and ventral head profiles sloping anteriorly. Mouth terminal. Anterior nostril circular, on upper lip. Posterior nostril circular, nearly two ocular diameters from anterior nostril and about 65% of ocular diameter from nearest eye margin. Cephalic lateral line pore above posterior nostril placed just behind vertical through middle or rear margin of this nostril. Eye large, dorso-laterally on head. Gape small, external mouth corner nearly on a vertical through midway between anterior and posterior nostrils or slightly closer to posterior nostril. Upper jaw overlapping lower jaw laterally. Upper jaw profile slightly concave behind anterior nostril, then directed downward and widely convex. Jaws toothless.

Caudal filament narrow and compressed. Pectoral fin short, roughly circular posteriorly, with iii-iv + 10-12 rays. Anal fin with xi + 188 – 211 rays, its origin on a vertical one eye diameter behind pectoral fin posterior border.

Color in alcohol. Body color pattern changes with growth. Small specimens with head dark brown dorsally, clearing ventrally to grayish-cream; mid-dorsum of body brown; body dorso-laterally with a darker brown longitudinal stripe presenting waving ventral margin; this stripe fusing to mid-dorsal brown area, behind middle of LEA; body below dark brown stripes clear cream. In larger specimens, dorso-lateral

body area becomes progressively darker down to lateral line. Small specimens with a series of circular to horizontally elongated dark spots on lateral line to middle of LEA, then fusing with mid-dorsal brown area. Anal fin hyaline, with a longitudinal line of dots, composed of wide chromatophores present over rays, macroscopically visible only posteriorly in the fin, or not visible in smallest specimen. Anal fin without chromatophores anteriorly; posteriorly with chromatophores only over posterior ray margins, except by a point almost on the tip of ray, where expanded chromatophores are present over rays. Tip of anal-fin rays without chromatophores. Pectoral fin hyaline, with chromatophores over rays proximally and only over posterior profiles of rays medially and distally on the fin. Body light cream below lateral line with a series of approximately circular to oblique spots nearly aligned longitudinally. Caudal filament brown with dark brown transversal bars and other dark brown irregular marks.

Large specimens (128 mm LEA or larger) with body uniformly dark brown above lateral line, with or without horizontally elongated sinuous darker wide brown marks. Below lateral line, ground color grayish-cream, with a series of approximately circular to oblique spots roughly aligned longitudinally. Head dark brown dorsally, clearing downward to grayish-cream ventrally. Caudal filament dark brown. Fins hyaline with dark chromatophores over rays (also over membrane but only close to body ventral profile). Anterior half of anal fin with chromatophore only on posterior profile of rays and between their branching point (chromatophores at this point responsible for the macroscopic appearance of a series of dots on fin). Behind middle of fin length, chromatophores spread over parts of rays to end of fin, more densely pigmented on branching point; posterior profile of rays with chromatophores to the end of fin. Anal fin hyaline and without chromatophores distally at least in the first half of fin length.

Color in life. Head black dorsally, light cream ventrally. Body ventral area dark cream with dark brown spots.

Distribution. Known to occur only in the Rio Una do Pre-lado system, which flows into the Atlantic Ocean, State of São Paulo, Southern Brazil.

Etymology. The epithet “*jureiae*” is the latinization of the word “Jureia”, regarding the provenance region of the type material.

Ecological notes. Specimens were collected in the Rio do Descalvado, a blackwater river of muddy bottom with surface partially covered by water-hyacinth (*Eichhornia* sp.); grasses are occasionally present on the margins. Water pH 6.0.

Discussion

Brachyhypopomus jureiae differs from the other species of the genus by the combination of characters presented in the diagnosis. In order to make clear which are the differences between the new species and each of the others, detailed comparisons are presented subsequently. The color pattern of the other *Brachyhypopomus* species differs clearly from *B. jureiae* as they do not present body uniformly dark above lateral line, nor a series of longitudinally arranged dark spots ventrally on the body, nor the anal fin longitudinal line of dots. All the other species present dark oblique transversal bars or series of fragments arranged in this pattern. *Brachyhypopomus*

janeiroensis presents a longitudinal series of dots (never oblique) in the same position as the spots of *B. janeiroensis*, but the size of the marks is clearly different. Also, *B. janeiroensis* presents vertically elongated bars. Some specimens of *B. beebei* and *B. occidentalis* may be almost entirely dark brown, but transversal bars are still present in some areas of the body. The anal fin of all previously known species presents chromatophores on its distal border, which does not occur in *B. jureiae*. The cephalic lateral line pore above the posterior nostril of *B. beebei* is placed anteriorly to a vertical line through the middle of the posterior nostril; in *B. pinnicaudatus* and *B. janeiroensis* it varies, occurring both anterior and posterior to a vertical through the middle of the posterior nostril. In *Brachyhypopomus occidentalis* and *B. diazi* the lower jaw is included in the upper jaw. *Brachyhypopomus beebei* has caudal peduncle length around 20% of total length. *Brachyhypopomus pinnicaudatus* presents a faint yellow line running through reticulations on the dorsal midline (Hopkins, 1991: 157); caudal filament ground color cream with dark transversal bars and other marks (Hopkins, 1991: 154, fig. 1). In *B. janeiroensis*, the dorsal scales are vertically elongated, while in *B. jureiae* they are circular.

Albert & Campos-da-Paz (1998) and Albert (2001) presented osteological derived characters to diagnose the genus. Few, type specimens of *B. jureiae* are available currently and anatomical preparations were avoided in order to assure external morphology conservation for taxonomic purposes. As the derived characters proposed to diagnose *Brachyhypopomus* are osteological, the inclusion of *B. jureiae* in the genus is tentative.

São Paulo is probably the best studied State of the country in relation to taxonomy and the presence of unknown forms in such conditions highlights the importance of preservation areas in economically developed and/or impacted regions. Intensive collects are necessary in order to provide specimens for external and internal studies.

Acknowledgements

We are grateful to O. T. Oyakawa and J. L. de Figueiredo for allowing to develop part of this work in the fish collection of MZUSP; R. Campos-da-Paz brought type material of *B. janeiroensis*, with permission of W. J. E. M. Costa; C. Jacobi reviewed the English version of the manuscript; R. Campos-da-Paz, M. Kottelat and an anonymous referee reviewed the final manuscript. FAPEMIG (Fundação de Amparo à Pesquisa do Estado de Minas Gerais, proc. n° 3430) provided optical equipment.

Appendix

Data from the comparative material included subsequently were explained in the material and methods. Acronyms are: USNM (National Museum of Natural History, Smithsonian Institution, Washington D. C.), MZUSP (Museu de Zoologia da Universidade de São Paulo, São Paulo), UFRJ (fish collection of Universidade Federal do Rio de Janeiro, Rio de Janeiro), MNRJ (fish section of Museu Nacional do Rio de Janeiro, Rio de Janeiro) and ANSP (Academy of Natural Sciences of Philadelphia, Philadelphia).

Brachyhypopomus beebei: USNM 38222, Surinam (4); MZUSP 30038, Rio Negro system, Amazon Basin, (5); MZUSP 30037, Amazon Basin. *B. brevirostris*: MZUSP 30048, Central Amazon Basin (29); *B. pinnicaudatus*: MZUSP 53862, State of São Paulo (5). *B. janeiroensis*: MZUSP 43131, Rio São João basin, State of Rio de Janeiro, paratype (1); UFRJ 0598, Rio São João basin at Silva Jardim, State of Rio de Janeiro, paratypes (4); MZUSP 22702, Rio Paraíba do Sul at São João da Barra, State of Rio de Janeiro (5); MNRJ 13503, Rio Dois Rios, Rio Paraíba do Sul basin, State of Rio de Janeiro. *B. occidentalis*: ANSP 163170, Costa Rica (1). *Brachyhypopomus* sp. n. 1: MZUSP 52139, Rio Tocantins (3). *Brachyhypopomus* sp. n. 2: MZUSP 48913, Rio Tefé (1). *Brachyhypopomus* sp. n. 3: MZUSP 23013, Rio Paraíba do Sul, State of Rio de Janeiro (1). *Brachyhypopomus* sp. n. 4: MZUSP 44261, Rio Paraguai (9).

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