

REVUE SUISSE DE ZOOLOGIE 112 (2): 401-408; juin 2005

***Astyanax pampa* (Characiformes, Characidae), a new species from the southernmost boundary of the Brazilian subregion, Argentina**

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***Astyanax pampa* (Characiformes, Characidae), a new species from the southernmost boundary of Brazilian subregion, Argentina.** - *Astyanax pampa* sp. n., the new species of characid described herein, is known from arroyo Las Mostazas, an Atlantic Ocean drainage, and the lower río Colorado basin. *Astyanax pampa* sp. n. is distinguished from all other *Astyanax* species by the possession of 17-20 branched anal-fin rays, one maxillary tooth unicuspidate to tricuspidate, short anal-fin base (24.2-30.3% of SL), and long caudal peduncle (10.5-12.7% of SL).

Keywords: Freshwater fishes - characids - Buenos Aires - systematics.

INTRODUCTION

The streams of the Atlantic Ocean drainage and the lower río Colorado represent the southern limit of the Brazilian subregion. In that area, the diversity of freshwater fishes is low, about 15 species (Casciotta *et al.*, 1999) and supposedly, the fish species are well known. Thus, collecting trips in the streams of Atlantic Ocean drainages and río Colorado are not frequent. In the last years, some trips in the area allow us to confirm the presence of several freshwater species including a new species of *Astyanax*. *Astyanax pampa* is included in this genus following Eigenmann (1921, 1927) by the presence of two series of premaxillary teeth, maxilla with few or no teeth, dentary with strong teeth in front and minute conical ones on the sides, lateral line complete, caudal fin naked, shallow body depth, and a complete series of scales in the predorsal area.

The aim of this paper is to describe *Astyanax pampa* sp. n. which has the southernmost distribution of the genus.

MATERIAL AND METHODS

The specimens were cleared and counterstained (C&S) following Taylor & Van Dyke (1985). Measurements were taken as straight line distances in mm, using digital calliper; all measurements are expressed as percentages of SL or indicated length. Standard length is taken from tip of snout to hypural joint; head length includes opercular flap; peduncle length is taken from insertion of last anal-fin ray to hypural

joint. Measurements of holotype and paratypes (Table 1) include two cleared and stained specimens. Values of holotype are indicated by an asterisk. Vertebrae count includes four vertebrae of Weber apparatus and the CP1+U1 as one element. Scales below lateral line are counted from that line to pelvic-fin origin. Perforated scales of lateral line were counted from first scale posterior to opercle to last scale on caudal peduncle. Institutional abbreviations are as listed in Leviton *et al.* (1985), excluded AI (Asociación Ictiológica, La Plata, Argentina), and CI-FML (Fundación Miguel Lillo, Tucumán, Argentina).

Comparative material examined (SL in mm). *Astyanax abramis* (Jenyns, 1842): MLP 9427, 2 ex., 102.0-113.0, Argentina, Misiones, río Paraná. *Astyanax asuncionensis* Géry, 1972: MLP 8660, 5 ex., 43.6-61.4, Argentina, Santiago del Estero, Bañado de Añatuya. *Astyanax eigenmanniorum* (Cope, 1894): ANSP 21627-28, 2 paratypes, 42.5-49.4, Brazil, Rio Grande do Sul. AI 167, 5 ex., 30.3-54.6, Brazil, Rio Grande do Sul, Rio Jacuí basin, Arroio do Conde. MLP 9160, 6 ex., 36.8-80.2, Argentina, Buenos Aires, man-made ponds in Los Talas. *Astyanax cf. fasciatus* (Cuvier, 1819): MLP 8668, 4 ex., 61.0-67.7, Argentina, Santiago del Estero, Bañado de Figueroa. MLP 8798, 17 ex., 28.8-39.6, Argentina, Formosa, highway from Formosa to Clorinda. *Astyanax ita* Almirón *et al.*, 2002: MLP 9599, holotype, 64.0, Argentina, Misiones, río Iguazú basin, arroyo Tateto. *Astyanax latens* Mirande *et al.*, 2004: CI-FML 3400, holotype, male, 44.3, Argentina, Salta, río Bermejo basin, arroyo El Oculo. *Astyanax leonidas* Azpelicueta *et al.*, 2002: MLP 9580, holotype, male, 45.6, Argentina, Misiones, río Paraná basin, headwaters of arroyo Uruguay-í. *Astyanax ojia* Azpelicueta & García, 2000: MLP 9470, holotype, male, 50.5, Argentina, Misiones, río Uruguay basin, arroyo Benítez, headwaters of arroyo Yabotí-Mini. *Astyanax paris* Azpelicueta *et al.*, 2002: MLP 9584, holotype, 75.6, Argentina, Misiones, río Uruguay basin, Arroyo Fortaleza. *Astyanax pynandi* Casciotta *et al.*, 2003: MACN-ict 8543, holotype, 52.0, Argentina, Corrientes, Esteros del Iberá, Laguna Iberá, Lobo-Cuá. *Astyanax saguazu* Casciotta *et al.*, 2003: MLP 9603, holotype, 63.0, Argentina, Misiones, Uruguay basin, arroyo Once Vueltas. *Astyanax stenohalinus* Messner, 1962: AI 132, 2 ex. C&S, 42.6-55.7, Argentina, Buenos Aires, Río de la Plata basin, Punta Indio, unnamed stream. *Astyanax troya* Azpelicueta *et al.*, 2002: MACN-ict 8310, holotype, 73.8, Argentina, Misiones, río Paraná basin, arroyo Cuñapirú Chico. *Astyanax tupi* Azpelicueta *et al.*, 2003: MACN-ict 8646, holotype, 70.1, Argentina, Misiones, arroyo Cuñapirú in Balneario of Aristóbulo del Valle.

RESULTS

Astyanax pampa sp. n.

Figs 1-6, Table 1

Holotype. MACN-ict 8651. 63.7 mm SL, female, Argentina, province of Buenos Aires, arroyo Las Mostazas (38°5'S, 61°27'W), coll. J. Casciotta and A. Almirón, October 1997.

Paratypes. AI 134, 8 ex., 38.3-73.0 mm SL, collected with the holotype. MHNG 2644.22, 4 ex., 37.7-65.0 mm SL, collected with the holotype. AI 135, 2 ex. C&S, 43.8-46.0 mm SL, collected with the holotype. AI 166, 2 ex. C&S, 27.5-31 mm SL, Argentina, province of Buenos Aires, río Colorado, coll. M. Azpelicueta, A. Almirón and J. Casciotta, December 1994.

Diagnosis. *Astyanax pampa* sp. n. is distinguished from all other *Astyanax* species by the possession of 17-20 branched anal-fin rays, one maxillary tooth uni-

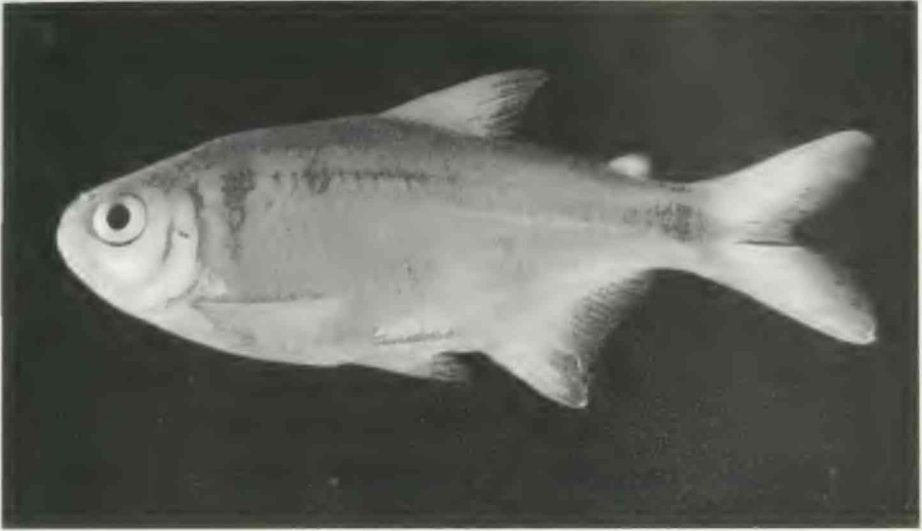


FIG. 1

Astyanax pampa sp. n., holotype, female, MACN-ict 8651, 63.7 mm SL, Argentina, province of Buenos Aires, arroyo Las Mostazas.

cuspidate to tricuspidate, short anal-fin base (24.2-30.3% of SL), and long caudal peduncle (10.5-12.7% of SL).

Description. Morphometrics of holotype and 14 paratypes are presented in Table 1. Maximum body depth located immediately anterior to dorsal-fin origin (Fig. 1). Dorsal profile of body convex from snout to dorsal-fin origin, with concavity over supraoccipital area; almost straight from dorsal-fin origin to adipose fin, then slanted ventrally to caudal peduncle, concave along caudal peduncle to base of caudal-fin rays. Ventral profile of body similar to dorsal profile, more curved at pelvic-fin origin.

Dorsal-fin origin nearer tip of snout than base of caudal-fin rays. Adipose fin located anterior to vertical through base of posteriormost anal-fin rays. Pelvic-fin origin situated anterior to vertical through dorsal fin-origin. Anal-fin origin placed posterior to vertical through last dorsal-fin ray insertion. Tip of pectoral fin surpassing pelvic-fin origin in males, even in small specimens. Tip of pelvic fin reaching anal-fin origin in males.

Head length moderate, mouth horizontal and terminal; snout smaller than eye. Lower jaw slightly longer than upper jaw. Premaxilla with slender ascending process (Fig. 2); alveolar process bearing two series of teeth. Outer row with 3 (1 ex.), 4 (12* ex.), 5 (2 ex.), tricuspidate or tetracuspidate teeth. Inner series with 5 teeth; symphyseal tooth tetracuspidate, remaining teeth tricuspidate to pentacuspidate, with central cusp larger. Maxilla long; laminar process with one small unicuspidate or tricuspidate tooth (Fig. 2). Dentary with 3 (11* ex.) or 4 (4 ex.) large teeth pentacuspidate followed by a median-sized tooth tricuspidate or pentacuspidate, and 3-4 smaller teeth unicuspidate or tricuspidate (Fig. 3).

TABLE 1. Morphometric data of the holotype and 14 paratypes of *Astyanax pampa* sp. n. Standard length expressed in mm.

	Holotype	Range	Mean	SD
Standard length	63.7	37.7-73.0		
% of standard length				
Predorsal distance	52.1	49.5-55.0	53.1	1.29
Prepelvic distance	50.5	46.1-52.8	49.6	1.72
Preanal distance	68.6	65.1-69.5	67.5	1.24
Body depth	39.6	36.9-42.2	38.7	1.37
Dorsal-fin base	13.7	13.2-15.3	14.1	0.61
Anal-fin base	25.7	24.2-30.3	27.8	1.69
Pectoral-fin length	25.0	22.3-26.0	24.5	1.16
Pelvic-fin length	19.3	18.4-21.6	20.0	1.01
Distance between pectoral and pelvic-fin origins	25.1	20.5-25.6	22.9	1.44
Distance between pelvic and anal-fin origins	21.0	18.5-22.2	20.1	1.10
Head length	27.8	26.5-30.3	28.6	1.31
Caudal peduncle depth	13.7	12.8-14.2	13.5	0.46
Caudal peduncle length	12.7	10.5-12.7	11.4	0.80
% of head length				
Snout length	25.4	21.9-26.5	24.0	1.29
Eye	32.2	30.9-42.3	37.1	3.03
Interorbital distance	32.8	31.3-34.8	33.1	1.09
Postorbital length	40.1	40.1-46.9	43.4	1.90
Maxillary length	27.1	25.0-29.9	27.6	1.55

Eye scarcely larger than interorbital. Third infraorbital not contacting latero-sensory canal of preopercle.

Dorsal fin with iii,9 rays; first dorsal-fin ray very small, easily visible in some specimens. Distal margin of dorsal fin slightly straight. Anal fin with iii-v, 17 (1* ex.), 18 (4 ex.), 19 (4 ex.), 20 (6 ex.) rays. Males with anal-fin distal margin straight and females with anteriormost rays somewhat lengthened to form a small lobe. Caudal fin with i,17,i principal rays, upper lobe scarcely shorter and narrower than lower lobe. Pectoral-fin with i,11-14 rays; 11 (1 ex.), 12 (8 ex.), 13 (5* ex.), 14 (1 ex.); margin rounded. Pelvic-fin with i,7 rays and margin slightly rounded.

Hooks on anal and pelvic fins of males; one pair on each segment, on posterior branch of ray. Hooks extended on first to eighth branched anal-fin rays, curved anteriorly. Pelvic fin with large hooks on second to seventh branched rays.

Scales cycloid. Lateral series with 35 (7* ex.), 36 (4 ex.), 37 (4 ex.) perforated scales. Scales between dorsal-fin origin and lateral line 6-7, 6 (14* ex.), 7 (1 ex.); scales between lateral line and pelvic-fin origin 5-6, 5 (10 ex.), 6 (5* ex.). Scales around caudal peduncle 16-17. Nine to 13 scales forming an irregular row between tip of supraoccipital spine and dorsal-fin origin. Nine to 12 scales situated along anal-fin base, covering base of all unbranched and first 8 to 12 branched anal-fin rays. Few scales on caudal-fin base.

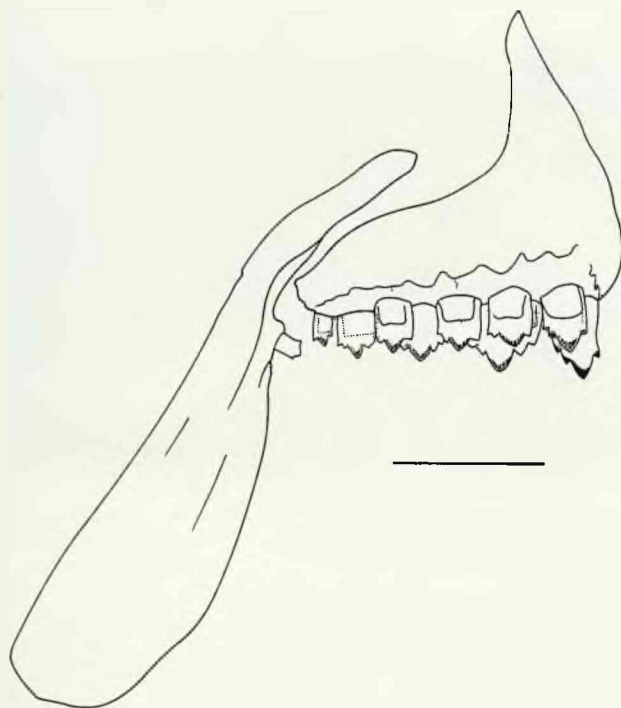


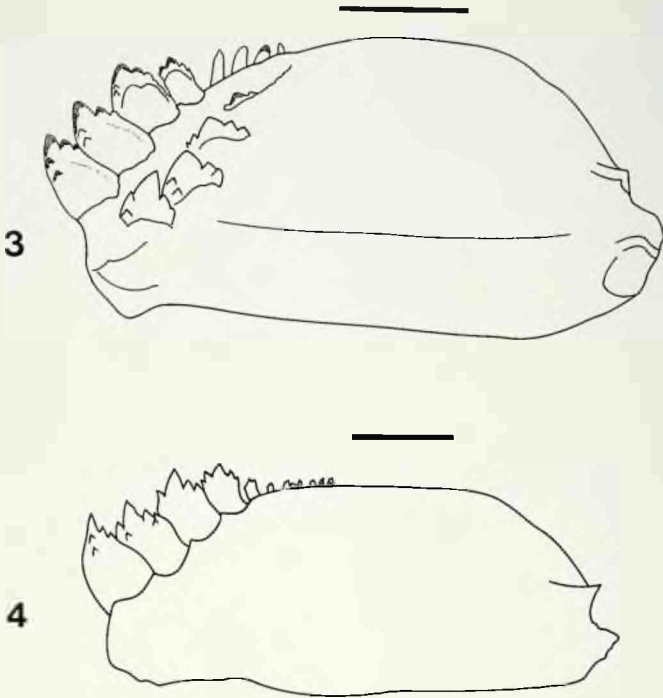
FIG. 2

Astyanax pampa sp. n., 46.0 mm SL, right upper jaw in lateral view. Scale bar = 1 mm.

In 4 cleared and stained specimens, first branchial arch with 19 to 21 gill rakers (2 on hypobranchial, 11-12 on ceratobranchial, 1 on cartilage, and 7-8 on epibranchial). Caudal fin with 9-10 dorsal and 8-10 ventral procurent rays. Thirty three to 35 vertebrae. Ten to eleven dorsal-fin pterygiophores between neural spines of vertebrae 9-10 and 18-19; 19 to 20 anal-fin pterygiophores between hemal spines of vertebrae 18-19 and 27-28. Eleven or twelve pairs of ribs. Five or six supraneurals.

Color in alcohol: Background light yellowish, dorsal region of body and head slightly darker. Lateral band extended from posterior margin of opercle to caudal peduncle, forming a caudal spot; this band continuing onto middle caudal-fin rays. One vertical triangular humeral spot with its vertex directed ventrally, located posterior to vertical through pectoral-fin insertion. A second humeral spot very faint, posterior to vertical through middle pectoral fin. Dark chromatophores concentrated on scale margins of uppermost portion of body. Small faint chromatophores present on premaxilla and around nares. Mouth surrounded by chromatophores. All fins hyalines. Anal and caudal fins with dark chromatophores concentrated on distal margins (Fig. 2).

Etymology. The specific epithet *pampa*, a noun in apposition, is a Quichua word that named one of the groups of aborigines that lived in the plain regions of Buenos Aires province.



FIGS 3-4

Right lower jaw in medial view. 3, *Astyanax pampa* sp. n., 46.0 mm SL; 4, *Astyanax eigenmanniorum*, 47.8 mm SL. Scale bar = 1 mm.

Distribution. *Astyanax pampa* sp. n. is known from arroyo Las Mostazas and the lower río Colorado basin, both environments running through the south of Buenos Aires province into the Atlantic Ocean.

Habitat. The arroyo Las Mostazas is a short stream with variable depth ranging from 0.60 to 1 m. The water was turbid because of rainfall, with slow current and muddy bottom (Fig. 5). The lower río Colorado basin presently has a net of irrigation canals, 0.30 to 1 m deep with the caudal varying between 0.20 to 3 m³/seg⁻¹; the current velocity can reach 1.5 km/h⁻¹ (Almirón *et al.*, 1997).

DISCUSSION

Astyanax pampa sp. n. comes from arroyo Las Mostazas and the lower río Colorado basin. Both environments are at the southernmost border of the zoogeographic Brazilian subregion in the cis-Andean basins and they are probably isolated from the remaining Brazilian drainages at least since middle Miocene (Casciotta *et al.*, 1999). *Astyanax pampa* (cited as *A. eigenmanniorum* by Almirón *et al.*, 1997; Casciotta *et al.*, 1999) is the only species of the genus inhabiting the streams and rivers of southern Buenos Aires province. The species *A. abramis*, *A. asuncionensis*, *A. eigenmanniorum*, *A. fasciatus*, and *A. stenohalinus* do not surpass the Río de la Plata



FIG. 5

Habitat of *Astyanax pampa* sp. n., at arroyo Las Mostazas, type locality.

basin, about 37° S. There is only one and old record of *Astyanax fasciatus* (in Eigenmann, 1921 following Günther, 1880) that surpasses the geographical limit of the species mentioned above because it reaches the río Negro basin (about 41° S) but it has never been found again in that river.

Astyanax pampa sp. n., *Cheirodon interruptus* (Jenyns, 1842), *Bryconamericus iheringii* (Boulenger, 1887), *Oligosarcus jenynsii* (Günther, 1864), and *Gymnocharacinus bergii* Steindachner, 1903, are the species of characiforms with the southernmost distribution in South America.

Astyanax pampa sp. n. is similar to *A. eigenmanniorum* in shape, color pattern, and number of perforated scales of lateral line system. *Astyanax pampa* sp. n. and *A. eigenmanniorum* differ in having lower number of branched anal-fin rays (17-20 vs. 22-24), shorter anal-fin base (24.2-30.3 vs. 30.3-32.6 % SL), longer caudal peduncle (10.5-12.7 vs. 8.5-9.4 % SL). Furthermore, *A. pampa* sp. n. is distinguished from *A. eigenmanniorum* by the lower number of smaller dentary teeth (2-5 vs. 6-8), the distal tip of maxilla not reaching vs. surpassing the anterior margin of the eye, and depth of dentary higher vs. lower (see both dentaries in Figs 3, 4).

Astyanax pampa sp. n. has similar number of branched anal-fin rays that *A. brachypterygium* Bertaco & Malabarba, 2001, *A. cremnobates* Bertaco & Malabarba, 2001, *A. intermedius* Eigenmann 1908, *A. ita* Almirón *et al.*, 2002, *A. laticeps* (Cope, 1894), *A. leonidas* Azpelicueta *et al.*, 2002, *A. paranae* Eigenmann, 1914, *A. scabripinnis* (Jenyns, 1842), and *A. obscurus* (Hensel, 1870). *Astyanax pampa* sp. n. is distinguished from *A. brachypterygium* and *A. cremnobates* by the longer anal-fin base (24.2-30.3 vs. *A. brachypterygium* 17.0-23.3 and *A. cremnobates* 18.4-24.1% of SL). *Astyanax pampa* sp. n. has 17-20 branched anal-fin rays whereas *A. intermedius* has 21-26 rays. *Astyanax pampa* sp. n. bears one unicuspidate to tricuspidate maxillary tooth and *A. ita* has one heptacuspidate maxillary tooth; in addition, *A. laticeps* has three or four maxillary teeth.

The caudal-fin hooks of males in *A. leonidas* differentiate it from *A. pampa* sp. n. The body depth of *A. paranae* (less than 33% of HL) separates *A. pampa* sp. n. with deeper body (36.9-42.2% of SL). The width of the interorbital (38.5% of HL) and the predorsal length (46.2% of SL) of the holotype of *A. scabripinnis* (following Melo, 2001) distinguish that species from *A. pampa* sp. n. (31.3-34.8% of HL and 49.5-55.0% of SL respectively). The numerous dark dots present on body, opercle, and all fins and the body depth (33.3% SL) of *A. obscurus* differentiate it from *A. pampa* sp.n. (36.9-42.2% SL).

ACKNOWLEDGEMENTS

The authors thank C. Tremouilles (Museo de La Plata, UNLP) for help with the figures, L. Malabarba (Museu de Ciências e Tecnologia, PUCRS) for gift of *A. eigenmanniorum* topotypes, S. Körber for translation of the original description of *A. obscurus*, L. Soibelson for assistance in field trips, Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) PID 3895/92, Facultad de Ciencias Naturales y Museo (UNLP), and Comisión de Investigaciones Científicas de la Provincia de Buenos Aires (CIC) for financial support.

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