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RESEARCH ARTICLE

# *Astyanax taurorum* a new species from dos Touros River, Pelotas River drainage, an upland southern Brazilian river (Characiformes: Characidae)

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*http://zoobank.org/2C4F6889-11BA-4C8A-9E1C-4C6CF36D50C6*

ABSTRACT. A new species of *Astyanax* belonging to the *Astyanax scabripinnis* complex is described from dos Touros River, tributary of the Pelotas River, Uruguay River basin. *Astyanax taurorum* **sp. nov.** is distinguished from other species of the *Astyanax scabripinnis* species complex by having two humeral spots, the first vertically elongated; teeth of inner row of premaxilla with three to five cusps; 2–3 (modes 2 or 3) maxillary teeth; 20–23 (mode 22) branched anal-fin rays; 13–15 (mode 14) gill rakers on lower branch of the first branchial arch; 20–23 (mode 21) total gill rakers in first branchial arch; 33–36 (mode 35) perforated lateral line scales. *Astyanax taurorum* **sp. nov.** is similar to *Astyanax paris*; nevertheless, it can be readily distinguished from it by having a smaller head depth (73.6-83.1% vs. 86.4–95.6%) and smaller interorbital width (24.1–28.0% vs. 30.8–32.8%). In addition, it differs from *A. paris* by the presence a posttemporal hook-shaped posterodorsal margin.

KEY WORDS. Taxonomy, Rio Grande do Sul, Uruguay River, distribution.

## INTRODUCTION

The fishes of the genus *Astyanax* Baird & Girard, 1854 inhabit Neotropical drainages from the Colorado River in Texas and New Mexico in the United States to Northern Patagonia, Argentina (Menni 2004, López et al. 2008, Ornelas-Garcia et al. 2008). As suggested by phylogenetic analyses based on morphological (Mirande 2010) and molecular evidence (Javonillo et al. 2010, Oliveira et al. 2011), *Astyanax* is not monophyletic. The genus comprises 150 valid species (Eschmeyer et al. 2016), and it is still defined as in Eigenmann (1921, 1927) (for the characters, see Marinho and Ohara 2013). The *Astyanax scabripinnis* complex is a non-monophyletic group with 29 species (Ingenito and Duboc 2014: tab. 1). It is characterized, according to Bertaco and Lucena (2006), by possessing the deepest and most robust body area close to the middle length of the pectoral fins, a robust head, snout short and abrupt, body depth smaller than 41% of SL, reduced number of branched anal-fin rays (13-23, rarely 22 or 23 rays), presence of one or two humeral spots, and a dark mid-lateral body stripe extending to the tip of the middle caudal-fin rays.

Currently, there are 19 recognized species of *Astyanax* from the Uruguay River, Laguna dos Patos system to the Tramandaí River drainage: *A. aramburui* Protogino, Miquelarena & López, 2006; *A. bagual* Bertaco & Vigo, 2015; *A. brachypterygium* Bertaco & Malabarba, 2001; *A. cremnobates* Bertaco & Malabarba, 2001; *A. douradilho* Bertaco, 2014; *A. dissensus* Lucena & Thofehrn, 2013; *A. eigenmanniorum* (Cope, 1894); *A. henseli* Melo & Buckup, 2006; *A. lacustris* (Luetken, 1875); *A. laticeps* (Cope, 1894); *A. obscurus* (Hensel, 1870); *A. ojiara* Azpelicueta & Garcia, 2000; *A. paris* Azpelicueta, Almirón & Casciotta, 2002; *A. pirabitira* Lucena & Bertcaco, 2013; *A. procerus* Lucena, Castro & Bertaco, 2013; *A. saguazu* Casciotta, Almirón & Azpelicueta, 2003; *A. stenohalinus* Messner, 1962), *Astyanax* sp. aff. *fasciatus*, sensu Melo and Buckup (2006); and *A. xiru*, Lucena, Castro & Bertaco, 2013. While studying the genus *Astyanax* from the Pelotas River drainage, a new species of the *Astyanax scabripinnis* complex was found and it is described herein.

## MATERIAL AND METHODS

The examined material belongs to the following institutions: Museu de Ciências e Tecnologia, Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre (MCP); Museu de Zoologia, Universidade de São Paulo, São Paulo (MZUSP); Muséum d'histoire naturelle, Genève (MHNG); Universidade Federal do Rio Grande do Sul, Porto Alegre (UFRGS).

Counts and measurements follow Fink and Weitzman (1974) and Bertaco and Lucena (2006) with the addition of the head depth, measured at the vertical through posterior margin of the orbit. Measurements were preferentially taken on the left side of specimens using callipers (0.1 mm approximation). Counts of vertebrae, supraneurals, teeth of dentary, unbranched dorsal, and anal-fin rays taken from cleared and stained (c&s) specimens prepared according to the protocol of Taylor and van Dyke (1985). Vertebral counts included the four vertebrae of the Weberian apparatus, and the terminal centrum counted as a single element. In the description, the frequency of each count is given in parentheses after the respective value. In the material examined, the total number of specimens in the lot follows each catalogue number, and in parentheses is the number of specimens measured and counted with their respective standard length range. HL stands for head length throughout.

The Laguna dos Patos system and the Tramandaí River drainage, follow definitions of Malabarba (1989) and Malabarba and Isaia (1992), respectively. Data for *A. paris* are from Azpelicueta et al. (2002), except when said otherwise.

## TAXONOMY

### *Astyanax taurorum* sp. nov.

http://zoobank.org/F15C02B5-AF1B-4052-A67A-741560E1468F
Fig. 1, Table 1

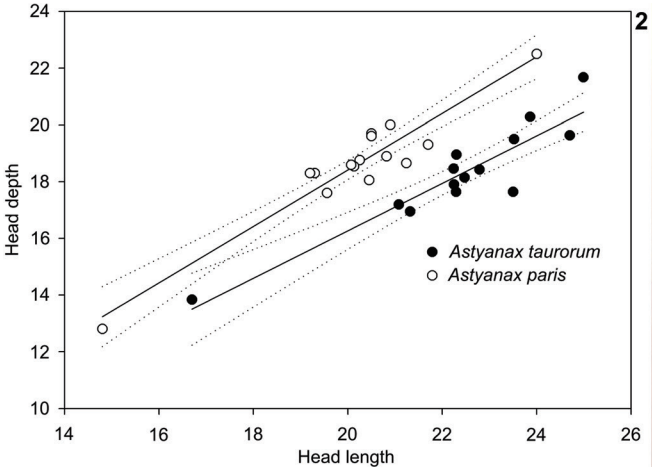
Types series. Brazil, Rio Grande do Sul, Bom Jesus. Holotype: Tributary of dos Touros River ca. 4 km northeastern of the road BR-285, Pelotas River drainage, 1,056 m a.s.l., 28°41′06″S 50°12′51″W, 12 Feb 2016, J. Pezzi da Silva and E. Pereira leg., MCP 49468, 80.7 mm SL. Paratypes: Tributary of dos Touros River, on the road Silveira-Rondinha, ca. 28°39′08″S 50°18′25″W, 14 Jan 1989, C. Lucena, P. Azevedo and E. Pereira leg., MCP 14370, 20 (17, 22.2-82.6 mm SL, 3 c&s, 29.6–62.6 mm SL). Same locality of MCP 14370, MZUSP 120697, 1, 29.9 mm SL. Dos Touros River, dowstream dam, Pelotas River drainage, road Rondinha – Silveira, 998 m a.s.l., 28°38′44″S, 50°17′06″W, 12 Feb 2016, J.P. Silva and E. Pereira leg., MCP 49467, 1, 75.7 mm SL.

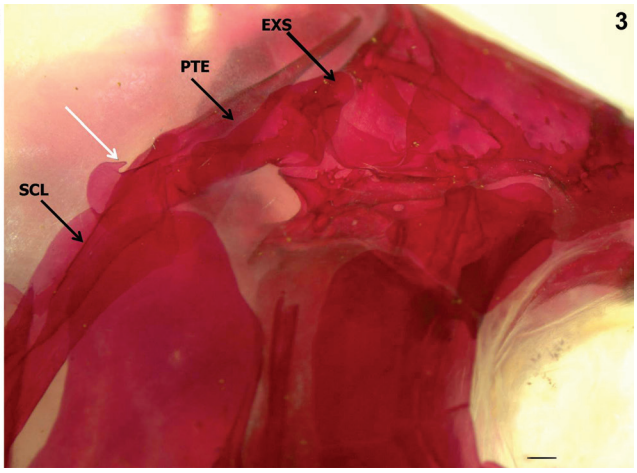
Diagnosis. *Astyanax taurorum* sp. nov. belongs to the *A. scabripinnis* species complex and is distinguished from the species of that complex by having two humeral spots (vs. one in *A. courensis* Bertaco, Carvalho & Jerep, 2010, *A intermedius* Eigenmann, 1908, *A. jenynsii* (Steindachner, 1877), *A. jordanensis* Vera Alcaraz, Pavanelli & Bertaco, 2009, *A. laticeps* (Cope, 1894), *A. microschemos* Bertaco & Lucena, 2006, *A. serratus* Garavello & Sampaio, 2010, *A. totae* Haluch & Abilhoa, 2005, *A. rivularis* and *A. varzeae* Abilhoa & Duboc, 2007); 20–23 total gill rakers in first branchial arc (vs. 16 in *A. jacobinae* Zanata and Carmelier, 2008, 16–17 in *A. gymnogenys* Eigenmann, 1911, 18 in *A. burgerai* Zanata & Carmelier, 2009, 17–18 in *A. troya* Azpelicueta, Casciotta & Almirón, 2002, 18–19 in *A. epiagos* Zanata & Carmelier, 2008, 17–19 in *A. ojiara* Azpelicueta & Garcia, 2000, *A. cremnobates* Bertaco & Malabarba, 2001 and *A. leonidas* Azpelicueta, Casciotta & Almirón, 2002); 13–15 gill rakers on the lower branch of the first branchial arch (vs. 9–10 in *A. turmalinensis* Triques, Voino & Caiafa, 2003); 33–36 perforated lateral line scales (vs. 39–41 in *A. gymnogenys* and *A. eremus* Ingenito & Duboc, 2014, 40–43 in *A. guaricana* Oliveira, Abilhoa & Pavanelli, 2013); 20–23, usually 21 or 22, branched anal-fin rays (vs. 18–19 in *A. burgerai*, 13–16 in *A. goyanencis* Miranda Ribeiro, 1944, 16–20, usually 16 or 17 in *A. serratus* Garavello & Sampaio, 2010, 14–18 in *A. microschemos*, 15–18 in *A. totae*, 12–16 in *A. brachypterychium*, 14–18 in *A. cremnobates*, and 13–17 in *A. epiagos* and *A. jordanensis*); inner row of premaxilla with teeth bearing three to five cusps (vs. heptacuspid in *A. ita* Almirón, Azpelicueta & Casciotta, 2002 and *A. pirabitira* Lucena, Bertaco & Berbigier, 2013); 2–3 maxillary teeth (vs. 1 in *A. obscurus* Hensel, 1870, *A. ojiara*, *A. troya* Azpelicueta, Casciotta & Almirón, 2002, *A. guaricana*, *A. courensis* and *A. ita* Almirón, Azpelicueta & Casciotta, 2002; 0–1 in *A. pirapuan* Tagliacollo, Britzke, Silva & Benine, 2011); length of anal-fin base 23.6–28.0% (mean = 26.3%) of SL (vs. 19.8–24.3% (mean = 21.5%) of SL in *A. eremus* and 30.2% in *A. scabripinnis* Jenyns, 1842 in the holotype); body depth 33.8–37.6% of SL (vs. 26.9–29.7% in *A. microschemos*, and 27.3–31.3% in *A. eremus*); head length 29.0–30.5% of SL (vs. 22.9–25.1% in *A. gymnogenys*, 21.9–27.1% in *A. courensis*, 26.6–28.2% in *A. turmalinensis*, and 23.9–26.6% of SL in *A. guaricana*); eye diameter 29.0–32.4% of

Table 1. Morphometric data of *Astyanax taurorum* sp. nov. The range includes the holotype; n = number of specimens; SD = standard deviation.

| | Holotype | n | Range | Mean | SD |
|---|---|---|---|---|---|
| Standard length (mm) | 80.7 | 14 | 54.7–82.6 | 69.6 | – |
| Percents of standard length | | | | | |
| Depth at dorsal-fin origin | 34.9 | 14 | 33.8–37.6 | 35.9 | 0.99 |
| Predorsal length | 52.8 | 14 | 51.6–54.9 | 53.5 | 0.99 |
| Prepectoral length | 29.0 | 14 | 27.8–30.0 | 29.1 | 0.61 |
| Preanal length | 66.4 | 14 | 65.0–68.7 | 66.4 | 1.04 |
| Prepelvic length | 50.5 | 14 | 49.1–52.2 | 51.0 | 0.88 |
| Dorsal-fin length | 25.9 | 14 | 22.3–26.6 | 24.6 | 1.24 |
| Pectoral-fin length | 22.7 | 14 | 18.6–22.7 | 20.6 | 1.22 |
| Pelvic-fin length | 15.6 | 14 | 14.4–16.8 | 15.2 | 0.62 |
| Anal-fin base length | 26.9 | 14 | 23.6–28.0 | 26.3 | 1.08 |
| Anal-fin lobe length | 17.0 | 13 | 13.2–18.3 | 16.3 | 1.56 |
| Caudal peduncle length | 14.0 | 14 | 12.7–15.7 | 14.2 | 0.88 |
| Caudal peduncle depth | 11.4 | 14 | 11.0–12.7 | 11.5 | 0.42 |
| Head length | 29.1 | 14 | 29.0–30.5 | 29.9 | 0.75 |
| Percents of head length | | | | | |
| Head depth | 83.1 | 14 | 75.1–86.7 | 81.6 | 2.98 |
| Snout length | 25.1 | 14 | 23.8–28.8 | 27.1 | 1.58 |
| Interorbital width | 26.7 | 14 | 24.7–28.0 | 26.4 | 0.99 |
| Horizontal orbit diameter | 30.3 | 14 | 29.0–32.4 | 30.7 | 1.22 |
| Upper jaw length | 38.4 | 14 | 36.7–41.5 | 39.2 | 1.60 |

Figure 1. *Astyanax taurorum* sp. nov., MCP 49468, 80,7 mm SL, holotype, tributary of dos Touros River, Rio Grande do Sul, Brazil.




Figures 2–3. (2) Head depth as function of head length for *Astyanax paris* (y = -1.517 +(0.996X), R = 0.952, and *Astyanax taurorum* sp. nov. (y = -5·158+(1.037X), R = 0.932. Dotted lines, confidence interval of 95%; (3) *Astyanax taurorum* sp. nov. Posterodorsal region of head (lateral view, right side); EXS = Extrascapular, PTE = posttemporal, SCL = supracleithrum. White arrow indicates the hook on posterodorsal region of posttemporal bone (see text). Scale bar = 0.2 mm.

HL (vs. 24.4–26.1% in *A. gymnogenys*, and 36.8–40.3% in *A. jacobinae*); snout length 23.8–28.8% of HL (vs. 16.0–20.4% in *A. paranae*); and interorbital length 24.7–28.0% of HL (vs. 35.2–37.8% in *A. gymnogenys*, 29.6–37.3% in *A. jacobinae*, 30.4–34.5% in *A. goyanensis*, 37.5–47.1% in *A. intermedius*, 29.8–37.7% in *A. varzea*, 32.7–40.9% in *A. guaricana*, 30.6–35.7% in *A. jordanensis*, 40.7% in *A. scabripinnis* holotype), and 31.7–39.2% in *A. pirapuan*). Within the *Astyanax scabripinnis* complex, *Astyanax taurorum* sp. nov. is most similar to *A. paris* Azpelicueta, Almirón & Casciotta, 2002 – species known from the type locality, Arroio Fortaleza, tributary of upper Uruguay River, Argentina – with which most counts and morphometric percentages overlap. Nevertheless, *Astyanax taurorum* sp. nov. differs from *A. paris* by the presence of hooks on branched anal-fin rays (vs. secondary sexual dimorphism absent in *A. paris*), interorbital width 24.7–28.0% HL (vs. 28.4–32.8% HL) and head depth 73.6–86.7% HL (vs. 86.4–96.6% HL) (Fig. 2) (Table 2), and by having posterodorsal margin of the posttemporal hook-shaped (Fig. 3) (see Discussion). *Astyanax taurorum* sp. nov. is distinguished from the other species in the genus by the following combination of characters: presence of two conspicuous humeral spots, the first one vertically elongated with the upper portion enlarged, but narrowing ventrally; dark midlateral horizontal stripe; conspicuous caudal spot extending posteriorly to the middle of caudal-fin rays; 20–23 branched anal-fin rays; 20–23 total gill rakers in first branchial arc; 33–36 perforated lateral line scales; 5–7 scale rows between lateral line

Table 2. Morphometric data of *Astyanax paris*.* = Values from Azpelicueta et al. (2002). **The range includes the holotype. Museo de La Plata (MLP), Muséum d'histoire naturelle (MNHG), Museu de Ciências e Tecnologia PUCRS (MCP). n = number of specimens, m = mean.

| Measurements | Holotype | Paratypes | | | | | | Topotypes | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | MLP 9584 | MLP 9586 | | | MNHG 2623.65 | | | MCP 34461 | | |
| | | n | Range** | m | n | Range** | m | n | Range | m |
| Standard length (mm) | 75.6* | 7 | 51.3–86.1* | 72.4 | 3 | 70.3–73.1 | 71.6 | 4 | 66.9–73.5 | 70.4 |
| Percentages of head lenght | | | | | | | | | | |
| Head depth | 95.6 | 7 | 86.4–96.6 | 93.1 | 3 | 90.7–92.6 | 91.8 | 4 | 88.2–92.6 | 89.6 |
| Interorbital width | 32.8* | 15 | 28.4–32.8* | 30.8* | | | | 4 | 30.8–32.1 | 31.2 |

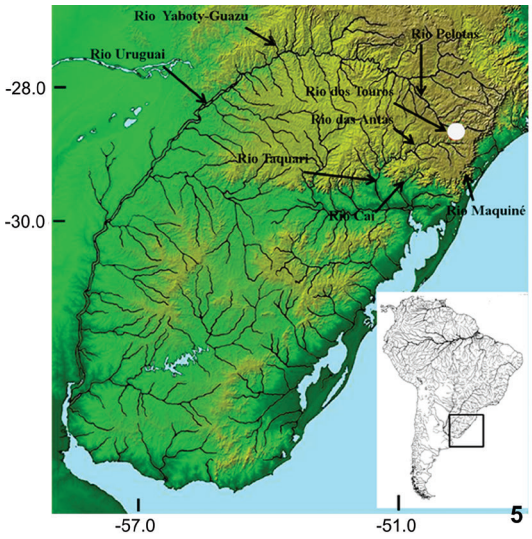
and pelvic-fin origin; outer row of premaxilla with tricuspid teeth; teeth in inner row of premaxilla with three to five cusps; 2–3 tricuspid teeth in the maxilla, head length 29.0–30.5% of SL; body depth 33.8–37.6% of SL; interorbital width 24.7–28.0% of HL; eye diameter 29.0–32.4% of HL, and length of anal-fin base 23.6–28.0% of SL.

Description. Morphometric data summarized in Table 1. Body compressed and moderately elongate, greatest body depth at vertical through near middle length of pectoral fin. Dorsal profile of head convex from tip of snout to vertical through nostrils, straight from that point to vertical through posterior border of orbital, slanted until tip of supraoccipital spine. Snout relatively slender. Dorsal profile of body convex from tip of supraoccipital bone to dorsal-fin origin; straight from that point to end of caudal peduncle. Ventral body profile convex from mandibular symphysis to pelvic-fin origin, nearly straight from that point to anal-fin origin, and slanted along anal-fin base. Dorsal and ventral profiles of caudal peduncle nearly straight.

Mouth terminal or slightly subterminal, slit below horizontal passing through middle of eye. Posterior tip of maxilla extending between vertical through anterior margin of orbit and the vertical through middle of orbit. Two tooth rows in premaxilla; outer row with 3*(2), 4(13), or 5(5) tricuspid teeth; inner row with five teeth, usually bearing four cusps on first tooth, five cusps on second to fourth tooth, three cusps on fifth tooth. Maxilla with 2(8) or 3(8) tricuspid teeth. Dentary with four large pentacuspid teeth, followed by seven small tricuspid teeth and one conical tooth (two c&s). Median cusp in all cuspidate teeth longer than remaining cusps; cusp tips slightly curved inwardly on dentary (Fig. 4).

Dorsal-fin rays ii, 9 (23); first unbranched ray short, one-half length of second ray. Distal margin of dorsal fin slightly convex. Dorsal-fin origin slightly behind middle of SL. Adipose-fin origin at vertical through base of fifth or sixth last anal-fin rays. Anal-fin rays iii-iv 20(2), 21(6), 22(9), or 23(4). Anal-fin origin posterior to vertical through base of last dorsal-fin ray. Pectoral-fin rays i, 11(1), 12(7), 13(11), or 14(1). Tip of pectoral-fin tip ending one scale before or, occasionally, reaching pelvic-fin insertion. Pelvic-fin rays i, 7(23), tip of fin not reaching anal-fin origin. Axillary scale present.

Figure 4. Maxilla, premaxilla and dentary of *Astyanax taurorum* sp. nov., MCP 14370, paratype, 62.6 mm SL, lateral view of right side. Scale bar = 0.5 mm.





Figures 5–6. (5) Distribution of *Astyanax taurorum* sp. nov., white circle = type-locality. The symbol represents more than one locality; (6) stream tributary of dos Touros River, type locality of *Astyanax taurorum* sp. nov.

Caudal-fin forked, lobes similar in size.

Lateral line complete with 33(2), 34(2), 35(8), or 36(5) perforated scales. Scale rows between dorsal-fin origin and lateral line 6(5) or 7(12); scale rows between lateral line and pelvic-fin origin 5(5), 6(13), or 7(1); scale rows between lateral line and anal-fin origin 5(1), 6(15), or 7(1); scale rows around caudal peduncle 14 (8), 15(5), or 16(2).

Precaudal vertebrae 13 (3); caudal vertebrae 18(2) or 19(1); total vertebrae 31(2) or 32(2). Supraneurals 5(3). Gill rakers on upper branch 6(1), 7(11) or 8(11) and on lower branch 13(7), 14(14), or 15(2) in first branchial arch; total gill rakers in first branchial arch 20(3), 21(13), 22(6), or 23(1).

Color in alcohol. Dorsal and dorsolateral portions of head and body dark brown. Scales on lateral of body with dark brown chromatophores sometimes concentrated on anterior border. Two conspicuous humeral spots. Anterior humeral spot vertically elongate with upper portion wider, located on second to third or fourth scale vertical series, extending three horizontal scale series above lateral line; lower portion narrow, extending on the lateral line and one or two horizontal scale series below it. Posterior humeral spot large, absent in small specimens (22.8–29.4 mm SL), reaching but not surpassing lateral line ventrally, extending on two or three horizontal scale series and three vertical scale series. Humeral spots separated by a clear area occupying two or three vertical scale series. Dark midlateral strip inconspicuous anteriorly, but conspicuous posteriorly from about vertical through middle of dorsal-fin base to caudal peduncle; absent in small specimens (22.8–29.4 mm SL). Caudal peduncle spot triangular, extending over median caudal-fin rays. Scattered dark chromatophores on dorsal, anal, and caudal fins. Pectoral and pelvic-fins hyaline or covered by sparse dark chromatophores.

Color in life. Overall body olive green, silvery below lateral line. Humeral spots and caudal peduncle spot conspicuous. Dorsal, anal, pelvic and caudal fins reddish. Pectoral-fin yellowish. Dark brown blotches located on anterior portion of scales.

Sexual dimorphism. Hooks on anal-fin rays of four specimens with 75.4 to 80.6 mm SL (MCP 14370). Hooks short, conical or slightly retrorse found on the first or third to eighth branched rays, along the posterolateral margin of the posterior branch. One pair on each segment. One specimen with a single hook on the third branched anal-fin ray and another specimen with a very small hook on the first branched ray and small protuberances on other rays.

Distribution and habitat. *Astyanax taurorum* sp. nov. is known from the dos Touros River drainage, tributary of Pelotas River, which in turn is a tributary of Uruguay River (Fig. 5). The Pelotas River drainage is located in the region named "Campos de Altitude do Planalto das Araucárias (= Araucaria Plateau in Bertaco et al. 2016)" or "Campos de Cima da Serra", which has a high level of endemism of fishes (Malabarba et al. 2009, Bertaco et al. 2016: 430) and other groups of animals (for example: sponges, Ribeiro et. al. 2009; crustaceans, Bond-Buckup et al. 2009). The dos Touros River tributary, type locality of *Astyanax taurorum* sp. nov., has a low to medium flow, transparent waters with stones and rocks on the bottom and moderate emergent marginal vegetation (Fig. 6). Four characid species were caught along with *Astyanax taurorum* sp. nov.: *Bryconamericus patriciae* Silva, 2004, *B. iheringi* Boulenger, 1887, *Cheirodon interruptus* Jenyns, 1842, and *Oligosarcus brevioris* Menezes, 1987.

Etymology. The specific name *taurorum*, is derived from the Latin masculine noun *taurus* (second declension, meaning bull) inflected in the plural and genitive case. Therefore *taurorum*

means "of the bulls" in reference to "rio dos Touros" (= Portuguese, which means "river of the bulls") the type locality.

Conservation status. *Astyanax taurorum* sp. nov. is likely rare and occurs in low densities. All type specimens were collected in the dos Touros River drainage, during two field trips in 1989 and 2016. Over the last four decades (from 1980 to 2016), six field trips to the dos Touros River system have been conducted by the MCP team, two of which with the sole purpose of collecting specimens of *A. taurorum*. Unfortunately, no specimens were collected in 2015, and only two were found in 2016. The Museu de Ciências Naturais (FZB, Porto Alegre) and Universidade Federal do Rio Grande do Sul also conducted field surveys in that region, but no specimens of *A. taurorum* sp. nov. were obtained. Despite the reduced number of specimens collected and the apparently restricted geographical distribution of the new species, we did not assign *Astyanax taurorum* sp. nov. to any threat category because we the lack biology data for it. Instead, we considered *A. taurorum* sp. nov. as data deficient (DD) (IUCN 2014).

Additional material. Types: Argentina: *Astyanax paris*, MNHG 2623.065 paratypes, 3 (70.3–73.1 mm SL), arroio Fortaleza. MCP 34461 topotypes, 5 (4, 66.9–73.5 mm SL, 1 c&s 68.2 mm SL). *Astyanax troya*, MCP 28438 paratypes. All c&s specimens: Types: Brazil: *Astyanax cremnobates*, paratypes MCP 11650 (2); *Astyanax dissensus*, paratypes MCP 17361 and MCP 47518 (1); *Astyanax douradilho*, paratypes MCP 25700 (3);*Astyanax elachylepis*, paratype MCP 16054 (1); *Astyanax eremus*, paratypes MCP 46942 (1); *Astyanax jordanensis*, paratype MCP 41915(1); *Astyanax microschemos*, paratype MCP 34366 (1); MCP 19783 (5); *Astyanax pelecus*, paratype MCP 17919 (1); *Astyanax pirabitira*, paratypes MCP 14390 (6); *Astyanax utiariti*, paratypes MCP 40041 (3); *Astyanax procerus*, paratype MCP 25513 (1); *Astyanax xiru*, paratype MCP 21730 (1). Non-types: *Astyanax lacustris*, MCP 20339 (1); *Astyanax eigenmanniorum* MCP 25122 (1); *Astyanax henseli* MCP 48121 (3); *Astyanax* aff *fasciatus* MCP 21627 (1); *Astyanax laticeps*, MCP 25690 (1), MCP 17614 (1), MCP 27619 (2); *Astyanax obscurus* MCP 26125 (2)); *Astyanax saguazu* MCP 16808 (1), and MCP 4000 (3); *Astyanax* sp. UFRGS 14052 (6), UFRGS 14051 (6) and UFRGS 14055 (6); *Hyphessobrycon anisitsi* MCP 21633 (2); *Markiana nigripinnis* MCP 17086 (1).

## DISCUSSION

The *Astyanax scabripinnis* species complex is not a monophyletic group; this clustering, however artificial, facilitates discussions and comparisons on the diversity of the genus according to Bertaco and Lucena (2006). These authors presented a series of morphological characters that delimit this complex, which are mostly found in *A. taurorum* sp. nov. except for the abrupt snout (slender in *A. taurorum* sp. nov.).

Mirande (2010) presented the most encompassing, morphology-based phylogeny of Characidae. *Astyanax taurorum* sp. nov. has all synapomorphies that define node 201 in that analysis (sister group of Tetragonopterinae clade): dorsal expansion in the rhinosphenoid absent (character 48, state 0), and tubule with anterior branch parallel to anterior margin of maxilla, reaching a third of its length (character 98, state 1). Node 201 has two branches, the *Hyphessobrycon luetkenii* clade and node 200. The new species shares all synapomorphies of node 200: fourth infraorbital approximately square, or more developed longitudinally than dorsoventrally (67, state 0); coronomeckelian situated dorsal to Meckelian cartilage (character 110, state 1); 24 or less branched anal-fin rays (288, state 0). Node 200 has two branches named *Astyanax paris* and node 199 clades. For now, we note that *A. taurorum* shares, with the former clade, "the abrupt decrease in size of dentary teeth (character 148, state 1)" and not the synapomorphy of clade 199 "ventral margin of horizontal process of anguloarticular perpendicular to laterosensory canal of dentary from medial view". We have examined some species of the clade at node 199, mostly included in the *Astyanax* clade (node 267) (e.g., *Astyanax lacustris* Lutken, 1875 and *A. eigenmanniorum* Cope, 1894, *Markiana nigripinnis* Perugia, 1891, and *Hyphessobrycon anisitsi* Eigenmann, 1907), and other representatives of *Astyanax* not analyzed by Mirande (see Additional material). None of them have a posterodorsal margin with posttemporal hook-shape, as it is the case with *A. taurorum*, though some species have an enlarged posterodorsal margin, which is not hook-shaped (see Mirande 2010: fig. 48).

*Astyanax* is represented in the Laguna dos Patos, Tramandaí River, and Uruguay River drainages, by 20 species, eight of which have restricted distribution within these drainages (Fig. 5): *A. bagual* Bertaco & Vigo, 2015 (middle Taquari-Antas River), *A. brachypterigium* (upper Pelotas River and upper das Antas River), *A. cremnobates* (upper das Antas River, upper Caí River and upper Maquiné River), *A. douradilho* (middle and upper portions of Maquiné River), *A. obscurus* (upper das Antas and upper Caí Rivers), *A. ojiara* (upper Yaboty-Guazu River), *A. paris* (upper Yaboty-Guazu River), and *A. taurorum* sp. nov. (upper dos Touros River). With the exception of *A. bagual* and *A. douradilho*, these species are included in the *A. scabripinnis* complex (Ingenito and Duboc 2014) and are mainly found in headwater streams. *Astyanax laticeps*, in contrast, is the only species of the *Astyanax scabripinnis* complex that is widely distributed, occurring in the three main drainages of Rio Grande do Sul, besides the southern and southeastern coastal rivers of Brazil (Lucena and Bertaco 2010). Recent descriptions of new species in different genera (e.g., characiforms *Bryconamericus patriciae*, *Hollandichthys taramandahy* Bertaco & Malabarba, 2013, siluriforms *Trichomycterus tropeiro* Ferrer & Malabarba, 2011, or perciforms *Australoheros taura* Ottoni & Cheffe, 2009 and *Crenicichla lucenai* Mattos, Schindler, Ottoni & Cheffe, 2014), with restricted distributions on the headwaters mentioned above, as well as the occurrence of 43 undescribed fish species in these drainages (Bertaco et al. 2016: 428), demonstrate the importance of conservation of this type of environment, as remarked by other authors (e.g., Ferrer and Malabarba 2011, Ferrer et al. 2015).

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