Zootaxa 3915 (1): 581–590
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

http://dx.doi.org/10.11646/zootaxa.3915.4.8
http://zoobank.org/urn:lsid:zoobank.org:pub:6599CBBB-5E35-42CE-9604-A372962C52F4

Oligosarcus amome (Ostariophysi: Characidae), a new species from the río Uruguay basin, Misiones, Argentina

ADRIANA ALMIRÓN[1,4], JORGE CASCIOTTA[1,3], LUBOMÍR PIÁLEK[2],
KLÁRA DOUBNEROVÁ[2] & OLDŘICH ŘÍČAN[2]

[1]*UNLP, Facultad de Ciencias Naturales y Museo, División Zoología Vertebrados, Paseo del Bosque, 1900 La Plata, Bs. As., Argentina. E-mail: aalmiron@fcnym.unlp.edu.ar, jrcas@fcnym.unlp.edu.ar*
[2]*University of South Bohemia, Faculty of Science, Department of Zoology, Branišovská 31, 370 05, České Budějovice, Czech Republic. E-mail: lpialek@yahoo.com, klara.doubnerova@gmail.com, oldrichrican@yahoo.com*
[3] *CIC, Comisión de Investigaciones Científicas de la Provincia de Buenos Aires, 1900 La Plata, Argentina*
[4]*Corresponding author*

Abstract

Oligosarcus amome is described from tributaries of the arroyo Yabotí-Guazú, río Uruguay basin, Misiones Province, Argentina. This new species can be distinguished from all its congeners by the following combination of characters: presence of two conspicuous series of teeth on premaxilla bearing pentacuspidate teeth in the outer series. *Oligosarcus amome* is the sister taxon of all remaining analyzed species of the genus excepting *O. itau*.

Key words: Neotropical, Freshwater fish, Characiformes, systematics, taxonomy

Resumen

Oligosarcus amome es descripta de tributarios del arroyo Yabotí-Guazú, cuenca del río Uruguay, provincia de Misiones, Argentina. Esta nueva especie puede ser distinguida de todos sus congéneres por la siguiente combinación de caracteres: presencia de dos conspicuas series de dientes en el premaxilar con dientes pentacuspidados en la serie externa. *Oligosarcus amome* es la especie hermana de todas las restantes especies analizadas del género exceptuando *O. itau*.

Introduction

The genus *Oligosarcus* Günther, 1864 includes 20 valid species distributed in southeastern South American rivers from the eastern coastal rivers of Brazil to the south in the Buenos Aires Province in Argentina (Mirande *et al.* 2011). A systematic revision of *Oligosarcus* was performed by Menezes (1969), who included *Oligosarcus* and *Acestrorhynchus* in the tribe Acestrorhynchini. However, according to Buckup (1998), Javonillo *et al.* (2010), Mirande (2010), and Oliveira *et al.* (2012) the genus *Oligosarcus* is not closely related to the genus *Acestrorhynchus* but rather to *Astyanax*.

Most species of *Oligosarcus* bear only one series of conical or slightly tricuspidate premaxillary teeth. Only two species in the genus, *O. itau* Mirande, Aguilera & Azpelicueta, 2011 and *O. platensis* (Messner, 1962) bear two clear series of multicuspidate premaxillary teeth. However, Mirande *et al.* (2011) considered that *O. menezesi* and *O. pintoi* have two premaxillary series of teeth condensed into a single row.

The province of Misiones, in spite of its small size, is one of the regions with the highest biodiversity in Argentina (Bertonatti & Corcuera 2000). The ríos Uruguay, Paraná, and Iguazú form the main boundaries of this province and with their different sets of species offer an ideal setting for the study of faunal evolution in the larger context of the La Plata basin (Říčan *et al.*, 2011; Piálek *et al.* 2012). Recent collecting trips allowed us to find several new species endemic to this region (Casciotta *et al.* 2010, 2012, 2013; Piálek *et al.* 2010; Říčan *et al.* 2011).

The aim of this paper is to describe a new endemic species of *Oligosarcus* with two series of multicuspidate premaxillary teeth from the río Uruguay basin in Misiones Province, Argentina. The presence of ectopterygoid teeth placed a priori this species in this genus.

Accepted by M.R. de Carvalho: 8 Dec. 2014; published: 5 Feb. 2015

Material and methods

Measurements and counts were taken as described by Fink &Weitzman (1974). Measurements were taken as straight line distances with digital caliper to 0.1 mm. Specimens were cleared and counterstained (C&S) following Taylor & Van Dyke (1985). Vertebral counts were taken from C&S specimens and include the four vertebrae of the Weberian apparatus and the last half centrum.

In the description, the number of specimens is indicated in parentheses and values of the holotype are indicated by an asterisk. Body length is expressed as standard length (SL). Institutional abbreviations are as listed in Ferraris (2007).

The phylogenetic placement of the new species was studied on the base of morphological characters in the context of the character matrix of Mirande (2010) and Mirande *et al.* (2011). The morphological matrix includes 366 characters for 166 species (see Appendix 1). The phylogenetic analysis was performed using PAUP* 4b.10 (Swofford, 2003) with maximum parsimony (MP). The phylogenetic analysis was performed with 500 random sequence additions, keeping up to 10 trees per replicate and followed by a heuristic search on the saved trees to find all the shortest trees.

Results

Taxonomy

***Oligosarcus amome*, new species**
(Fig. 1–7, Table 1)

Holotype. MLP 10679, 125.0 mm; Argentina: Misiones Province: río Uruguay basin, arroyo Oveja Negra, tributary of Arroyo Yabotí-Guazú, 27º08'15.5" S-53º55'28.8" W, col: Casciotta *et al.*, April 2010 (Fig. 1).

FIGURE 1. *Oligosarcus amome*, female, holotype, MLP 10679, 125,0 mm; Misiones Province, río Uruguay basin, arroyo Oveja Negra, tributary of arroyo Yabotí-Guazú.

Paratypes. MLP 10680, 6 ex. (1 ex. C&S), 112.3–121.4 mm; same data as holotype. MACN-ict 10374, 1 ex., 125.1 mm; Argentina: Misiones Province: río Uruguay basin: arroyo Fortaleza, tributary of the arroyo Yabotí-Guazú, 26º45'57.1" S–54º10'51.7" W, col: Casciotta *et al.*, November 2011.

Diagnosis: *Oligosarcus amome* differs from the remaining species of the genus except *O. platensis* and *O. itau* by the presence of two conspicuous series of teeth on the premaxilla.

Oligosarcus amome differs from *O. platensis* in having premaxillary teeth in the outer series pentacuspidate vs. tricuspidate; premaxillary inner series with five teeth penta to heptacuspidate vs. bi to pentacuspidate; ten to eleven maxillary teeth (uni to pentacuspidate) vs. 17 teeth (uni to tricuspidate); dentary teeth uni to heptacuspidate vs. uni to pentacuspidate; branched anal-fin rays 20 to 23 vs. 27; lateral line scales 39 to 41 vs. 44; and predorsal scales 14 to 16 vs. 24.

Oligosarcus amome differs from *O. itau* in having premaxillary teeth in the outer series pentacuspidate vs. tricuspidate; 39–41 vs. 41–42 lateral line scales, and 14–16 vs. 16–17 predorsal scales. The following morphometric characters also distinguish *O. amome* from *O. itau*: predorsal distance (51.4–53.5 vs. 54.7–57.0% SL); body depth (32.0–34.0 vs. 36.3–37.5% SL); pectoral-fin length (18.6–20.7 vs. 22.7–23.9% SL); pelvic-fin length (14.5–16.2 vs. 18.2–20.0% SL); pectoral to pelvic-fin distance (24.1–25.7 vs. 19.7–20.1% SL); head length (26.7–27.8 vs. 28.7–30.8% SL); peduncle depth (10.5–11.4 vs. 12.6–13.2% SL); peduncle length (10.5–12.0 vs. 14.9–16.0% SL); eye diameter (26.9–29.3vs. 31.6–33.2% HL); and snout length (27.5–29.9 vs. 23.9–24.6% HL).

Besides the presence of two series of teeth on the premaxilla, *Oligosarcus amome* is distinguished from *O. brevioris*, *O. jacuiensis*, *O. jenynsii*, and *O. oligolepis*, inhabiting the río Uruguay basin, by several characters. *Oligosarcus amome* is distinguished from *O. brevioris*, *O. jacuiensis*, and *O. jenynsii* by the number of circumpeduncular scales (17–18 vs. 21–23, 21–25, and 12–16 respectively), lateral line scales (39–41 vs. 47–56, 55–65, and 54–63 respectively), and ectopterygoid teeth (3 vs. 7–18, 10–20, and 12–16, respectively). *Oligosarcus amome* is clearly differentiated from *O. oligolepis* by the number of circumpeduncular scales (17–18 vs. 25–27), lateral line scales (39–41 vs. 72–79), and ectopterygoid teeth (3 vs. 14–16). Finally, *Oligosarcus amome* is different from *O. pintoi* in having 20–23 vs. 24–28 branched anal fin-rays; 10–11 vs. 15–23 maxillary teeth; 3 vs. 5–14 ectopterygoid teeth; and penta to heptacuspidate vs. all tricuspidate premaxillary teeth.

Description. Morphometric data of the holotype and seven paratypes are presented in Table 1. Body elongate with maximum depth at dorsal-fin origin (32.0–34.0% SL). Dorsal profile slightly convex from tip of snout to nares, straight to tip of supraoccipital process; convex to dorsal-fin origin; almost straight from this point to caudal peduncle; slightly concave along caudal peduncle to base of caudal-fin rays (Fig. 1). Ventral profile of body gently convex from dentary tip to anal-fin origin; straight along base of anal fin, and slightly concave under caudal peduncle.

TABLE 1. *Oligosarcus amome* **n. sp.** Morphometrics of holotype and seven paratypes. Standard lengths are expressed in mm. SD: standard deviation.

	Holotype	range	X	SD
Standard length	125.0	112.3–125.1		
% of standard length				
Predorsal distance	51.8	51.4–53.5	52.3	0.76
Preanal distance	65.7	65.7–67.5	66.4	0.63
Preventral distance	48.2	48.2–50.4	49.2	0.98
Body depth	34.0	32.0–34.0	33.3	0.80
Dorsal-fin base	13.3	12.6–13.7	13.2	0.34
Anal-fin base	25.4	24.0–28.9	26.1	1.42
Pectoral-fin length	18.6	18.6–20.7	19.5	0.64
Pelvic-fin length	16.1	14.5–16.2	15.7	0.58
Pectoral to pelvic-fin distance	24.9	24.1–25.7	24.8	0.56
Pelvic to anal-fin distance	19.8	18.0–20.7	19.2	0.89
Head length	26.7	26.7–27.8	27.0	0.41
Peduncle depth	10.8	10.5–11.4	10.9	0.35
Peduncle length	11.4	10.5–12.0	11.3	0.51
% head length				
Eye diameter	26.9	26.9–29.3	27.8	0.99
Interorbital width	30.5	29.4–31.3	30.5	0.74
Postorbital distance	47.6	47.3–50.0	48.6	0.98
Snout length	29.9	27.5–29.9	28.9	0.96
Maxillary length	27.2	26.2–28.4	27.5	0.86
Upper-jaw length	43.7	43.1–45.2	44.4	0.89

Dorsal-fin origin just posterior to middle standard length (predorsal distance 51.4–53.5% SL). Pelvic-fin origin placed anterior to vertical through dorsal-fin origin. Anal-fin origin placed behind at vertical through base of posteriormost dorsal-fin rays. Tip of pectoral fin not reaching pelvic-fin origin; tip of pelvic fin not reaching anal-fin origin.

Mouth terminal, tip of maxilla reaching posteriorly to middle of orbit. Premaxilla bears two series of teeth. Outer row with 4 (7*) 5 (1) pentacuspidate teeth, with large central cusp and very small lateral ones. Inner row with 5 (7*), 6 (1) narrow teeth with a central cusp well developed, and lateral cusps smaller; symphyseal tooth slender and long, with 5–6 cusps; second, third and fourth tooth with 7 cusps; and fifth tooth with 5–6 cusps (Fig. 2). Maxilla rather long, with 10–11 conical, tri or pentacuspidate teeth (Fig. 2). Dentary with 4–5 heptacuspidate teeth followed by 1 pentacuspidate and 8 to 10 smaller tricuspidate or conical teeth (Fig. 3). Lateral cusps of dentary teeth much smaller than medial ones. Ectopterygoid with 3 teeth.

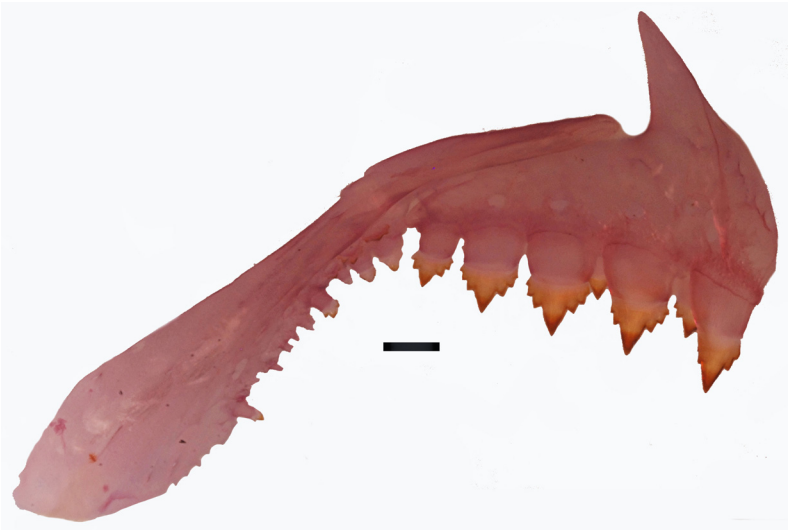

FIGURE 2. *Oligosarcus amome*, MLP10680, 119.0 mm SL, medial view of left upper jaw. Scale bar: 1 mm.

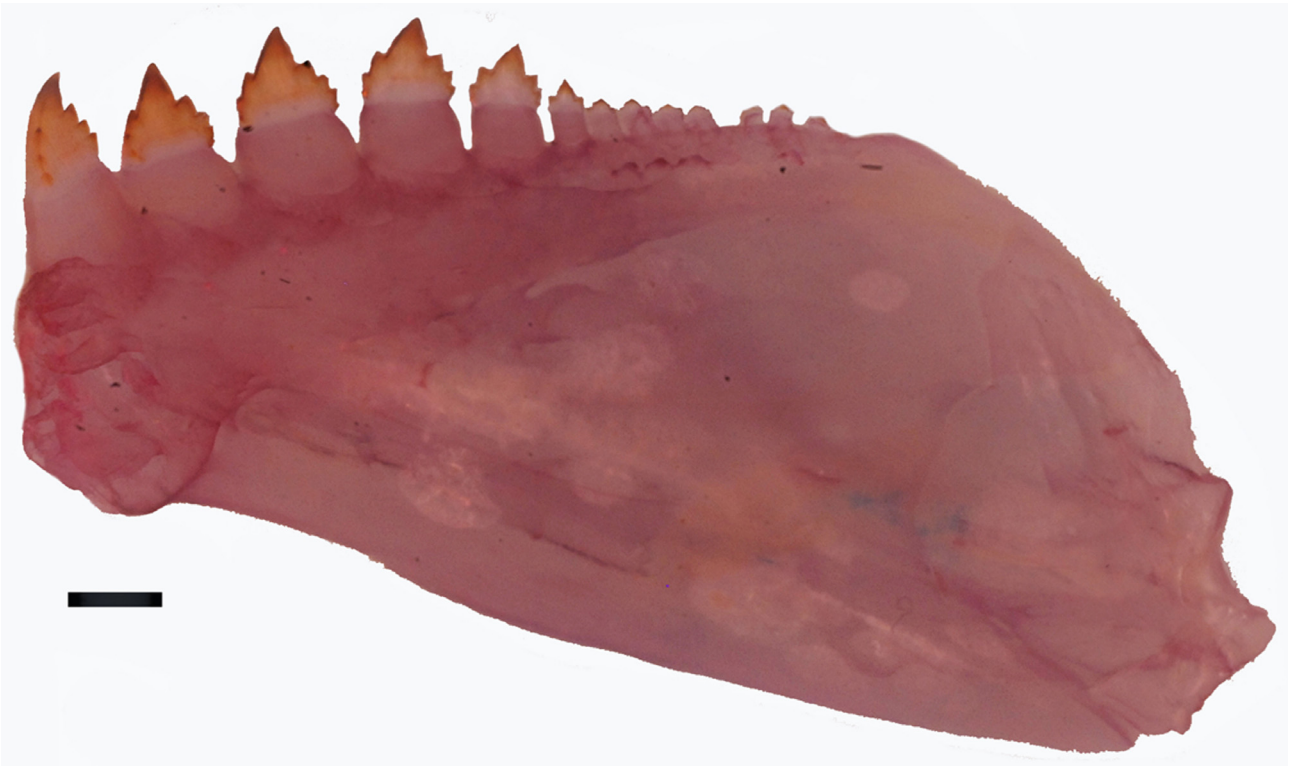

FIGURE 3. *Oligosarcus amome*, MLP 10680, 119.0 mm SL, medial view of right lower jaw. Scale bar: 1 mm.

FIGURE 4. *Oligosarcus amome*, live specimen, MACN-ict 10374, paratype, female, 125.1 mm SL, Argentina, Misiones Province, río Uruguay basin, arroyo Fortaleza, tributary of the arroyo Yabotí-Guazú.

Eye as long as snout. Third infraorbital not contacting laterosensory canal of preopercle.

Dorsal-fin rays iii,9 (first ray visible only in C&S specimen); distal margin of dorsal fin straight, with last unbranched and first branched dorsal-fin rays longest. Anal-fin rays iii-v,20(2), 21(1*), 22(4), or 23(1), C&S specimen with five unbranched rays. Caudal fin with principal rays i,17,i. Pectoral-fin rays i,12(2*),13(6). Pelvic-fin rays ii,7(5*) or 8(2), first ray visible only in C&S specimen. Membranous flaps on dorsal and anal fin in both sexes, pelvic fin with flaps only in males.

Scales cycloid. Lateral line complete with 39(1), 40(5*) or 41(2) perforated scales. Scales between dorsal-fin origin and lateral line 8(7*) or 9(1); scales between lateral line and pelvic-fin origin 5(3*), 5½ (4), or 6(1). Scales around caudal peduncle 17(5*) or 18(3). Predorsal scales 14*–16. One row of 9–15 scales forming a sheath covering base of anterior (9 to 12) anal-fin rays.

First branchial arch with 20 gill rakers: 7 on epibranchial, 1 on cartilage, 10 on ceratobranchial, and 2 on hypobranchial; posterior edge of first epibranchial with a second row of 4 gill rakers. Thirty-five vertebrae. Seven supraneurals. Caudal fin with 12 dorsal and 10 ventral procurrent rays (1 ex., C&S).

Sexual dimorphism. Males with hooks on last unbranched and first 9 branched anal-fin rays. Hooks on posterior branch of rays, one pair per segment. Males bearing hooks on second to fifth pelvic-fin rays, one pair per segment.

Colour in life. Body silvery yellow, dark grey dorsally. Lateral band faint. Two vertically elongated humeral spots, anterior one well defined and posterior one faint. Black caudal spot horizontally elongated, extends backwards on median caudal-fin rays to the end of caudal fin. Dorsum of head, snout, maxilla, and dentary, dark grey. Cheek and opercle silvery yellow with small scattered chromatophores. Dorsal and ventral region of eye, red. Anal fin deep yellow, red on anterior lobes from first unbranched to fourth branched rays. External lobes of caudal fin red, medial rays orange, central rays black. Dorsal, pectoral, and pelvic fins, yellow with scattered red and dark chromatophores. Adipose-fin hyaline with scattered dark grey chromatophores (Fig. 4).

Colour in alcohol. Body yellowish, darker dorsally. Dorsum of head, premaxilla and tip of dentary dark. Scattered chromatophores on maxilla, cheek, and opercle. Scales from upper half of flank darker. Scales on flanks with chromatophores concentrated on posterior margin, giving a reticulated aspect. First humeral spot vertically elongated, situated just behind the opercular membrane. A second spot, very faint, vertically elongated, placed three scales behind the first one. A dark wide lateral band on flank extended from anterior humeral spot to end of

middle caudal-fin rays. Dark and subcircular caudal spot placed at the end of caudal peduncle. Pectoral and pelvic fins hyaline; dark scattered chromatophores on pectoral-fin rays. Dorsal fin hyaline with dark scattered chromatophores on rays and flaps. Adipose fin hyaline with dark scattered chromatophores on its surface. Anal fin hyaline with chromatophores on distal edge of rays and membranes forming a narrow band. Caudal fin hyaline with dark middle caudal-fin rays; scattered chromatophores on distal edge of rays and membranes.

Distribution. *Oligosarcus amome* is only known from the arroyos Oveja Negra (Fig. 5) and Fortaleza, both tributaries of the arroyo Yabotí-Guazú, río Uruguay basin in Yabotí Biosphere Reserve in Misiones, Argentina (Fig. 6).

FIGURE 5. *Oligosarcus amome*, type locality, Argentina, Misiones Province, arroyo Oveja Negra, tributary of arroyo Yabotí-Guazú, 27º08'15.5"S-53º55'28.8"W.

Etymology. The species epithet *amome* is a Guaraní word that means once in a while, rare, in references to the low occurrence of the specimens of this species in the localities where they were captured.

Systematics. The phylogenetic analysis of the 166 taxa and 366 character matrix resulted in a large number of MP trees. The strict consensus of 5000 MP trees is shown in Fig. 7. The shortest MP trees had a length of 2173

steps, a consistency index of 0.18 and a retention index of 0.67. *Oligosarcus amome* is the sister taxon of all remaining analyzed species of the genus excepting *O. itau*. The Central American *Bramocharax bransfordii* is the sister group of *Oligosarcus* in this morphological phylogeny. The successive sister groups of this clade are two species of the polyphyletic *Bryconamericus* (*B. scleroparius* and *B. emperador*), and the genera *Markiana* (*M. nigripinnis*) and *Astyanacinus* (*A. moorii*). This monophyletic group which includes *Oligosarcus* is nested inside the paraphyletic *Astyanax*, which further includes one species of the polyphyletic *Hyphessobrycon* (*H. anisitsi*) and *Psellogrammus kennedyi*.

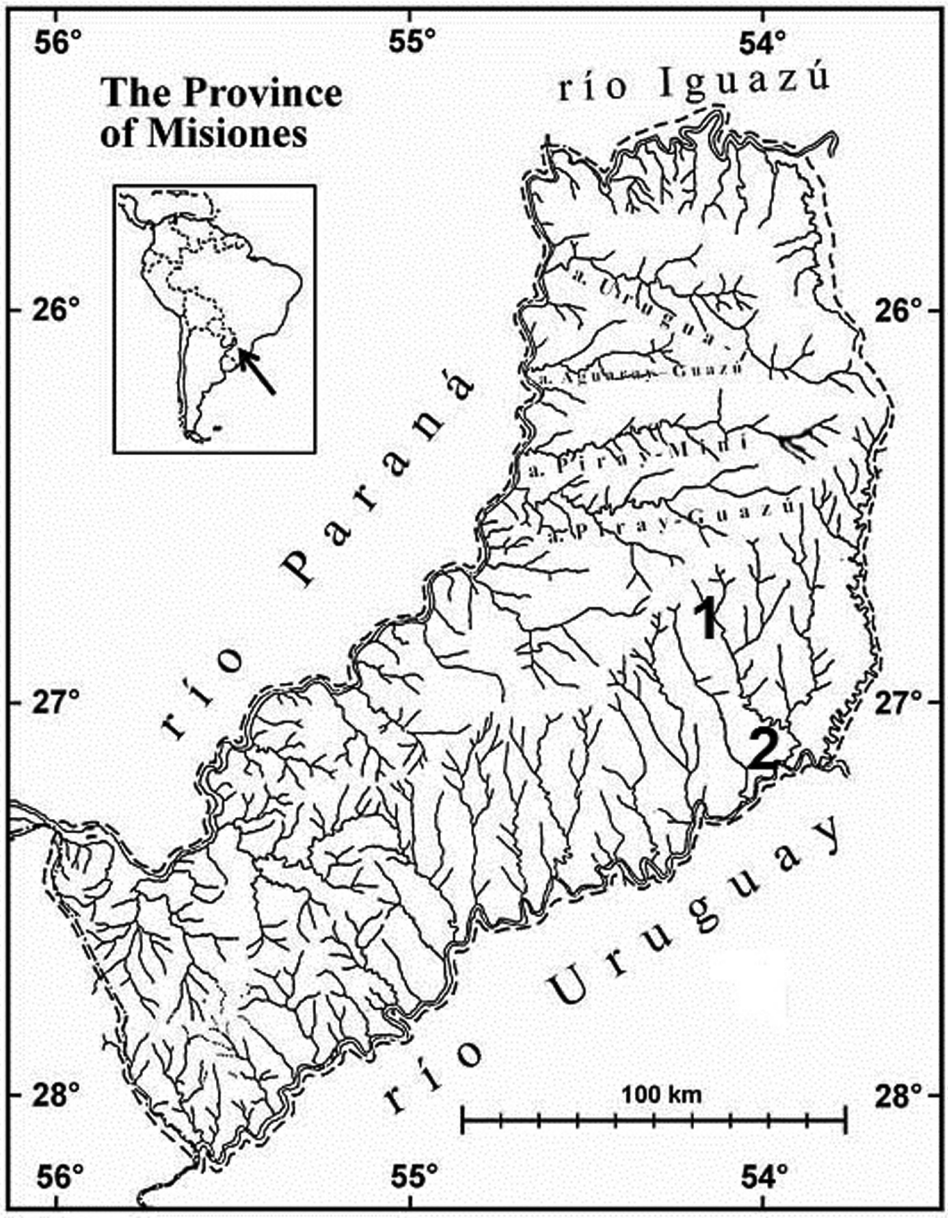

FIGURE 6. Hydrological map of the Misiones Province, Argentina showing the sampling sites. 1. arroyo Fortaleza, 2. arroyo Oveja Negra (type locality). Both streams are tributaries of arroyo Yabotí-Guazú.

Discussion

The monophyly of the genus *Oligosarcus* is supported by seven synapomorphies (Mirande *et al.* 2011). However, until present only seven species were included in the phylogenetic analysis and hence, as was stated by previous authors, a comprehensive analysis of the genus is still pendant.

Based on our phylogenetic analysis *Oligosarcus amome* is the sister taxon of all remaining analyzed species of

Oligosarcus excepting *O. itau*. These two species are successive sister-groups to the terminal clade that, in agreement with Mirande *et al.* (2011) includes *O. longirostris, O menezesi, O. pintoi, O. bolivianus* and *O. jenynsii* (Fig. 7). The internal relationships of species within *Oligosarcus* are identical in our study and in Mirande *et al.* (2011) despite differences in the phylogenetic methodology.

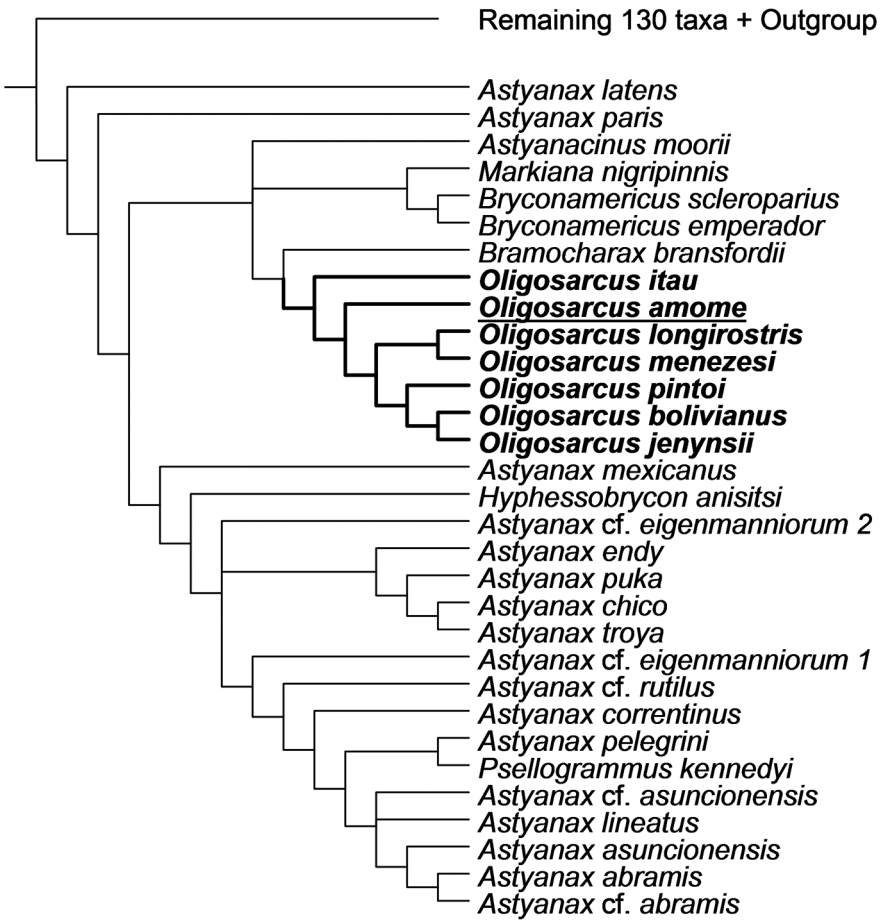

FIGURE 7. Strict consensus of 5000+ maximum parsimony trees from phylogenetic analysis of 165 taxa plus outgroup and 366 morphological characters of the Characidae and selected Characoidei. The genus *Oligosarcus* is highlighted and the new species is underlined.

As already was mentioned above, *O. itau*, *O. platensis*, and *O. amome* are the only species of the genus *Oligosarcus* having two rows of multicuspidate teeth on the premaxilla. Curiously, all these three species have very restricted distributions and additionally are very rare at their only known localities despite the great sampling effort. *Oligosarcus itau*, represented by only three specimens, is known from a small unnamed stream tributary of the río Bermejo, río Paraguay basin. *Oligosarcus platensis* is known from only one specimen from Laguna Tropa Vieja, Río de la Plata basin. Finally, the eight specimens of *O. amome* were only collected in two tributaries of the Arroyo Yaboti Guazú, río Uruguay basin despite detailed collecting efforts in the whole province of Misiones. What makes these rare and restricted species of *Oligosarcus* including *O. amome* even more peculiar is that they (two of them at least) appear to be basal species of the genus (at least in the so far available morphological phylogeny).

Mirande *et al.* (2011) noted the urgent need to obtain more specimens of *O. itau* due to the risk of extinction by the habitat loss and fragmentation. The same situation applies to *O. platensis*. Fortunately this is so far not the case for *O. amome* which inhabits the only large-scale natural protected area in the Uruguay river basin, the Reserva de Biosfera Yaboty in Misiones, Argentina.

Comparative material

Oligosarcus bolivianus: MACN-ict 10375, 5 ex., 104.5–118.3 mm, Argentina, Jujuy Province, Dique La Ciénaga. *Oligosarcus brevioris*: MACN-ict 10455, 1 ex., 103.2 mm, Argentina, Misiones Province, río Uruguay basin, arroyo Toro, Tributary of arroyo Pepirí guazú, 26° 36' 32.8" S, 53° 44' 13.9" W. MACN-ict 10456, 4 ex., 51.0–153.0 mm, Argentina, Misiones Province, río Uruguay basin, río Pepirí-Guazú, 26° 18' 31.0" S, 53° 39' 43.7" W. *Oligosarcus jenynsii*: MACN-ict 10457, 3 ex., 148.0–167.0 mm, Argentina, Buenos Aires Province, rio Salado basin, Laguna Chis-Chis, 35° 46' 5.8" S, 57° 57' 50.4" W. *Oligosarcus longirostris*: MACN-ict 10458, 2 ex. 136.0–168. mm, Argentina, Misiones Province, río Paraná basin, arroyo Urugua-í, 26° 13' 27.3" S, 53° 43' 43.4" W. *Oligosarcus menezesi*: MACN-ict 10459 1 ex. 115.0 mm, Argentina, Misiones Province, río Paraná basin, arroyo Urugua-í, 26° 13' 27.3" S, 53° 43' 43.4" W. *Oligosarcus oligolepis*: MACN-ict 10460, 1 ex. 112.0 mm, Argentina, Corrientes Province, río Uruguay basin, arroyo Cuatro Bocas. MACN-ict 10461, 3 ex., 76.0–103.8 mm, Argentina, Buenos Aires Province, Río de La Plata basin, Laguna de los Talas. *Oligosarcus paranensis*: MACN-ict 10462, 4 ex., 79.0–86.4 mm, Argentina, Misiones Province, río Paraná basin, arroyo Piray-miní. MACN-ict 10463, 1 ex. 160.8 mm, Argentina, Misiones Province, río Paraná basin, arroyo Urugua-í, 26° 13' 27.3" S, 53° 43' 43.4" W. *Oligosarcus pintoi*: MZUSP 090627, 1 ex., C&S, 74.6 mm, Brasil, São Paulo, Indaiatuba; Açude no córrego do Campo Bonito, afluente do ribeirão do Buru, médio Tietê, 23º5'15.0"S, 47º17'20.0"W. *Oligosarcus platensis*: MHNM 762, holotype, 97.0 mm, Uruguay, Canelones, arroyo Tropa Vieja.

Acknowledgements

Thanks to J. L. de Figueiredo for loan of *O. pintoi*. To W. Serra and M. Loureiro for loan the holotype of *O. platensis*, and to E. Donadio for carrying in hands this material. To J. Miceli for help us with the Guaraní language. To S. Faiad for help with some illustration. The study was in part financed by grants from the German Cichlid Society (Deutsche Cichliden-Gesselschaft, DCG) and the Grant Agency of the Czech Republic (GAČR) (grant no. 14-26060P).

References

Bertonatti, C. & Corcuera, J. (2000) *Situación ambiental Argentina*. Fundación Vida Silvestre, Buenos Aires, 400 pp.

Buckup, P.A. (1998) Relationships of the Characidiinae and phylogeny of characiform fishes (Teleostei, Ostariophysi). *In:* Malabarba, L.R., Reis, R.E., Vari, R.P., Lucena, Z.M.S. & Lucena, C.A.S. (Eds.), *Phylogeny and Classification of Neotropical Fishes*. Edipucrs, Porto Alegre, pp. 123–143.

Casciotta, J.R., Almirón, A.E., Piálek, L.,Gómez, S. & Říčan, O. (2010) *Crenicichla ypo* (Teleostei: Cichlidae), a new species from the middle Paraná basin in Misiones, Argentina. *Neotropical Ichthyology*, 8, 643–648. .

Casciotta, J.R., Almirón, A.E., Piálek, L. & Říčan, O. (2012) *Cyanocharax obi*, a new species (Characiformes: Characidae) and the first record of the genus from tributaries of the río Paraná basin, Argentina. *Zootaxa*, 3391, 39–51.

Casciotta, J.R., Almirón, A.E., Aichino, D. ,Gómez, S., Piálek, L. & Říčan, O. (2013) *Crenicichla taikyra* (Teleostei: Cichlidae), a new species of pike cichlid from the middle río Paraná, Argentina. *Zootaxa*, 3721 (4), 379–386. http://dx.doi.org/10.11646/zootaxa.3721.4.5

Ferraris, C.J. Jr. (2007) Checklist of catfishes, recent and fossil (Osteichthyes: Siluriformes), and catalogue of siluriform primary types. *Zootaxa*, 1418, 1–300.

Fink, W.L. & Weitzman, S.H. (1974) The so-called Chirodontin fishes of Central America with description of two new species (Pisces: Characidae). *Smithsonian Contribution to Zoology*, 172, 1–46. http://dx.doi.org/10.5479/si.00810282.172.

Javonillo, R., Malabarba, L.R., Weitzman, S.H. & Burns, J.R. (2010) Relationships among major lineages of characid fishes (Teleostei: Ostariophysi: Characiformes), based on molecular sequence data. *Molecular Phylogenetics and Evolution*, 54, 498–511. http://dx.doi.org/10.1016/j.ympev.2009.08.026.

Menezes, N.A. (1969) Systematics and evolution of the tribe Acestrorhynchini (Pisces, Characidae). *Arquivos de Zoologia*, 18, 1–159. http://dx.doi.org/10.11606/issn.2176-7793.v18i1-2p1-150.

Mirande, J.M. (2010) Phylogeny of the family Characidae (Teleostei: Characiformes): From characters to taxonomy. *Neotropical Ichthyology*, 8, 385–568.

http://dx.doi.org/10.1590/s1679-62252010000300001.
Mirande, J. M., Aguilera G. & Azpelicueta, M de las M. (2011) A threatened new species of *Oligosarcus* and its phylogenetic relationships, with comments on *Astyanacinus* (Teleostei: Characidae). *Zootaxa*, 2994, 1–20.
Oliveira, C., Avelino, G.S., Abe1, K.T., Mariguela, T.C., Benine, R.C., Ortí, G., Vari, R.P. & Corrêa e Castro, R.M. (2012) Phylogenetic relationships within the speciose family Characidae (Teleostei: Ostariophysi: Characiformes) based on multilocus analysis and extensive ingroup sampling. *BMC Evolutionary Biology*, 11, 275–289. [2011] http://dx.doi.org/10.1186/1471-2148-11-275
Piálek, L., Říčan, O., Casciotta, J. & Almirón, A. (2010) *Crenicichla hu*, a new species of cichlid fish (Teleostei: Cichlidae) from the Paraná basin in Misiones, Argentina. *Zootaxa*, 2537, 33–46. http://dx.doi.org/10.1590/s1679-62252010000300009.
Piálek, L., Říčan, O., Casciotta, J., Almirón, A. & Zrzavý, J. (2012) Multilocus phylogeny of *Crenicichla* (Teleostei: Cichlidae), with biogeography of the *C. lacustris* group: Species flocks as a model for sympatric speciation in rivers. *Molecular Phylogenetics and Evolution*, 62, 46–61. http://dx.doi.org/10.1016/j.ympev.2011.09.006
Říčan, O., Piálek, L., Almirón, A. & Casciotta, J. (2011) Two new species of *Australoheros* (Teleostei: Cichlidae), with notes on diversity of the genus and biogeography of the Río de la Plata basin. *Zootaxa*, 2982, 1–26.
Swofford, D.L. (2003) PAUP*.Phylogenetic Analysis Using Parsimony (*and other methods) version 4b10, Sinauer, Sunderland, MA.
Taylor, W.R. & Van Dyke, G.C. (1985) Revised procedures for staining and clearing small fishes and other vertebrates for bone and cartilage study. *Cybium*, 9, 107–119.

APPENDIX 1. Characters states of *Oligosarcus amome* according to the characters considered by Mirande (2010) and Mirande *et al.* (2011).

Oligosarcus amome

```
00111010-1 0001000100 0011100001 0000100?00 0000011000 0100000000
0201000001 -010000000 0010000110 0101000-10 0010000001 1000000100
0100111010 0001111110 001-000000 0011000010 1000000101 0001110110
0101000001 0001100000 0111000010 0100000111 1100010100 1000000000
0000000001 0111000100 0001100001 1000010001 0100111000 0000010101
00001?1110 0000000011 200000000? ?????????0? 0000000000? 0?00?0????
?????1
```