

# REDESCRIPTION OF *Cheirodon ibicuhiensis* EIGENMANN, 1915 (CHARACIFORMES: CHEIRODONTINAE), WITH NOTES ON ITS DISTRIBUTION IN ARGENTINA

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## ABSTRACT

*Cheirodon ibicuhiensis* Eigenmann, 1915, is redescribed including new anatomical data based on material collected at sixteen localities in the Lower Paraná and Lower Uruguay River basins in Argentina. This is the first report of the species with accurate localities for this country. *C. ibicuhiensis* is distinguished from *C. interruptus*, a morphologically similar and geographically close species, by the following combination of characters: body relatively deep (28.2-39.8% SL) and compressed; snout to anal-fin origin (55-61.7% SL); anal-fin base length (22-31% SL); peduncle depth (8.8-12.6% SL); iv-v, 19-23 anal-fin rays; 17-22 ventral procurrent caudal-fin rays; maxilla with 1-2 teeth; 33-36 scales in the longitudinal series; 6-11 perforated scales on the lateral line.

Ecological notes on this species are also provided.

## Key words:

Ostariophysi, *Cheirodon*, taxonomy, distribution.

# REDESCRIPCIÓN DE *Cheirodon ibicuihensis* EIGENMANN, 1915 (CHARACIFORMES: CHEIRODONTINAE), CON NOTAS SOBRE SU DISTRIBUCIÓN EN ARGENTINA

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## RESUMEN

Se presenta una redescipción de la especie *Cheirodon ibicuihensis* Eigenmann, 1915, que incluye nuevos datos anatómicos, en base a material colectado en 16 localidades pertenecientes a las cuencas de los ríos Paraná medio y Uruguay inferior, en Argentina. Este es el primer reporte de la especie con localidades concretas para este país. *C. ibicuihensis* puede ser distinguido de *C. interruptus*, una especie morfológicamente similar y geográficamente cercana, por la siguiente combinación de caracteres: cuerpo relativamente alto (28,2-39,8% LE) y comprimido; distancia del hocico hasta el origen de la aleta anal (55-61,7% LE); longitud de la base de la aleta anal (22-31% LE); altura del pedúnculo caudal (8,8-12,6% LE); iv-v, 19-23 radios en la aleta anal; 17-22 radios caudales procurrentes inferiores; maxilar con 1-2 dientes; 33-36 escamas en la serie longitudinal; 6-11 escamas perforadas en la línea lateral. Además se proporcionan notas ecológicas sobre la especie.

### Palabras clave:

Ostariophysy, *Cheirodon*, taxonomía, distribución.

## INTRODUCTION

The genus *Cheirodon* Girard 1855, includes the largest species of the tribe Cheirodontini, whose adults often reach 30 to 60 mm standard length. Seven species are currently recognized within the genus. *C. australe* Eigenmann, 1928, *C. galusdai* Eigenmann, 1928, *C. killiani* Campos, 1982 and *C. pisciculus* Girard, 1855, inhabit the waters of the western slopes of the Andes between 28 and 42° S, while *C. ibicuiensis* Eigenmann, 1915, *C. interruptus* (Jenyns, 1842) and *C. parahybae* Eigenmann, 1915, inhabit the Atlantic drainages between 27 and 40° S in Argentina, Uruguay and Brazil (Malabarba, 1998; 2003).

Although *C. interruptus*, *C. galusdai* and *C. ibicuiensis* have been reported for Argentina, only the presence of the first of these species is properly documented with well-defined geographic distribution, and is frequently found in most of the basins of the country. The Chilean species, *C. galusdai*, was referred by Lüling (1981) for the Lagunas Encadenadas, in western Buenos Aires Province in Argentina, but it was not subsequently confirmed (Miquelarena & López, 1995). *C. ibicuiensis* was reported for the Uruguay River basin, without defined localities (Malabarba, 2003).

*Cheirodon ibicuiensis* was first described in 1915 by Eigenmann as a new variety *C. interruptus ibicuiensis* and it was subsequently recognized as a species by Malabarba (1989). Eigenmann provided few diagnostic characters in his brief original description. Braun *et al.* (2000) and Oliveira *et al.* (2002) studied the reproductive biology of *C. ibicuiensis* and Malabarba (1998) described two morphological traits, but currently there is no detailed description of this species.

Here we report the presence of *C. ibicuiensis* in 16 localities from the lower reaches of Paraná and Uruguay Rivers in the Entre Ríos and Santa Fe Provinces, Argentina, with a redescription of the species.

## MATERIALS AND METHODS

Measurements to the nearest 0.01 mm were taken using a Geotech digital caliper, on the left side of specimens whenever possible, following Fink & Weitzman (1974). Counts were made under stereoscopic microscope Leica M8. Counts of vertebrae, supraneurals, gill-rakers of first arch, teeth and fin rays were performed on nine specimens cleared and stained according to Dingerkus & Uhler (1977), and from x-rays taken from the type material. Vertebral counts included the four vertebrae of the Weberian apparatus, and the terminal centrum was counted as one vertebra. All measurements are expressed as percentage of standard length (SL), except for head measurements, which are expressed as percentage of head length (HL). In all counts, frequencies are given in parentheses. The measurements of the type material and the counts taken from x-rays

or photographs were performed by P. Willink of FMNH, where the type specimens are deposited. Counts on x-rays were subsequently corroborated by the authors. Values of the syntypes of *C. ibicuihensis* are marked in bold in the description.

The specimens examined are from the following institutions: Instituto de Limnología "Raúl A. Ringuelet", Buenos Aires, Argentina (ILPLA); Instituto Nacional de Limnología, Santa Fe, Argentina (INALI); Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires, Argentina (MACN); Museo de La Plata, La Plata, Argentina (MLP); California Academy of Sciences/Stanford University, USA (CAS/SU); Museu de Ciências e Tecnologia da PUCRS, Porto Alegre, Brazil (MCP); Field Museum of Natural History, Chicago, USA (FMNH). Abbreviations used in the material listed indicate number of specimens measured: m, or cleared and stained: c&s.

#### MATERIAL EXAMINED

##### *Cheirodon ibicuihensis* Eigenmann, 1915

Type material: FMNH 57833, syntype (male 33.8 mm SL) Cacequi, Ibicuí river, Rio Grande do Sul, Brazil; FMNH 98573, 7 syntypes (females 35.7-41.3 mm SL), same locality as former; CAS/SU 17515, 1 syntype, female (photograph and radiograph), same locality as first.

Nontype material: Argentina: INALI 1188, 5 m of 9 (1 male 31.4 mm SL, 4 females 31.2-34 mm SL), shallow lake in the Salado River flood valley, 2 km from its mouth on Paraná River, Santo Tomé marshes (31°39'12.69" S-60°45'15.11" W), Santa Fe Province, coll.: P. Scarabotti, 07/10/2004; INALI 1442, 3, 05/01/2005; INALI 1637, 1, 14/03/2005, from the same locality as first; INALI 1667, 1m (female 35.6 mm SL), shallow lake in the Salado River flood valley, 2 km from its mouth on Paraná River, Santo Tomé marshes (31°39'19.18" S-60°45'26.60" W), Santa Fe Province, coll.: P. Scarabotti, 14/03/2005; INALI 1151, 1m (female 33.9 mm SL), Lagoon 1, Los Sapos Island, Santo Tomé (31°39'52.73" S-60°45'16.30" W), Santa Fe Province, coll.: P. Scarabotti, 14/10/2004; INALI 1231, 4m (females 36.1-38.6 mm SL), Lagoon 13, Los Sapos Island, Santo Tomé (31°39'45.62" S-60°45'20.23" W), Santa Fe Province, coll.: P. Scarabotti, 09/11/2004; INALI 1238, 1m (female 38.6 mm SL), Lagoon 14, Los Sapos Island, Santo Tomé (31°39'40.05" S-60°45'19" W), Santa Fe Province, coll.: P. Scarabotti, 09/11/2004; MLP 9674, 2m (males 24.7-26 mm SL), Cuatro Bocas creek (31°42'27.4" S-60°44'58.5" W), Santa Fe Province, coll.: M. Galván & E. Martín, Jul. 1961; MLP 9675, 11m (6 males 25.3-30.6 mm SL, 1 c&s, 5 females 26.2-29.3 mm SL, 2 c&s), Coronda River (32°36' S-60°46' W), Santa Fe Province, coll.: M. Galván & E. Martín, Jul. 1961; MLP 9676, 1m (female 31.7 mm SL), Internal oxbow lake near Colastiné River (31°40' S-60°36' W), Santa Fe Province, coll.: R. Ringuelet & R. Arámburu, Oct. 1961; ILPLA 1727, 11m (4 males 25-27.2 mm SL, 7 females 25.2-28.5 mm SL), Osuna creek, 5 km from Campichuelo, Colonia Elia (32°41' S-58°12' W), Entre Ríos

Province, coll.: A. Miquelarena *et al.*, 09/04/2005; MLP 9677, 9m (females 30-39.8 mm SL, 2 c&s), Villa Elisa (32°10' S-58°24' W), Entre Ríos Province, coll.: A. Abba & D. Udrizar Sauthier, 05/11/2001; ILPLA 1728, 6m (4 males 28-29.2 mm SL, 2 females 30.1-30.8 mm SL), intersection of El Palmar creek and Road 14, 500 m from the bridge (31°51.597' S-58°19.507' W), Entre Ríos Province, coll.: A. Miquelarena *et al.*, 17/11/2005; MACN 9101, 2m of 15 (2 females 24.6-24.9 mm SL), El Palmar creek at El Palmar National Park, Entre Ríos Province, coll.: H. Castello, 05/05/1979; ILPLA 1729, 4m of 8 (1 male 26.7 mm SL, 3 females 26.8-29.7 mm SL), coastal area flooded by Gualeguay River, on the Paraná-Villaguay road, Entre Ríos Province, coll.: A. Miquelarena *et al.*, 06/11/2004; ILPLA 1730, 8m of 10 (5 males 24.6-25.7 mm SL, 3 females 24.6-25.7 mm SL), coastal area flooded by Gualeguay River (31°48.276' S-59°6.768' W), Entre Ríos Province, coll.: A. Miquelarena *et al.*, 04/09/2004; MLP 9678, 10m of 20 (5 males 24.9-28.7 mm SL, 2 c&s, 5 females 26.7-31.7 mm SL, 2 c&s), water body near Curupí creek (31°09.406' S-58°42.740' W), Entre Ríos Province, coll.: A. Miquelarena *et al.*, 03/09/2004; ILPLA 1731, 34, from the same locality as first; ILPLA 1732, 46, Villaguay creek, Entre Ríos Province, coll.: A. Miquelarena *et al.*, 03/11/2004. Brazil: MCP 11910, 10m of 146 (8 males 25.9-29.6 mm SL, 2 females 27-28 mm SL), Ibicuí river, at the bridge between São Rafael and Cacequi, Rio Grande do Sul, coll.: C. A. S. Lucena *et al.*, 13/09/1983.

#### COMPARATIVE MATERIAL

*Cheirodon galusdai* (Eigenmann, 1928): Chile: MLP 8942, 2 c&s, Perales marsh (36°26' S-72°00' W), Biobo Region VIII, coll.: E. de la Hoz, 01/1986.

*Cheirodon interruptus* (Jenyns, 1842): Argentina: ILPLA 1733, 1m (male 24.8 mm SL), water body near Curupí creek, (31°09.406' S-58°42.740' W), Entre Ríos Province, coll.: A. Miquelarena *et al.*, 03/09/2004; ILPLA 1734, 1m (female 34.5 mm SL), Osuna creek, 5 km from Campichuelo, Colonia Elia (32°41' S-58°12' W), Entre Ríos Province, coll.: A. Miquelarena *et al.*, 09/04/2005; ILPLA 1735, 2m of 6 (females c&s 38.2-41.9 mm SL), intersection of El Palmar creek and National Road 14, 500 m from the bridge (31°51.597' S-58°19.507' W), Entre Ríos Province, coll.: A. Miquelarena *et al.*, 17/11/2005; MLP 9679, 2m of 17 (1 male 29.3 mm SL, 1 female 29.6 mm SL), El Pelado creek (32°19' S-58°14' W), Entre Ríos Province, coll.: A. Miquelarena *et al.*, 24/06/2005; ILPLA 1736, 2m (males c&s 23-30.6 mm SL), El Pelado creek (32°19' S-58°14' W), Entre Ríos Province, coll.: A. Miquelarena *et al.*, 23/06/2005; MACN 7769, 4m (3 males 25.7-28.1 mm SL, 1 female 25.1 mm SL), ponds along the road to Bella Vista, Corrientes Province, coll.: H. Castello, 22/06/1971; MACN 8129, 8m (6 males 29.6-35.6 mm SL, 2 females 30.8-32.7 mm SL), Paraná River, Ramallo, Buenos Aires Province, coll.: Tonina; MLP 9680, 22m of 24 (5 males 28.8-34.1 mm SL, 17 females 22.4-40.6 mm SL), El Pescado creek, Buenos Aires Province, coll.: L. Protogino *et al.*,

27/10/1992. Brazil: MCP 14192, 10m of 36 (4 males 24.7-26.6 mm SL, 6 females 24.9-40.9 mm SL), Ibicuí da Armada river next to Campo Seco, coll.: C. Weber *et al.*, 13/12/1989.

*Cheirodon pisciculus* (Girard, 1855): Chile: MLP 8944, 2 c&s, Puangue-Curacaví marsh, Santiago Metropolitan Region, coll.: R. Aldunate, 11/1983.

## RESULTS

*Cheirodon ibicuihensis* Eigenmann, 1915 (Fig. 1)

*Cheirodon interruptus ibicuihensis* Eigenmann, 1915: 74 [diagnosis in key], 71-74 [description, type locality: Cacequi, Ibicuí river, Rio Grande do Sul, Brazil].

*Cheirodon ibicuihensis* Géry 1977: 574 [possible synonym of *Cheirodon interruptus*]; Malabarba, 1989: 133 [listed, Laguna dos Patos, Brazil]; Casciotta *et al.*, 1992: 10 [osteological characters]; Malabarba, 1998 [phylogeny]; Braun *et al.*, 2000 [reproductive biology]; Oliveira *et al.*, 2002 [reproductive biology]; Malabarba, 2003: 216 [Lectotype listed as FMNH 57883 but it does not meet the requirements of the 1999 Code unless the code is amended].

## DIAGNOSIS

*Cheirodon ibicuihensis* is distinguished from all other species of the genus by the following combination of characters: body relatively deep (28.2-39.8% SL) and compressed; anal-fin base length (22-31% SL); iv-v, 19-23 anal-fin rays; 17-22 ventral procurrent caudal-fin rays.

The high number of branched anal-fin rays, 19-23 (usually 20-21) distinguishes *C. ibicuihensis* from all other *Cheirodon* species: 10-14 in *C. pisciculus*, 12-15 in *C. killiani*, 12-14 in *C. galusdai*, 14-16 in *C. australe*, and 14-20 (usually 15-18) in *C. interruptus*.

The number of ventral procurrent caudal-fin rays, 17-22 separates *C. ibicuihensis* from *C. interruptus* (22-29), *C. galusdai* (22-25), and *C. australe* (23-28).

Additionally, the presence of 2-3 (rarely 1) paired hooks per segment of lepidotrichia on anal-fin rays in adult males differentiates *C. ibicuihensis* from all other *Cheirodon* species that have 1 (rarely 2) paired hooks.

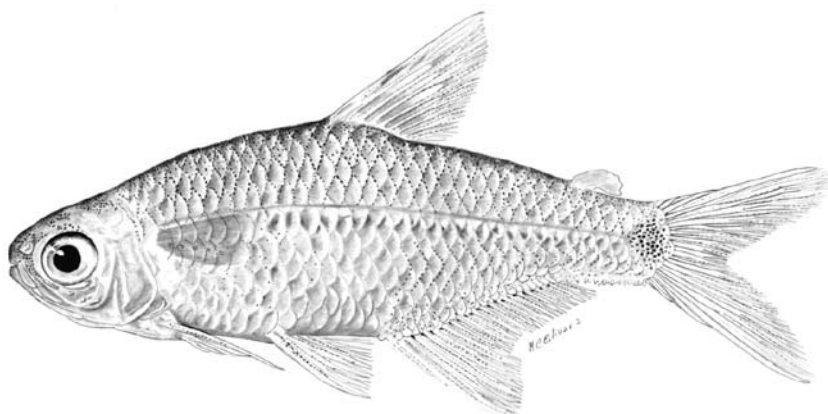
## DESCRIPTION

Morphometric data in Table 1. Body relatively compressed and elongated. Dorsal and ventral profiles: similarly convex. Greatest body depth at dorsal-fin origin. Snout: short, approximately half of eye diameter. Maxilla: short, oblique, with the distal tip reaching

or almost reaching a vertical through anterior border of eye. Caudal peduncle: longer than deep. Pectoral-fin origin at vertical level of posterior margin of operculum. Pelvic-fin origin anterior to dorsal-fin origin. Anal-fin origin at vertical level of last dorsal-fin ray base. Dorsal-fin rays iii, 8, i (12), iii, 9 (6). Length of second unbranched ray: about one half of third. First unbranched ray: very small, only visible in cleared and stained specimens. Adipose fin: well developed in all specimens. Pectoral-fin rays i, 9 (5), i, 10 (7), i, 11 (5), i, 12 (1). Pelvic-fin rays i, 5, i (3), i, 6 (14). Anal-fin rays iv, 19 (2), v, 19 (1), iv, 20 (4), v, 20 (2), iv, 21 (4), v, 21 (1), iv, 22 (2), v, 22 (1), v, 23 (1). Caudal-fin principal rays i, 17, i (18). Dorsal procurrent caudal-fin rays 9 (5), 10 (5), 11 (3), 12 (4). Ventral procurrent caudal-fin rays 17 (2), 19 (3), 20 (6), 21 (5), 22 (2), extending anteriorly through ventral margin of caudal peduncle more than half of their length.

Scales cycloid, lateral line incomplete, perforated scales 6 (2), 7 (6), 8 (24), 9 (26), 10 (5), 11 (6). Longitudinal scales series 33 (5), 34 (8), 35 (20), 36 (6). Predorsal scales 10 (2), 11 (25), 12 (52), 13 (11), arranged in irregular series. Scales row between dorsal-fin and anal-fin origins 9 (1), 10 (59), 11 (18), 12 (1). Scale rows around caudal peduncle 14 (30), 16 (1). Anal fin with 1-5 scales in a single series at the base of anterior rays.

Four, rarely five premaxillary teeth bearing 5-7 cusps, usually 6; maxilla with 1-2 teeth bearing 4-6 cusps, usually 5 (Fig. 2). Dentary with 5-8 teeth with 5 cusps. Vertebrae 34 (8), 35 (10). Supraneurals 5 (6), 6 (12). Infraorbital 6, third infraorbital not contacting preopercular sensory canal. Upper gill rakers 7, lower gill rakers 11.



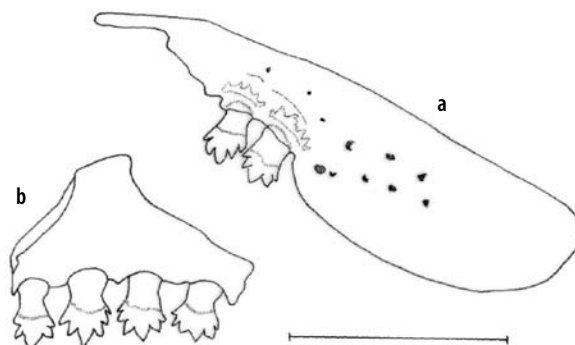
**Figure 1.** *Cheirodon ibicuhiensis*, ILPLA 1728, male, 28.8 mm SL, El Palmar creek, Entre Ríos Province, Argentina.

**Paraná and Uruguay river basins, Argentina**

Character	Nontype material															
	Syntypes				Ibicuí river, Brazil				Paraná and Uruguay river basins, Argentina				Females (n=48)			
	Male (n=1)	Females (n=7)	Males (n=8)	Females (n=2)	Males (n=28)	Females (n=48)	Male (n=1)	Females (n=7)	Males (n=8)	Females (n=2)	Males (n=28)	Females (n=48)	Mean	SD		
Standard length (mm)	33.8	35.7-41.3	38.7	2	25.9-29.7	27.6	1.4	27-28	27.5	0.7	24.6-31.4	26.9	1.8	24.6-39.8	30.7	4.4
Percents of SL																
Head length					24.1-26	25.1	0.5	25-25.1	25	0.1	22.5-26.4	24.4	1	21.3-26.7	23.8	1.3
Greatest depth					32.5-35.4	34.3	1	36.9-38.4	37.6	1	28.2-35.9	32.2	1.6	29.9-39.8	35.4	2.6
Snout-Dorsal fin origin					48.3-53.8	51.1	1.8	49.1-53	51	2.8	46-53	49.9	1.8	47.3-55.2	50.6	1.7
Snout-Pectoral fin origin					23.2-25.1	24.2	0.7	23.7-24.2	24	0.3	21.9-26.5	24.1	1.3	19.4-26.2	23.1	1.6
Snout-Pelvic fin origin					41.5-43.7	42.5	0.9	44-45.7	44.9	1.2	38.2-43.5	41.4	1.4	37.4-44.6	41.4	1.5
Snout-Anal fin origin					59.3-61.5	60.3	1	60-61.3	60.7	1	55-60.7	58.4	1.5	56.7-61.7	59.4	1.4
Peduncle length	16.5	12.4-16.3	14.6	1.3	12.5-14.2	13.2	0.7	12.3-12.6	12.5	0.2	10.8-16.9	13.9	1.3	10.5-16	13	1.2
Peduncle depth	11.4	10.7-12.4	11.6	0.7	11.4-12.6	12.1	0.4	10.2-10.5	10.4	0.2	10.1-11.9	11.3	0.5	8.8-12.1	10.6	0.7
Anal-fin base length	26.7	26-28.7	27.3	1.2	25.2-29.6	27.4	1.5	25.5-27.6	26.6	1.5	22-29.8	26.4	2	24.8-31	27.7	1.5
Pectoral-fin length					22.4-25.3	23.9	1	19.4-21.5	20.5	1.5	18-24.3	22.2	1.4	18.4-23.3	20.9	1.2
Pelvic-fin length					18.7-20.9	19.6	0.7	17.5-18.2	17.9	0.5	16.3-21.4	18.9	1.2	15.4-20.1	17.6	0.9
Dorsal-fin length					29.8-32.3	30.9	0.7	25.4-28.3	26.9	2	29.3-34.4	31.7	1.3	27.2-32.3	30.1	1.4
Eye-Dorsal fin origin					35-37.7	35.9	0.9	36-38.2	37.1	1.6	34.1-38.8	37.1	1.2	33.5-40.1	37.8	1.3
Percents of HL																
Eye diameter					38.1-41.2	39.8	1	40.5-40.9	40.7	0.2	39.5-49.5	45	2.3	38.2-49.4	42.8	2.9
Snout length					16.2-17.7	17.1	0.6	17.4-17.7	17.6	0.2	13.4-21.2	18.4	1.8	13.5-23.3	18.8	2.4
Interorbital width					34.7-37.7	36.3	1.1	32.5-33.9	33.2	1	34.6-41.2	37.7	1.7	29.1-42.6	36.7	3.5
Upper jaw length					27.1-30.2	29.1	1.1	27.1-28.2	27.6	0.8	25.6-34.4	30.7	2.5	24.1-36.2	30	2.7

**Table 1.** Morphometric data of *Cheirodon ibicuihensis*. **SD:** Standard deviation, **SL:** Standard length, **HL:** Head length.





**a:** left maxilla, external view; **b:** left premaxilla, external view. Scale bar = 1 mm.

**Figure 2.** *Cheirodon ibicuihensis*, MLP 9678.

#### COLOR IN LIFE

Ground color in life: iridescent with silvery, greenish, yellowish, and lilac hues. Scale margins covered with dark chromatophores producing a faint reticulate pattern, mainly above the midline and in ventrolateral region above anal fin. Dorsal, anal and caudal fins: greyish. Pectoral and pelvic fins: transparent, with some scattered small dark spots (Fig. 3).

#### COLOR IN ALCOHOL

Ground color: light creamy-brown. Small melanophores present on dorsum of head, snout, and premaxilla. Small melanophores also present on scale margins of back; more numerous dorsally, forming reticulate pattern above midline. Midline with groups of melanophores forming diffuse lateral stripe internal to the scales. Scattered melanophores between anal-fin base and midline, following myosepta. Caudal spot present as a romboid area of dense melanophores at caudal-fin base. Dorsal, anal, and caudal fins with small melanophores on membrane and rays. Pectoral and pelvic fins: hyaline, the former, with small melanophores along first unbranched ray.

#### SEXUAL DIMORPHISM

On average, body depth is greater in females than in males. Males: with well developed hooks on posterior margin of pelvic and anal-fin rays. Two-three (rarely 1) paired hooks per segment of lepidotrichia, on last unbranched anal-fin rays, and 1<sup>st</sup> to 11<sup>th</sup> branched anal-fin rays, positioned at middistal portion of rays and usually not extending to ray tip; tiny hooks can be present up to 16<sup>th</sup> anal-fin branched ray. One-two paired hooks per segment

of lepidotrichia on unbranched pelvic-fin ray and 1<sup>st</sup> to 6<sup>th</sup> branched pelvic-fin ray. Females: with hooks only in pelvic fin in larger individuals, not as developed as in males.

Anal-fin margin: almost straight in males and slightly concave in females. Pectoral and pelvic fins: larger in males, in which pectoral-fin tip reaches or surpasses pelvic-fin origin. Pelvic-fin tip reaching anal-fin origin. In females the pectoral fin does not reach the pelvic-fin origin, and pelvic fin does not reach the anal fin.

Males: with ventral procurent caudal-fin rays forming a well-developed keel which is absent in females.



**Figure 3.** *Cheirodon ibicuiensis*, female, about 30 mm SL, Santo Tomé marshes, Paraná River basin, Santa Fe Province, Argentina, photo by Javier López.

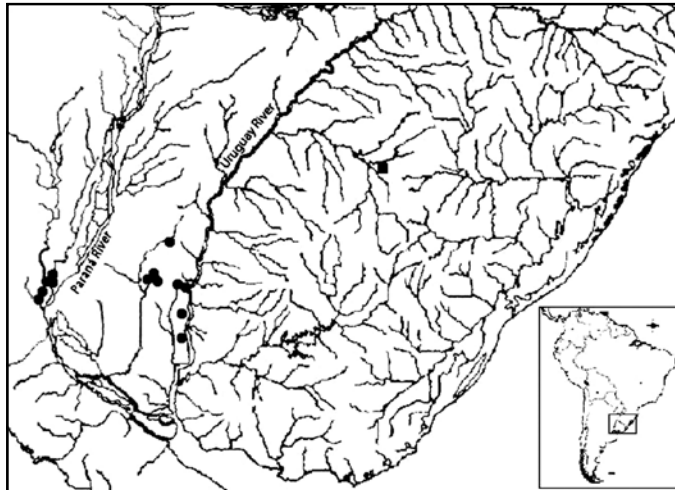
#### GEOGRAPHICAL DISTRIBUTION

Paraná and Uruguay River basins in Argentina; Laguna dos Patos, Upper Uruguay and Tramandaí River basins in Brazil (Fig. 4).

#### ECOLOGICAL NOTES

*Cheirodon ibicuiensis* is found in floodplain lakes and creeks with muddy or rocky bottom in the lower basins of Uruguay and Paraná River (Fig. 5). Eight environmental variables were measured at the collection sites near Santa Fe city (Table 2). The latter are floodplain lakes flooded by the turbid and high-ion-concentration waters of the Salado Norte River, located 2 km upstream from the confluence with the Lower Paraná River. *C. ibicuiensis* individuals were found under a wide range of environmental con-

ditions. The occurrence of individuals in water with oxygen concentration as low as 0.8 mg/l, suggests the presence of certain accessory mechanism for respiration in hypoxic water. The rooted and floating vegetation within these lakes is dominated by water grass *Ludwigia peploides* and *Azolla* sp., but *Eichhornia crassipes*, *Pistia stratiotes* and *Salvinia* spp. also occur. The terrestrial vegetation surrounding the lakes comprises mostly *Solanum glaucophyllum*, *Tessaria dodoneaeifolia*, and *Tessaria integrifolia*.



Square: type locality; circles: localities in Argentina.

Figure 4. Geographic distribution of *Cheirodon ibicuihensis*.

	Range	Median
Maximum depth (cm)	35 - 142	40
Secchi transparency (cm)	11 - 35	14
Temperature (°C)	18 - 30.5	25
Conductance (µS/cm)	120 - 2200	2000
Oxygen concentration (mg/L)	0.8 - 10	4.8
Vegetal cover (%)	0 - 95	20
Surface area (ha)	0.3 - 1.5	1.2
Distance from river channel (m)	208 - 550	210

Table 2. Environmental variables of the floodplain lakes of the Salado Norte River where *C. ibicuihensis* was collected.



**Figure 5.** One of the localities where *Cheirodon ibicuhiensis* was found: Lagoon 13, Los Sapos island, Santo Tomé, Santa Fe Province, photo by Pablo Scarabotti.

## DISCUSSION

Eigenmann (1915) mentioned the differences observed among individuals of *C. interruptus* from different localities and distinguished the new variety *Cheirodon interruptus ibicuhiensis* (from Cacequy, Ibicuí River, Uruguay River basin) from the varieties *monodon* and *interruptus* (Río Grande do Sul, Brazil; Maldonado, Uruguay and Uruguay River). This author recognized this new variety by the following combination of characters: "Anal-fin rays 21-24, most frequently 22; 4-4, or 4-5 teeth in the premaxillary; base of anal fin equal to length of caudal peduncle and middle caudal rays; caudal spot diffuse". This description was not supplemented with an illustration or figure from which we could obtain additional data on the morphology of the species. Géry (1977) considered *C. ibicuhiensis* a possible synonym of *C. interruptus*. In 1989, Malabarba reported *C. ibicuhiensis* from Laguna dos Patos, recognizing it as a different species.

In several surveys carried out in Entre Ríos Province and areas near Santa Fe City (Santa Fe Province) *C. ibicuhiensis* was found as frequent species in many tributaries of the lower reaches of the Uruguay and Paraná River basins. The lack of reports of this species to date may be probably due to its being misidentified as *C. interruptus*. The latter species, widely distributed in the Paranaplantense basin, has similarities with *C. ibicuhiensis*, but can be distinguished from it by the following combination of characters: shorter anal-fin base (17.1-24.5, mean = 20.7 vs. 22-31, mean 27.2% SL), deeper caudal peduncle

(10.1-15.0, mean = 12.3 vs. 8.8-12.6 mean = 11% SL); lower number of branched-anal fin rays (14-20, usually 17 vs. 19-23, usually 20-21); lower number of maxillary teeth (1 vs. 1-2); higher number of premaxillary teeth (4-5, usually 5 vs. 4-5, usually 4); higher number of ventral procurrent caudal-fin rays (22-29 vs. 17-22); darker body pigmentation, with a conspicuous lateral stripe and caudal spot; males with lower number of paired hooks per segment of lepidotrichia on anal-fin rays (1, rarely 2 vs. 2-3, rarely 1).

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