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***Hemigrammus tridens* Eigenmann (Characiformes, Characidae): first records of a small tetra from the Paraná River basin**

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Abstract: *Hemigrammus tridens* is a small characid described by Eigenmann (in Eigenmann & Ogle, 1907) from Paraguay River, in the country Paraguay. The species has a conspicuous trident-shaped caudal spot, few perforated lateral line scales, scales on the caudal fin, and two pentacuspitate teeth in the outer series of the premaxilla. *Hemigrammus tridens* is found in the Paraná River basin of both, Argentina and Paraguay. The records from Argentina are the first for this species in the country. Comments on the type series are added.

Keywords: *Hemigrammus tridens* - Paraná River basin - Argentina - Paraguay - complementary description.

INTRODUCTION

The basin of the Río de la Plata comprises three large rivers: Paraná, Paraguay, and Uruguay. There are several tetras, e.g., *Hemigrammus ulreyi* (Boulenger, 1891) or *Hyphessobrycon elachys* Weitzman, 1985, which live in environments of Paraguay and Paraná Rivers. *Hemigrammus tridens* is a small characid described by Eigenmann (in Eigenmann & Ogle, 1907) based on two specimens from the arroyo Pypucú which is a tributary of the Río Apa (Eigenmann & Kennedy, 1903), Paraguay River basin, in the country Paraguay. Géry (1977) divided the genus *Hemigrammus* in several artificial groups; one of them is the *Hemigrammus-tridens*-group, based on the presence of a caudal spot, usually a longitudinal band or line along body and the absence of a humeral spot. Britski *et al.* (1999) mentioned its presence among the ichthyofauna of the Pantanal, Paraguay River basin (Mato Grosso, Brazil), and it was cited in several papers, usually, associated to descriptions of species: Uj & Géry (1989), Zarske & Géry (2002, as *Hyphessobrycon tridens*), Bertaco & Carvalho (2005), and Carvalho *et al.* (2010). For other collecting localities see Ota (2010) who included *H. tridens* in her thesis about the species of the genus *Hemigrammus* Gill, 1858 in the Paraguay River basin. The objective of this short contribution is to record this small tetra found at environments of the Paraná River, in the Provinces of Corrientes and Chaco, Argentina, and to report its presence in the Paraná River basin of the country Paraguay. The records from Argentina are the first for this species in the country.

MATERIAL AND METHODS

Specimens were fixed in formaldehyde and subsequently transferred to ethanol 70%. Measurements were taken following Fink & Weitzmann (1974), and are indicated in Table 1. Counts indicate the value followed by the number of specimens between brackets. Institutional abbreviations follow Sabaj-Pérez (2016).

Material examined

Paraguay River basin:

CAS 58609, photograph of holotype, *Hemigrammus tridens* Eigenmann, 1907.

MHNG 2544.071, 3 specimens, 15.5-18.2 mm SL, Paraguay, Concepción, Riacho El Postillón, 6 km from Puerto Max, coll.: F. Baud, C. Dlouhy, V. Mahnert, J.-L. Perret, C. Vaucher, B. Jacquet, and A. Colman. October 20, 1979.

Paraná River basin:

MHNG 2179.022, 1 specimen, 19.5 mm SL, Argentina, Chaco, Puerto Tirol, affluent of a lagoon, coll.: A. Pira.

MHNG 2678.025, 5 specimens (3 measured, 1 female, 3 males), 16.5-17.3 mm SL, Argentina, Corrientes, Depto. San Cosme, RN 12, km 1072, 27°22'34"S-58°23'47"W (taken from Google Earth), permanent lake in the premises of Olho-Porá, coll.: S. Koerber and J.O. Fernández Santos, September 23, 1995.

Table 1. Measurements of nine specimens of *Hemigrammus tridens* from the Paraná River basin in Argentina and Paraguay. Güyraugua N=5. San Cosme N=3. Puerto Tirol N=1.

<i>Hemigrammus tridens</i>	Paraguay		Argentina		Argentina
	Güyraugua		San Cosme		Puerto Tirol
	min	max	min	max	
SL	15.00	16.90	16.50	17.30	19.50
Percentage in SL					
predorsal length	1.67	1.84	2.2	2.4	1.86
prepelvic length	1.75	2.01	1.76	1.84	1.88
preanal length	1.48	1.56	1.48	1.59	1.47
maximum body depth	2.78	2.95	2.89	3.00	3.07
head length	3.16	3.25	3.05	3.11	3.36
anal-fin base	3.78	3.9	4.12	4.2	3.82
pectoral length	5.0	3.96	4.17	4.71	4.02
ventral length	3.95	4.84	4.24	4.71	4.43
pelvic fin/anal fin length*	2.8	3.05	2.73	2.84	2.63
anal fin/caudal rays length**	2.56	2.67	2.63	2.74	2.56
Percentage in head length					
snout	3.69	4.08	3.7	3.92	3.6
eye	2.00	2.22	2.29	2.54	1.98
interorbital distance	3.06	3.69	2.94	3.17	3.05
postorbital distance	2.04	2.4	2.1	2.43	2.14

*length between pelvic-fin origin and anal-fin origin; **length between anal-fin origin and middle caudal-fin rays.

CI-FML 7107 (ex MHNG 2742.079), 8 specimens, 15.0-16.9 mm SL, Paraguay, Caaguazú, small tributary of Río Güyraugua, Paraná River basin, South of the route between Asunción and Ciudad del Este, coll.: S. Fisch-Muller, C. Dlouhy and V. Mahnert, July 11, 1990.

MLP 10917 (ex MHNG 2742.079), 2 specimens, 16.4-17.2 mm SL, all collecting data same as of previous.

MHNG 2494.019, 2 specimens, 17.4-18.4 mm SL, Paraguay, Itapúa, arroyo Pirayu-í, coll.: C. Weber and C. Dlouhy, October 10, 1986.

RESULTS

Hemigrammus tridens (Figs 1-2) has a conspicuous caudal-fin spot as a “jet-black band” across the end of the caudal peduncle and caudal fin. It extends forward, forming a blunt median point and backward along edge of caudal-fin rays also, especially marked in the base of middle caudal-fin rays. Thin lateral band along body. Humeral spot absent or present as a very faint spot of scattered chromatophores.

Origin of dorsal fin nearer caudal fin than eye; dorsal fin ii,9 rays (9). Pectoral fin falling short anal-fin origin or surpassing it in males, pectoral fin with i,10(3),11(6) rays. Pelvic fin with i,7 rays, surpassing anal fin origin; pelvic-fin origin in a vertical through second or third scale anterior to dorsal-fin origin; pelvic fin with hooks in all branched rays. Anal fin short with iii-iv,15(2),16(3),17(4) rays; its origin in a vertical through second scale posterior to last dorsal-fin ray insertion; anal fin of males with anterior lobe very well developed, formed by six or seven branched rays. Hooks developed from last unbranched anal-fin ray to middle anal-fin length in most specimens (Fig. 3) although one specimen with hooks until last rays. Anal-fin hooks large, located one pair per segment, up to 12 in a ray, in both branches, and decreasing in number backward. Snout short; eye larger than snout; mouth terminal, at horizontal through upper half of eye. Maxilla long, surpassing anterior margin of eye. Two maxillary teeth, pentacuspitate. Premaxilla with an inner series of five teeth and an outer series formed by two teeth, all of them pentacuspitate (Fig. 4). Dentary with three or four large teeth followed by three to five small teeth. Three or four first teeth pentacuspitate,

remaining teeth tricuspidate or conic. Number of lateral line scales: 30(5) or 31(4); perforated scales of lateral line: 3(1),4(3),5(2),6(3); transverse scales: 5/3-3.5(3) or 5/3.5(6).

DISCUSSION

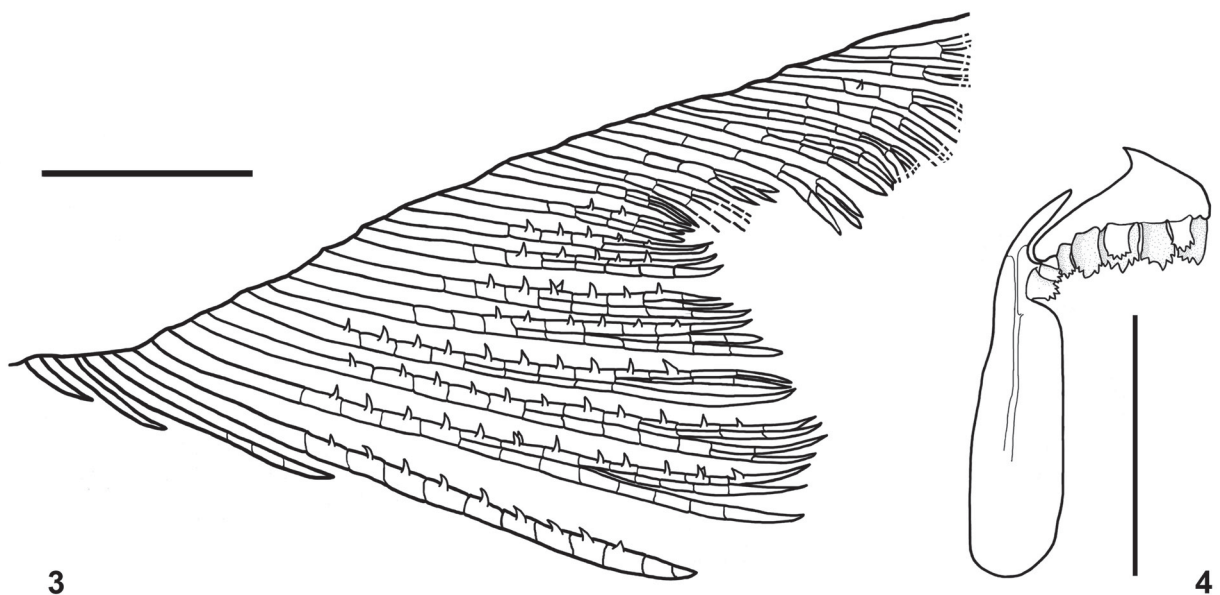
Eigenmann & Ogle (1907) commented that species of *Hemigrammus* Gill, 1858 differ from *Astyanax* Baird & Girard, 1854, by the incomplete lateral line. Nonetheless, the diagnosis of the genus *Hemigrammus* following Eigenmann (1918) is based on the presence of an incomplete lateral line, caudal fin scaled, premaxillary teeth in two rows, and maxillary teeth lacking or reduced in number, restricted to the upper portion of the bone, a definition still in usage. Ota (2010) considered that

the humeral spot of *H. tridens* – if present – is only a faded concentration of chomatophores in the study of the genus *Hemigrammus* from Paraguay Basin. The genus, considered today within *Pristellinae* (Géry & Boutière, 1964; Eschmeyer *et al.*, 2016), contains about 60 species. Uj & Géry (1989) discussed the inclusion of *H. tridens* in the genus because they could not find scales in the caudal fin. However, in the material examined, few specimens from the Paraná river basin have scales in the caudal fin. The small scales of the caudal fin fall down easily. Ota (2010) examined a large number of specimens, many of them without caudal-fin scales, considering that those small scales may be lost.

Hemigrammus tridens was so far only known from several localities in the Paraguay River basin. The specimens examined belong to three collecting sites of the Paraná River basin, downstream from its confluence



Figs 1-2. (1) *Hemigrammus tridens*, MHNG 2678.025, 17.3 mm SL, male. (2) Detail of the caudal spot. Scale bars = 1 mm.



Figs 3-4. (3) *Hemigrammus tridens*, MHNG 2678.025, 17.3 mm SL, male, anal fin with hooks. (4) *Hemigrammus tridens*, CI-FML 7107, 17.0 mm SL, female, premaxilla and maxilla. Scale bars = 1 mm.

with the Paraguay River (Fig. 5). Güyraugua river is a tributary of Monday river in the country Paraguay. Puerto Tirol is located on the coast of Paraná River in Argentina. The environment in which *H. tridens* was collected close to San Cosme is a permanent lake, more than 1 m deep, with profuse vegetation and abundant wood on substrate (Fig. 6). In this habitat the following species were found: *Aphyocharax nattereri*, *Hyphessobrycon elachys*, *H. eques*, *H. igneus*, *H.luetkenii*, *Moenkhausia dichroua*, *Serrapinnus calliurus*, *Pyrrhulina australis*, *Apistogramma borellii*, *Cichlasoma dimerus*, and *Laetacara dorsigera* (captured in December 1994 and/or September 1995).



Fig. 6. Permanent lake close to San Cosme (27°22'34"S-58°23'47"W), RN 12, km 1072, Depto. San Cosme, Corrientes, Argentina.

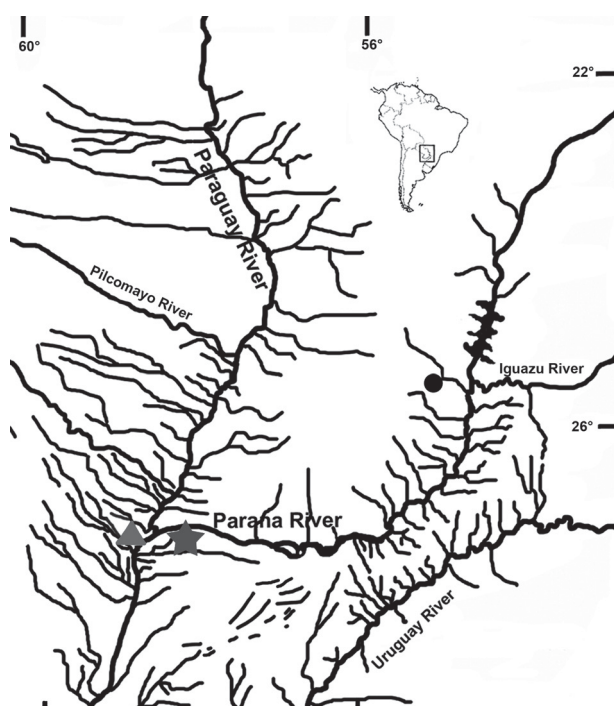


Fig. 5. Map showing the three collecting sites of *Hemigrammus tridens* in the Paraná Basin. Circle: Paraguay (Country), Güyraugua River; star: Argentina, Corrientes, San Cosme; triangle: Argentina, Chaco, Puerto Tirol.

COMMENTS ON THE STATUS OF THE TYPE SPECIMENS

Eigenmann & Ogle (1907) described *Hemigrammus tridens* based on two specimens, designated "Type" and "Cotype", from the Pypucú stream in Paraguay, being then deposited both at the Indiana University collection (IU 11262). These specimens are today housed at the California Academy of Sciences in the lots CAS 58609 (holotype) and CAS 61474 (paratype). This type status is supported by the article 72.4.6 of the International Code of Zoological Nomenclature (1999). A decade

later, Eigenmann (1918) mentioned a third specimen from the same locality which was not included in the original description. This additional specimen is also still available in San Francisco (CAS 61475) and the CAS online database states that it was initially also from lot IU 11262 with the remark as "collected w/ type series, but non-type" because the article before mentioned expressly excluded other specimens not nominated as types. Eschmeyer *et al.* (2016) list a potential additional paratype specimen from the collection of Zoologisches Museum Berlin as "?ZMB 17146 [from Eigenmann] (1) Corumbá". This specimen is available in the ZMB-collection. The respective label states "Typus", probably noted on the label by August Brauer (Peter Bartsch, pers. comm.), director of ZMB from 1906 to 1917. Also, the label provides information about Eigenmann and Anisits as donators, Anisits as collector and 328 as Anisits' collector's field number. The ZMB holds yet another specimen (ZMB 17258) from Corumbá with Anisits' collector's number 305a. This one is not labeled as type. Eigenmann *et al.* (1907) have seen specimens from the afore mentioned collector's lots, but they did not identify the specimens as *Hemigrammus tridens*. In this paper, specimens from Anisits' lot 328 are mentioned as *Hemigrammus ulreyi* from Corumbá and from lot 305, as small individuals similar to *Moenkhausia agassizii*. As both papers were published in 1907, one would expect that Eigenmann had recognized additional specimens of *Hemigrammus tridens* while determining these lots. Anisits spent nearly his whole professional life in Paraguay; around 1907 he moved to Berlin where he passed away in 1911 (Zarske, 2012). One year after his death, a note was published (Anisits, 1912) in which he confirmed that he did not send all material to Eigenmann but retained what he considered duplicates for his own further studies and that he donated those to the ZMB-collection. It is a mandatory condition for types that the author/s of a new species has determined the specimens.

Considering the article 72.4.6 the specimens in the Collection of the ZMB are not type material. Also, article 72.4.1.1 does not apply in this case.

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