

First record of *Leporinus tigrinus* from the Middle Paraná River basin, Argentina.

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Abstract

Leporinus tigrinus Borodin, 1929, is an anostomid species currently considered native to the Araguaia/Tocantins, Xingu and Tapajos River basins. The species has been progressively reported from downstream points of the Upper Paraná River basin in Brazil and it is considered a putative invasive species. Here we provide new southern records of this species from the Middle Paraná River basin in Argentina, collected from the Yabebiry stream thus extending the species' distribution range approximately 300 km downstream from the Piracema inlet, the previous most southern distribution limit.

Resumen

Leporinus tigrinus Borodin, 1929, es una especie de anostómido actualmente considerada nativa de las cuencas de los ríos Araguaia/Tocantins, Xingu y Tapajos. La especie ha sido reportada progresivamente en puntos cada vez más al sur en la cuenca del alto Río Paraná (Brasil) y es considerada potencialmente invasora. En este trabajo, presentamos nuevos registros de esta especie en la cuenca del Paraná Medio (Argentina). Especímenes colectados en el arroyo Yabebiry, permiten extender el rango de distribución de esta especie, aproximadamente 300 km aguas abajo del Canal de Piracema, el límite sur de distribución previamente establecido para la especie.

keywords: fish, ichthyofauna, Anostomidae, Misiones

Introduction

The Anostomidae family is one of the richest families within Characiformes. With 147 species arranged in 16 genera (Fricke et al. 2024), it includes several species with outstanding value for fisheries and aquarism. The genus *Leporinus* is one of them and it can be recognized by having a terminal or subterminal mouth, three unicuspid and incisiform teeth on the premaxilla and four on the dentary (Sidlauskas & Birindelli 2017). Besides this morphological diagnosis, phylogenetic relationships within the genus *Leporinus* are currently under discussion and it seems to be a non-monophyletic group (Ramirez et al. 2016).



fig. 1 *Leporinus tigrinus* (LGEF 1283). Paraná River, Eldorado, Misiones. Lateral view. 167.15 mm SL.

As currently conceived, *Leporinus* constitutes the most diverse genus within Anostomidae and comprises nearly 80 valid species widely distributed in South America and commonly known as “bogas”, “piavas” or “piaus”. In Argentina, five species of *Leporinus* were formally reported (Mirande & Koerber 2015, 2020): *Leporinus acutidens* (Valenciennes, 1837), *Leporinus amae* Godoy, 1980, *Leporinus lacustris* Amaral Campos, 1945, *Leporinus octofasciatus* Steindachner, 1915 and *Leporinus striatus* Kner, 1858. All of these species inhabiting the Paraná River basin with exception of *L. amae*, which is found exclusively in the Uruguay River basin.

Originally, *Leporinus tigrinus* was described as a subspecies of *Leporinus fasciatus* (Bloch, 1794) by Borodin (1929) based on 2 specimens collected at Goyaz, Brazil. The exact type locality is unknown and ambiguity on its definition has led to discussions about the species’ drainage origin. Garavello & Britzki (2003) delimited species distribution to Araguaia/Tocantins basins, whereas Pavanelli et al. (2007), reported *L. tigrinus* from the Corumbá reservoir, Paranaíba River basin, defining the species as “endemic”. In addition, Langeani et al. (2007) included the species as “autochthonous” for the Upper Paraná River basin. However, many authors agree in considering *L. tigrinus* as an invasive or putative invasive species in the Paraná basin (Santos et al. 2013; Ota et al. 2018; Cavaretto et al. 2020; Dos Reis et al. 2020). Recently, Boaretto et al. (2024) provided evidence that *L. tigrinus* is a species widespread in the Araguaia, Tocantins, Xingú and Tapajos Rivers and that populations from Paraná River are allochthonous and stemmed from Tocantins/Araguaia basin.

Since the first report of *L. tigrinus* at the Corumbá reservoir (Pavanelli et al. 2007), the species was subsequently found further downstream in the Upper Paraná River basin (Santos et al. 2013; Ota et al. 2018; Cavaretto et al. 2020). The southernmost point from which the species has been recorded so far is the Piracema inlet at the Itaipú dam in Brazil (Ota et al. 2018). In this note, we report on the distribution extension of *Leporinus tigrinus* to the Middle Paraná River, Misiones province.

Materials and methods

Specimens were captured using gill nets or angling and stored at the Ichthyological Collection of the Laboratorio de Genética Evolutiva (LGE), Instituto de Biología Subtropical. Locations and specimen information are provided in the results section.

Identification of the specimens was based on the original description of *Leporinus tigrinus* (Borodin 1929) and a re-description provided by Boaretto et al. (2024). Measurements and counts were carried out with a digital caliper of 0.01 mm accuracy, following Birindelli & Britski (2013). Standard length is expressed in mm and measurements related to the body as percentages of standard length whereas measurements related to the head are expressed as percentages of the head length (HL). Lateral line scale counts included the porous scales extending to the base of the median rays of the caudal fin. Upper and lower transverse scales counts do not include lateral line porous scales.

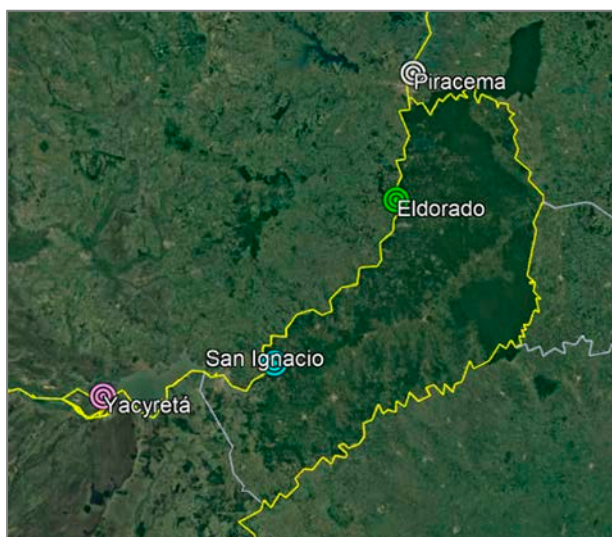


fig. 2 (above)
Leporinus tigrinus from the Yacyretá dam.

fig. 3 (left)
Map showing the four most southern localities as mentioned in the text. All three more southern ones are located along the Paraná River which here forms the political limit between Paraguay and the Argentinean provinces of Misiones (Eldorado, San Ignacio) and Corrientes (Yacyretá), respectively.

***Leporinus tigrinus* Borodin, 1929**

new records: **LGEP 1281** (1), 174.37 mm SL; Paraná River, Eldorado, Misiones, Argentina (-26.414856, -54.694779); coll.: Fernando Vier, Feb.2023. **LGEP 1282** (1), 199.67 mm SL; Paraná River, Eldorado, Misiones, Argentina (-26.2609722, -54.676861); coll.: Diego Germán Hoh, Jun.2023. **LGEP 1283** (1), 167.15 mm SL; Paraná River, Eldorado, Misiones, Argentina (-26.2609722, -54.676861); coll.: Diego Germán Hoh, Jun.2023. **LGEP 1510** (1), 119.44 mm SL; Yabebiry Stream, San Ignacio, Misiones, Argentina (-27.286779 -55.5340228); coll.: Danilo Aichino, Juan Carlos Cerutti, Feb.2023.

The examined specimens have the diagnostic characters that allowed us to identify them as *Leporinus tigrinus*. They can be distinguished from its congeners from the Paraná River in Misiones (with the exception of *Leporinus octofasciatus*) by the presence of dark brown bars across the body flank. It can be distinguished from *L. octofasciatus* by having 10 dark-brown vertical bars encircling the body in adults and at least one of these bars X or Y-shaped (vs. 8 vertical bars not encircling the body); the bright yellow color pattern of the body and fins (vs. reddish coloration); and for possessing 9 branched pelvic fin rays (vs. 8 rays).

	LGEP 1510	LGEP 1281	LGEP 1282	LGEP 1283
standard length (mm)	117.22	183.76	201.86	169.198
percentage of standard length				
predorsal distance	49.36	47.07	45.92	47.41
dorsal-fin to adipose-fin	39.21	40.99	37.89	40.52
prepelvic distance	52.89	51.83	48.93	50.45
body depth	29.28	28.19	30.05	28.20
caudal peduncle depth	10.71	9.99	9.57	10.10
caudal peduncle length	11.56	10.95	11.15	10.66
head length	25.92	24.12	21.38	24.09
percentage of head length				
preopercle length	76.56	78.21	78.36	79.39
snout length	41.97	44.12	42.52	44.14
head depth	79.20	76.90	74.47	70.09
eye diameter	25.91	22.56	22.52	23.45
bony interorbital	40.82	41.44	44.62	40.60
meristics				
dorsal fin rays	ii, 9	ii, 10	ii, 10	ii, 10
pectoral fin rays	i, 13	i, 14	i, 14	i, 14
pelvic fin rays	i, 9	i, 9	i, 9	i, 9
anal fin rays	ii, 8	ii, 8	ii, 8	ii, 8
caudal fin rays	i, 9-8, i	i, 9-8, i	i, 8-7, i	i, 8-7, i
total lateral line scales	40	40	40	40
upper transverse scales at dorsal fin origin	6	6	6.5	7
lower transverse scales at anal fin origin	5	5	5	5
circumpeduncular scales	16	*	16	16
predorsal scales	*	*	13	13
premaxillary teeth	3	3	3	3
dentary teeth	4	4	4	4

table 1 Measurements and counts of the four preserved specimens.

Discussion

Coloration patterns have been used to separate *Leporinus* into blotched, striped or barred groups (Géry 1977). Although this group-clustering is not a phylogenetic classification, it is still useful for alpha taxonomy. The barred or banded group includes species with many vertical dark brown bars across the body flank, and among the species of *Leporinus* inhabiting the Paraná River in Argentina *L. tigrinus* and *L. octofasciatus* are the only species with this coloration pattern. However, they are easily distinguished from each other based on coloration and number of pelvic fin rays.

Concerning the discussion about *Leporinus tigrinus*' origin, it is currently considered to be native to the Araguaia/Tocantins, Xingu and Tapajós basins and to be expanding to the Paraná River basin. The lack of

genetic differentiation, based on COI sequences, between specimens from the Araguaia/Tocantins and the Paraná River (Cavaretto et al. 2020; Boaretto et al. 2024) suggests a very recent separation of the species in these two basins, supporting the hypothesis of the introduction into the Paraná River.

As Cavaretto et al. (2020) pointed out, the Paraná basin is one of the most studied drainages of Brazil, and this species was never captured previous to Pavanelli's report. Ever since the species was subsequently found in more southern localities over the years. Cavaretto et al. (2020) also proposed a downstream dispersal of *L. tigrinus*, which is supported by our current findings. The southernmost record of distribution was, until now, the Piracema inlet at the Itaipú dam, expanding its distributional range for approximately 1,300 km. In this manuscript we add new localities on the Middle Paraná River in Argentina, extending the distribution range downstream for approximately 300 more km. However, the species distribution does eventually reach even further downstream. Based on a photograph (fig. 2) taken on 17.Nov.2023, taken during an inspection of the hydroelectric turbines at Yacyretá dam, we identify *L. tigrinus* specimens (not preserved). In that case, the extension range would increase to about 440 km downstream from the Piracema inlet (fig. 3).

In the last few years we have reported on the dispersal of some species to the middle Paraná River in Argentina previously known just from the Upper Paraná River (Brazil). These include *Cetopsorhamdia iheringi*, *Geophagus sveni*, and *Megaleporinus piavussu*. With this note, we are adding *Leporinus tigrinus* to the list. It is worth noting that both *L. tigrinus* and *G. sveni* are native species of the Tocantins/Araguaia basin and that they are gradually extending southwards into the Paraná River basin.

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