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Range extension of *Gasteropelecus sternicla* (Characiformes) for three coastal river basins of the Eastern Amazon region as well as for the Itacaiunas River drainage of upper Tocantins River basin

by

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Résumé. – Extension de la répartition de *Gasteropelecus sternicla* (Characiformes) dans trois bassins fluviaux côtiers de l'Amazonie orientale, ainsi que pour la rivière Itacaiunas du bassin supérieur du Tocantins.

La répartition géographique de *Gasteropelecus sternicla* (Gasteropelecidae) est ici étendue à trois bassins côtiers de l'Amazonie orientale, dans l'état de Maranhão, au nord-est du Brésil. De plus, cette espèce est répertoriée pour la première fois dans le drainage du fleuve Itacaiunas, dans le bassin du Tocantins, dans l'état de Pará, au nord du Brésil. Nous présentons également quelques données méristiques des échantillons qui ont été examinés, et enfin des informations sur l'occurrence de cette espèce dans les autres états du Brésil.

Key words. – Characiformes – Gasteropelecidae – *Gasteropelecus sternicla* – Brazil – Eastern Amazon – Freshwater hatchetfish – Taxonomy.

Gasteropelecidae is a family of freshwater Neotropical fishes, belonging to the order Characiformes and including three genera: *Gasteropelecus* Scopoli, 1777; *Thoracocharax* Fowler, 1907 and *Carnegiella* Eigenmann, 1909. These genera comprise three, two and four species, respectively (Weitzman and Palmer, 2003; Nelson *et al.*, 2016). These species are commercially collected for the aquarium trade (Weitzman and Palmer, 2003). The family, which occurs in Panama and all the South American countries except for Chile, is distributed along the river basins of the Amazon, Paraguay, Orinoco, Marowini and other Guiana shield rivers (Weitzman and Palmer, 2003). *Gasteropelecid* species, popularly known as hatchetfishes, are easily recognized by their highly modified body, characterized by the presence of a conspicuous keel on the pectoral girdle, strong muscles, and long pectoral-fin rays (Weitzman, 1960; Géry, 1977; Weitzman and Palmer, 2003). These features allow them to perform long and high jumps out of the water (Weitzman and Palmer, 2003).

Gasteropelecus differs from the other two genera of the family by the following characters: adipose fin always present, 28-37 scales on longitudinal series, 0-1 outer premaxillary teeth and anal fin with iii+19-33 rays (22-36 total rays), while *Carnegiella* never

possesses adipose fin, and *Thoracocharax* possesses 19-22 scales on longitudinal series, three outer premaxillary teeth and anal fin with iii+31-42 rays (34-45 total rays) (Weitzman, 1960; Géry, 1977). Currently, *Gasteropelecus* comprises: *G. sternicla* (Linnaeus, 1758), *G. maculatus* Steindachner, 1879 and *G. levis* (Eigenmann, 1909). *Gasteropelecus sternicla* was originally described as *Clupea sternicla*, based on specimens collected in Surinam (Weitzman and Palmer, 2003). The geographical distribution of the species is known for the Amazon, Orinoco and Guiana shield river basins in Brazil, French Guyana, Guyana, Peru, Surinam and Venezuela (Weitzman and Palmer, 2003); it is also recorded in the Paraguay River, Brazil (Britski *et al.*, 2007). In Brazil, the species occurs in the following states: Acre, Amazonas, Goiás, Mato Grosso, Mato Grosso do Sul, Pará and Rondônia (Veríssimo *et al.*, 2005; Britski *et al.*, 2007; Costa *et al.*, 2008; Montag *et al.*, 2009; Abe *et al.*, 2013; Pires and Ohara, 2013; Suarez *et al.*, 2013).

The recently collected specimens of *G. sternicla* increase the knowledge on the range of three occurrences of this species.

MATERIALS AND METHODS

Specimens of *G. sternicla* (Fig. 1) were collected in nine sites of the following river drainages and basins: Pindaré River drainage of the Mearim River basin (five sites), Itapecuru River basin (one site), Munim River basin (one site) and Itacaiunas River drainage of the Tocantins River basin (two sites) (Fig. 2). The specimens were fixed for 15 days in formalin 10%, and then transferred into alcohol 70% for preservation. Measurements and counts followed Fink and Weitzman (1974). Information on teeth and rays, and counts were conducted in cleared and stained specimens (C&S), prepared according to Taylor and Van Dyke (1985). The four modified vertebrae that constitute the Weberian apparatus were not included in the vertebrae counts and the fused PU1 + U1 was considered as a single element. Information about other congeners of *Gasteropelecus* and other genera of Gasteropelecidae were based on Eigenmann (1909), Weitzman (1960), Géry (1977) and Weitzman and Palmer (2003). The material is deposited in Coleção Ictiológica do Centro de Ciências Agrárias Ambientais, da Universidade Federal do Maranhão (CICCA) and Coleção de Peixes da Universidade Federal do Maranhão (CPUFMA). Sampling was authorized by IBAMA

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Figure 1. – Preserved specimen of *G. sternicla*, CICCAA 00157, 36.9 mm SL; Alto Alegre municipality, Pindaré River drainage of the Mearim River basin, Maranhão State, northeastern Brazil.

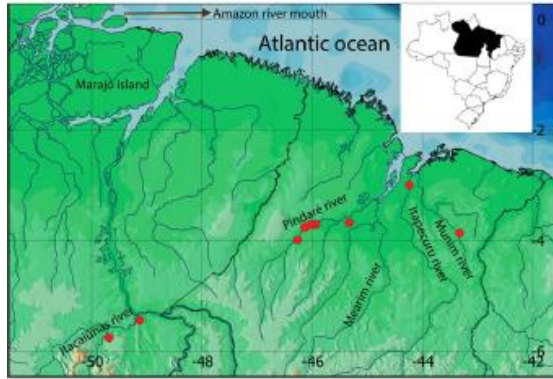


Figure 2. – Distribution (red circles) of *G. sternicla* in Pindaré River drainage of the Mearim River basin, Munim River basin, Itapecuru River basin and Itacaiunas River drainage of the Tocantins River basin, Maranhão State, northeastern Brazil.

and SISBIO through the documents N° 02001.007241/2004-37 and N° 42415, respectively.

Examined material

Gasteropelecus sternicla

Maranhão State: **Alto Alegre do Pindaré municipality:** CICCA 00157, 18 specimens, 30.58–44.6 mm SL; Igarapé Igarapé (Pindaré River drainage); 3°45'46"S–46°08'11"W; E. Guimarães and C. Costa; 03 Dec. 2015. CICCA 00158, 1 spm, 28.9 mm SL; Igarapé Presa de Porco (Pindaré River drainage); 3°59'25"S–46°15'51"W; E. Guimarães and C. Costa; 03 Dec. 2015. CICCA 00159, 40 spms, 26.1–33.5 mm SL; Igarapé Mineirão (Pindaré River drainage); 3°42'26"S–45°56'15"W; E. Guimarães and C. Costa; 03 Dec. 2015. CICCA 00161, 8 spms, 38.5–41.2 mm SL; Igarapé Brejinho (Pindaré River drainage); 3°42'27.54"S–46°01'17.00"W; E. Guimarães and C. Costa; 03 Dec. 2015. CICCA 00162, 5 (C&S) spms, 27.9–32.7 mm SL; Igarapé Brejinho (Pindaré River drainage); 3°42'27"S–46°01'17"W; E. Guimarães and C. Costa; 03 Dec. 2015.

Monção municipality: CICCA 00160, 63 spms, 33.2–42.1 mm SL; Bacia 814/815 (Pindaré River drainage); 3°40'48"S–45°19'51"W; E. Guimarães and C. Costa; 03 Dec. 2015. CICCA 00210, 4 (C&S) spms, 24.9–38.1 mm SL; Bacia 814/815 (Pindaré River drainage); 3°40'48"S–45°19'51"W; E. Guimarães and C. Costa; 03 Dec. 2015.

Chapadinha municipality: CICCA00211, 2 (C&S) spms, 32.6–38.2 mm SL; Munim River; 03°3'50'20"S–43°19'45"W; J. Nunes; 21 Nov. 2010.

Rosário municipality: CPUFMA 121125, 3 (C&S) spms, 28.9–41.1 mm SL; Itapecuru River, 2°59'58"S–44°14'32"W; N. Piorski; 03 Nov. 2012. CPUFMA 121125, 23 spms, 27.9–37.1 mm SL; Itapecuru River, 2°59'58"S–44°14'32"W; N. Piorski; 03 Nov. 2012.

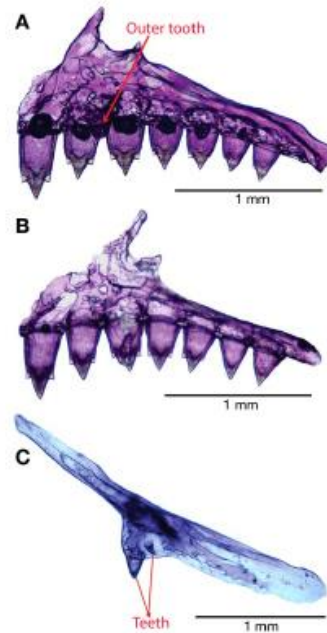


Figure 3. – Premaxilla of *G. sternicla*. **A:** CICCA 00162, 31.4 mm SL, C&S; Pindaré River drainage of the Mearim River basin, Maranhão state, northeastern Brazil. **B:** CICCA 00211, 32.6 mm SL, C&S; Munim River basin, Maranhão state, northeastern Brazil. **C:** Maxillary of *G. sternicla*, CICCA 00162, 31.4 mm SL, C&S; Pindaré River drainage of the Mearim River basin, Maranhão State, northeastern Brazil.

Pará State: Marabá municipality: CICCA 00212, 14 spms, 31.4–33.7 mm SL; Sororó River (Itacaiunas River drainage), 5°26'37"S–49°08'05"W; E. Guimarães and C. Costa; 03 Dec. 2015.

Parauapebas municipality: CICCA00213, 1 spm, 28.6 mm SL; Rio Castanheira (Itacaiunas River drainage), 5°45'31"S–49°41'17"W; E. Guimarães and C. Costa; 03 Dec. 2015. CICCA00214, 1 (C&S) spm, 25.8 mm SL; Castanheira River (Itacaiunas River drainage), 5°45'31"S–49°41'17"W; E. Guimarães and C. Costa; 03 Dec. 2015.

Thoracocharax stellatus

CICCA00215, 2 (C&S) spms, 30.8–33.2 mm SL; Sororó River (Itacaiunas River drainage), 5°45'31"S–49°41'17"W; E. Guimarães and C. Costa; 03 Dec. 2015.

CICCA00241, 4 spms, 51.3–49.4 mm SL; Sororó River (Itacaiunas River drainage), 5°45'31"S–49°41'17"W; E. Guimarães and C. Costa; 03 Dec. 2015.

RESULTS

The specimens of *Gasteropelecus* herein examined (Fig. 1) possess the following diagnostic character states of *G. sternicla*: absence of the sixth circumorbital bone and the outer premaxillary tooth rarely present (Fig. 3A, B), versus presence of the sixth circumorbital bone and the outer premaxillary tooth in both *G. levis* and *G. maculatus* (Weitzman, 1960; Géry, 1977); maxillary toothed (Fig. 3C) and larger body, while *G. levis* has maxillary not toothed, and a smaller body; and body without spots, while the body of *G.*

Table I. – Meristic data of *Gasteropelecus sternicla* herein examined.

| | Mearim basin | | Itapecuru basin | | Munim basin | | Tocantins basin | |
|--|--------------|--------|-----------------|--------|-------------|-------|-----------------|--------|
| | Nº | Range | Nº | Range | Nº | Range | Nº | Range |
| Number of dorsal-fin rays | 9 | 11 | 3 | 11 | 2 | 11 | 1 | 11 |
| Number of anal-fin rays | 9 | 33-34 | 3 | 33-34 | 2 | 32 | 1 | 33 |
| Number of pectoral-fin rays | 9 | 11 | 3 | 11 | 2 | 11 | 1 | 11 |
| Number of pelvic-fin rays | 9 | 5 | 3 | 5 | 2 | 5 | 1 | 5 |
| Number of longitudinal scales | 12 | 29-33 | 6 | 28-33 | 2 | 27-31 | 7 | 28-32 |
| Number of maxillary teeth | 9 | 2-3 | 3 | 2-3 | 2 | 2-5 | 1 | 2 |
| Number of teeth in the outer row of premaxilla | 9 | absent | 3 | absent | 2 | 1 | 1 | absent |
| Number of teeth in the inner row of premaxilla | 9 | 7-8 | 3 | 8 | 2 | 7-8 | 1 | 7 |
| Number of teeth in the dentary | 9 | 11-14 | 3 | 10-12 | 2 | 12 | 1 | 12 |
| Number of branchiostegal rays | 3 | 5 | 1 | 5 | 2 | 5 | 1 | 5 |
| Number of supraneurals | 9 | 11-12 | 3 | 11 | 2 | 11-12 | 1 | 12 |
| Number of principal caudal-fin rays | 6 | 21 | 3 | 21 | 2 | 21 | 1 | 21 |
| Number of dorsal procurent rays | 6 | 6 | 3 | 6 | 2 | 6 | 1 | 6 |
| Number of ventral procurent rays | 6 | 6 | 3 | 6 | 2 | 6 | 1 | 6 |
| Number of vertebrae | 9 | 29-30 | 3 | 29-30 | 2 | 30 | 1 | 29 |
| Number of rib pairs | 9 | 8 | 3 | 8 | 2 | 8 | 1 | 8 |

maculatus is spotted (Géry, 1977). Some meristic information of the specimens herein examined are presented in the table I.

DISCUSSION AND CONCLUSIONS

The present study expands the distribution of *G. sternicla*. The previously known eastern distribution limit for the Amazon River basin was in the Marajó Island of the Pará State (Montag *et al.*, 2009). We extended the species distribution for the following coastal river drainages and basins of the western Amazonia of the Maranhão State: Pindaré River drainage of the Mearim River basin, Itapecuru River basin and Munim River basin, as well as for the Itacaiunas River drainage of the Tocantins River basin, Pará state (Fig. 2).

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