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NOTES ON GEOGRAPHIC DISTRIBUTION

Range extension of Tropical Gar, *Atractosteus tropicus* Gill, 1863 (Lepisosteiformes, Lepisosteidae), to the Yucatan Peninsula, Mexico

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Abstract. The distribution of *Atractosteus tropicus* Gill,1863 is represented by three separate populations, which range from southeastern Mexico to Costa Rica. Herein, we document the first record of *A. tropicus* in the easternmost part of the Yucatan Peninsula, Mexico. Two individuals (total length 379–491 mm) were captured in Chan Laguna, and spring "ojo de agua" Ley Federal de Reforma Agraria in Campeche. Identification was based on the presence of 59–60 gill rakers on the first gill arch and teeth on palatines. We discuss the records and their pre-Hispanic evidence of the species' occurrence in the Calakmul region, as well as the possible introductions through aquaculture.

Key words. Campeche, freshwater fishes, new records, species distribution.

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Introduction

Fish of the family Lepisosteidae are commonly known as gars (Bussing 2002; Miller et al. 2009). They are representatives of a group with a long evolutionary history; the oldest fossil record is from to the Late Jurassic period (Brito et al. 2017), and the group diversified in the Cretaceous (Wiley 1976; Brito et al. 2017; Martinelli et al. 2025). Currently, the family is represented by seven species with distributions restricted to the east coast of North and Central America (Grande 2010). In Mexico, the family is represented by four species, the species with the southernmost distribution is the Tropical Gar, *Atractosteus tropicus* Gill, 1863 (Miller et al. 2009). This species is captured in Central America (Mora-Jamett et al. 1997) and highly appreciated in the southeast of Mexico, mainly in the Tabasco and southwest of Campeche area, where it has cultural significance and gastronomic importance (Lorente-Fernández 2018; Meneses Lopez 2020; Oropeza-Tosca et al. 2024).

Atractosteus tropicus lives in backwaters and marshy areas (Bussing 2002) and is a mainly ichthyophagous species, and its diet can include small arthropods. Females are larger than males, and the largest female reported is 131 cm in total length. This species reproduces mainly in the rainy season (Reséndez-Medina and Salvadores-Baledón 1983; Mora-Jamett et al. 1997). Its natural distribution is represented by three disjunct populations. The first occurs on the Atlantic slope between the basins of the Coatzacoalcos and Usumacinta rivers in southern Mexico and Guatemala; the second lives on the Pacific slope, between Chiapas, Mexico, and Guatemala; and the third occurs south of Lake Nicaragua and the San Juan river basin, Costa Rica (Bussing 2002; Miller et al. 2009).

On the Atlantic slope in Mexico, the southernmost verified records of *A. tropicus* are from the Usumacinta river basin (Miller et al. 2009; Soria-Barreto et al. 2018), and although its presence has been noted in the state of Campeche (Schmitter-Soto et al. 2010), there is no verifiable evidence of its presence on the Yucatan Peninsula. Here, we document the first records of *A. tropicus* on the Yucatan Peninsula, as part of the Atlantic population in the great Coatzacoalcos and Grijalva–Usumacinta basins.

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Methods

During a study of the ichthyofauna of the Yucatan Peninsula, in the Silvituc–Chan Lagoon complex (composed of the Silvituc, Las Maravillas, and Chan lagoons), the Canderia river subbasin, and the Champoton river basin (Figure 1; Wakida-Kusunoki et al. 2025), two specimens of *Atractosteus tropicus* were captured. One specimen was captured in Chan Lagoon using a gillnet with a mesh size of 7.62 cm, and the other in a spring ("ojo de agua") of the Ley Federal de Reforma Agraria in Campeche with polyester minnow seine (5 m long × 1.5 m high). The specimens were photographed in the field and identified using the taxonomic keys of Miller et al. (2009). Measurements were taken with an ichthyometer (± 5 mm), and meristic data were counted following Grande (2010). The specimens were subsequently fixed (10% formalin) and preserved (70% ethyl alcohol) in the Ichthyological Collection of the Faculty of Higher Studies Iztacala, National Autonomous University of Mexico (CIFI). The distribution map was created in QGIS v. 3.32.2 (QGIS Development Team 2023).

Results

***Atractosteus tropicus* Gill 1863**

Figures 1, 2A, B

New records. MEXICO — **Campeche** • Silvituc–Chan Lagoon System, Chan Laguna; 18°28'45"N, 090° 12'47"W; 7 m alt.; 09.XII.2024; Wakida-Kusunoki, A.T., Galindo-Hernandez, J.H., Martínez-Martínez, D., García-Mercado, E., Del Moral-Flores, L.F. leg.; Gillnet; 1 spec., CIFI-2401 • spring "ojo de agua" of Ley Federal de Reforma Agraria; 19°04'16"N, 090°48'37"W; 03.II.2025; Martínez-Martínez, D., Anguiano-Lara, G.A., Hernández-Ortiz, R., Del Moral-Flores, L.F. leg.; 1 spec., CIFI-2499.

Identification. Colouration: the back is greyish, and the belly is whitish. A dark line runs on the sides from the lower jaw to the opercular region, and the branchiostegal membrane is dark postopercular. Two dark lines run behind the pelvic fins to the caudal peduncle; these do not have a straight edge and appear as joined spots. The pectoral and pelvic fins are dark, and the dorsal, anal, and caudal fins have dark to whitish spots. The rays are highlighted in dark color grey (Figure 2).

Meristic data: The specimens presented the following meristic data: pectoral fin rays 11–13, pelvic-fin rays 6, anal-fin rays 8, dorsal-fin spine IV, dorsal-fin rays 7, principal caudal-fin rays 12; 52 rows of transverse ganoid scales, and 59 or 60 gill rakers on the first gill arch. Moreover, the species can be recognized by the following combination of characters: jaw length 52.3% of head length, symphysis teeth curved, four suborbital bones present, and palatine bones with a series of enlarged teeth. Table 2 shows the morphological and meristic data of our specimens.

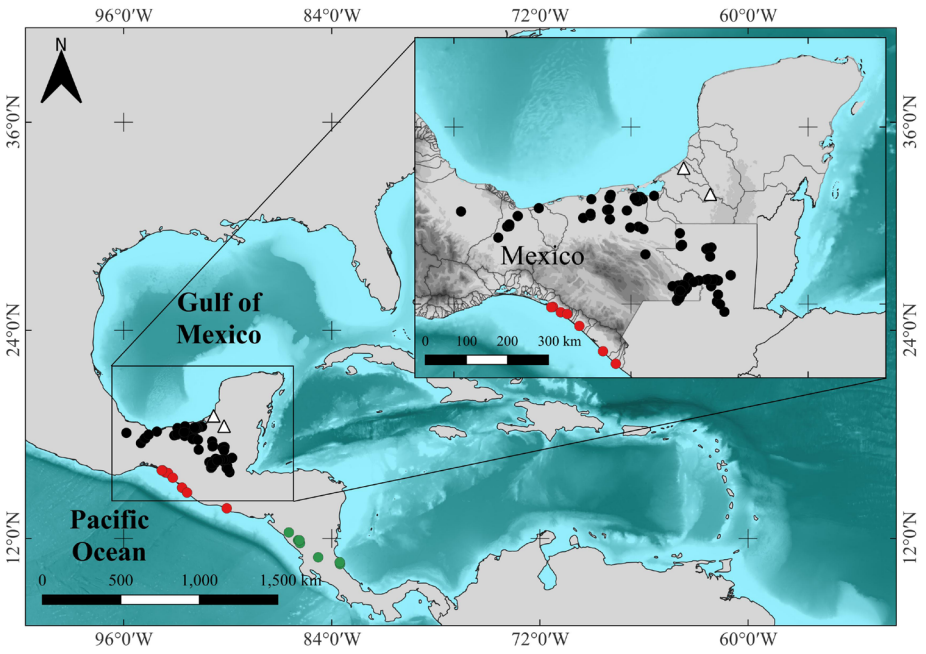

Figure 1. Map showing previous records of *Atractosteus tropicus* in dark circles (Coatzacoalcos–Usumacinta population), red circles (Pacific coast population), and green circles (southernmost population in Nicaragua and Costa Rica). It also shows new records in white triangle on the Yucatan Peninsula. Previous records obtained from GBIF (2025).

Figure 2. *Atractosteus tropicus* specimens collected in the Yucatan Peninsula, Mexico. **A, B.** Lateral and dorsal cephalic views, respectively (CIFI-2401, 491 mm total length). **C, D.** Dorsal and ventral views, respectively (CIFI-2499, 379 mm total length). Scale bars = 2 cm.

Discussion

The specimens correspond to *Atractosteus tropicus*, matching the diagnosis characters reported for the species sensu Miller et al. (2009) and Grande (2010). According to local fishermen, the species inhabits the three-lagoons complex (Silvituc-Chan Lagoon) and is commercially fished. However, it is rare in Reforma Agraría, where it is caught for local consumption during the dry season. The captured specimens are juveniles, as the species reaches maturity at 32.5–45.5 cm total length (TL) in males and 40–50 cm TL in females (Márquez-Couturier et al. 2013), and 40–60 cm TL in Costa Rica (Mora-Jamett et al. 1997).

The presence of *A. tropicus* is well documented in the great Grijalva–Usumacinta basin (Gómez-González et al. 2015), with the southernmost confirmed records in Guatemala (Quintana 2024), and the north-easternmost records in tributaries of the Usumacinta River in Campeche (Soria-Barreto et al. 2018). Our record increases its to the eastern distribution by approximately 139 km. Although

Table 1. Morphometric (mm) and meristic data of the *Atractosteus tropicus* specimens collected in the Yucatan Peninsula. The values in parentheses may be represented as a percentage of the head length (% HL) or standard length (% SL).

	Chan Laguna, Campeche (CIFI-2401)	**Spring "ojo de agua" Ley Federal de Reforma Agraria, Campeche (CIFI-2499)**	**Grande 2010 (*n* =6)**
Total length (mm)	491	379	405–600
Standard length (mm)	425	333	
Body depth	47 (11.1% SL)	45 (13.5% SL)	47-64 (11–13% SL)
Prepectoral length	139 (32.7% SL)	109 (32.7% SL)	105-173 (30-33% SL)
Prepelvic length	250 (58.8% SL)	173 (51.9% SL)	190–304 (54–58% SL)
Predorsal length	368 (86.6% SL)	286 (85.9% SL)	297–445 (84–86% SL)
Preanal length	363 (85.4% SL)	270 (81.1% SL)	290–440 (83–85% SL)
Dorsal-fin base	24 (5.6% SL)	19 (5.7% SL)	19–29 (5–6% SL)
Anal-fin base	28 (6.6% SL)	18 (5.4% SL)	20–33 (5–6% SL)
Caudal-fin length	63 (14.8% SL)	47 (14.1% SL)	64–85 (16–18% SL)
Caudal-peduncle depth	28 (6.6% SL)	21 (6.3% SL)	24.2–37 (6–7% SL)
Head length	131 (30.8% SL)	102 (30.6% SL)	99–160 (29–32% SL)
Mandibular length	69 (52.3% HL)	54 (52.9% HL)	53–86 (53–54% HL)
Premaxillary length	41 (31.3% HL)	33 (32.3% HL)	36–55 (31–37% HL)
Frontal length	55 (42.0% HL)	43 (42.2% HL)	42–73 (42–47% HL)
Preorbital length	76 (58.0% HL)	61 (59.8% HL)	59–94 (58–61% HL)
Postorbital length	41 (31.3% HL)	29 (28.4% HL)	31–49.5 (28–31% HL)
Meristics			
Total principal caudal rays	12	12	12
Branched caudal rays	12	12	12
Dorsal-fin rays	7	7	7–8
Anal-fin rays	8	8	8–9
Left and right pectoral fin rays	11; 11	13; 13	11–13; 11–12
Left and right pelvic fin rays	6; 6	6; 6	6; 6
Scales along lateral line	52	52	51–53
Preanal lateral line scales	36	35	33–36
Predorsal lateral line scales	42	45	43–47
Prepelvic lateral line scales	16	15	14–16
Scale rows above lateral line	12	12	11–12

Flores-Ramos (2014) reported *Lepisosteus platostomus* Rafinesque, 1820 from the Silvituc-Chan Lagoon, this identification is unlikely given that the species is restricted to the basin of the Mississippi River in the USA (Grande 2010).

The southeastern region of Mexico contains evidence of pre-Hispanic fishing, commerce, and aquaculture that may have affected the distribution of important freshwater fish species (Palka 2023; Varela Scherrer and García Barrios 2025). Zooarchaeological evidence from Silvituc Island, which is adjacent to the lagoon, indicates that an *Atractosteus* sp. was a prevalent fish species in the region (Alexander et al. 2013). This species might be *A. tropicus*.

The Chan Laguna region is an area of biogeographical interest; Silvituc and Las Maravillas are the largest bodies of water in the region. According to residents, Chan Laguna occasionally dries, but during the rainy season, channels form between the lakes, allowing species replacement and recolonization (Wakida-Kusunoki et al. 2025). Such floodplain dynamics are consistent with known reproductive habitats of *A. tropicus*, where rising water levels are associated with spawning and increases in fish abundance (Mora-Jamett et al. 1997; Méndez-Marin et al. 2016). Additionally, Chan Laguna retains its marshy characteristics, which are the preferred habitat of *A. tropicus*. Further into the peninsula, there is an area of karst slope where surface bodies of water tend to be rare. Ichthyofaunistic surveys in Calakmul, on the eastern edge of the Chan Laguna, have not recorded *A. tropicus* (Vega-Cendejas 2010; Vega-Cendejas et al. 2013).

The lack of ichthyofaunistic studies in the region overlooks the presence of several fish species. In Campeche, the Chumpán, Candelaria and Mamantel basins lack ichthyofaunistic investigation (Soria-Barreto et al. 2024). The lagoon complex is considered a sub-basin of the Candelaria River, which extends as far as Guatemala and adjoins the San Pedro basin, where there are records of *A. tropicus* (Barrientos et al. 2018; Quintana 2024). This may give an indication of the common ichthyofauna and its biogeographic relationship.

Due to the importance of *A. tropicus*, exploitation for food, and the recorded decrease in wild populations (Márquez-Couturier et al. 2013), this species is cultivated (Márquez-Couturier and Vázquez-Navarrete 2015). This has led to its cultivation outside of its natural geographic range (sensu Miller et al., 2009; Soria-Barreto et al. 2018), for example, in the Sabancuy area, where attempts are

being made to raise *A. tropicus* (González-Elías et al. 2011). If fish were accidental released from one of these aquaculture operations, it could become a translocated species. This highlights the need to establish and recognize the natural distribution limits of species.

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Additional information

Conflict of interest

The authors declare that no competing interests exist.

Ethical statement

No ethical statement is reported.

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Author contributions

Conceptualization: LFDMF, ATWK. Data curation: LFDMF, DMM. Formal analysis: LFDMF, ATWK. Funding acquisition: LFDMF, ATWK. Investigation: LFDMF, ATWK. Methodology: LFDMF, ATWK, DMM, GAAL, JHGH. Resources: LFDMF, ATWK. Supervision: LFDMF. Visualization: LFMD, GAAL. Project administration: LFDMF, ATWK. Validation: LFDMF, ATWK, DMM, GAAL, JHGH. Writing – original draft: LFDMF, ATWK, DMM, GAAL, JHGH. Writing – review and editing: LFDMF, ATWK, DMM, GAAL, JHGH.

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Data availability

All data that support the findings of this study are available in the main text.

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