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# OCCASIONAL PAPERS OF THE MUSEUM OF NATURAL SCIENCE

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**LOUISIANA STATE UNIVERSITY  
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**FIRST RECORD OF THE NON-NATIVE SUCKERMOUTH ARMORED  
CATFISH *HYPOSTOMUS* CF. *NICEFOROI* (FOWLER 1943)  
(SILURIFORMES: LORICARIIDAE) FROM CENTRAL AMERICA**

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## ABSTRACT

We document the first record of *Hypostomus* cf. *niceforoi* in Central America. Two specimens of these suckermouth armored catfishes were collected in Lake Nicaragua (Nicaragua) and identified as *H. cf. niceforoi*. *Hypostomus niceforoi* is endemic to Andean streams of Colombia, Venezuela, Ecuador, and Peru. We hypothesize that its introduction in Central America is related to the aquarium trade, as is the case of other armored catfish species introductions.

**KEY WORDS:** Nicaragua, invasive species, armored catfishes, Hypostominae

## INTRODUCTION

The loricariid catfishes of South America and Lower Central America are represented by over 900 recognized species (Eschmeyer and Fong 2015) and potentially 300 undescribed species (Ferraris 2003). Loricariidae is the second most species-rich family in the Neotropics, exceeded there by only the family Characidae (Reis et al. 2003). Although most loricariid diversity is found on the eastern side of the Andes Mountain Range, some groups are restricted to the South American Pacific Slope (Ferraris 2003) and a number of genera have managed to naturally disperse as far north as eastern Lower Central America (Bussing 2002; Angulo et al. 2013; Matamoros et al. 2015).

Loricariid species-richness is matched by the incredible diversity of habitats these fishes occur in, and the remarkable body shape variation they exhibit (Covain and Fisch-Muller 2007; Lujan and Armbruster 2012; Lujan et al. 2015). Loricariids are found at a range of altitudes that vary from near sea level up to 3000 meters in elevation (Nelson 2006). Their adult body size ranges from just a few centimeters to over a meter in total length (Fuller et al. 1999; Nelson 2006). However, despite their variable body shapes, loricariids are generally characterized by having a depressed body and a ventral suction-like mouth (Covain and Fisch-Muller 2007). These two morphological traits are hypothesized to have allowed these fishes to thrive in benthic, lotic environments (Nico and Martin 2001). Loricariids also possess a pair of maxillary barbels and a body covered by large bony plates (Covain and Fisch-Muller 2007), hence the common name “armored catfishes.” Loricariids have rows of fine specialized teeth (villiform), which in combination with their sucker-like mouth, allow them to scrape submerged substrates to consume algae, small invertebrates, organic sediments (e.g., detritus and mud), and even wood (Nico and Taphorn 1994; Yossa and Araujo-Lima 1998; Delariva and Agostinho 2001; Lujan et al. 2012). Many members of the family are popular aquarium fishes used for controlling algae in aquaria.

The popularity of armored catfishes in the aquarium trade has facilitated the introduction and subsequent establishment of several species outside their native ranges (Fuller et al. 1999; Nico and Martin 2001; Vidthayanon 2005; Page and Robins 2006). Introduced populations of armored catfishes have been reported in Hawaii (Welcomme 1988; Yamamoto and Tagawa 2000), Puerto Rico (Bunkley-Williams et al. 1994), Texas (Hoover et al. 2004), Florida (Courtenay et al. 1984; Ludlow and Walsh 1991; Shafland 1996; Nico et al. 2012), Mexico (Wakida- Kusunoki et al. 2007; Mendoza et al. 2007; Mendoza-Alfaro et al. 2009; Capps et al.

2011), Jamaica (Jones 2008), Costa Rica (Bussing 2002; Angulo et al. 2013), the Philippines (Chavez et al. 2006), Singapore (Lim and Ng 1990), Indonesia (Kottelat et al. 1993), Japan (Nakabo 2002), Taiwan (Liang et al. 2005), Thailand (Vidthayanon 2005), Vietnam (Levin et al. 2008), Malaysia (Page and Robins 2006), and South Africa (Jones et al. 2013). Armored catfish identified as *Hypostomus niceforoi* (Fowler 1943) have also been reported in the San Antonio River, Texas (Hoover et al. 2014).

Several studies have been conducted for assessing the ecological effects of armored catfishes in the introduced portions of their distributions (e.g., Nico et al. 2009a, b; Capps et al. 2011; Capps and Flecker 2013). Armored catfishes in non-native areas have been correlated with extreme changes in water quality and nutrients (Capps and Flecker 2013). In freshwater systems in southern Mexico they have become locally abundant and have been correlated with the reduction of native fish populations and, as a consequence, serious reductions in local artisanal fisheries (Capps et al. 2011). In peninsular Florida, armored catfishes have been associated with riverbank instability and erosion because of their burrowing behavior (Hoover et al. 2004; Nico et al. 2009a). In addition, due to the presence of strong spines on the body, armored catfishes have been reported to damage fishing gear (Gestring et al. 2010).

The main objective of this paper is to report the suspected establishment of the armored catfish we identify as *H. cf. niceforoi* in Nicaragua. *Hypostomus niceforoi* is a species native to the Andean region from Colombia to Peru in the Amazon and Orinoco basins; this is the first report of this species in Central America.

## MATERIALS AND METHODS

Ichthyologists from the Louisiana State University Museum of Natural Science (LSUMZ), in collaboration with personnel of the Ministerio del Ambiente y Recursos Naturales de la Republica de Nicaragua (MARENA), performed fish survey work in the Nicaraguan Mosquitia and around the Nicaraguan lakes in August of 2011. Sampling in Nicaragua was performed under collection permits issued by MARENA. The two specimens of *H. cf. niceforoi* discussed here were donated by MARENA personnel to the LSUMZ Fishes Collection (LSUMZ 15096). The specimens were collected in the Rivas Department, municipality of Cardenas (Fig. 1), as part of a MARENA armored catfishes monitoring program (Marengo 2010).

Specimen identification was performed in the laboratory of Dr. Jonathan Armbruster at Auburn University. The LSUMZ specimens were compared to specimens of suckermouth armored catfishes in Auburn and also with the holotype: ANSP (Academy of Natural Sciences, Philadelphia) 70511. Unfortunately, after verifying their identification to species, the LSUMZ specimens were lost in postal transit back to Louisiana State University.

## RESULTS AND DISCUSSION

Unfortunately, species of *Hypostomus*, especially when found outside of their native ranges, are difficult to identify. No keys are available for *Hypostomus*, and the range of the genus extends throughout the entire range of the family. There are currently over 100 species in the genus, and many undescribed species (Armbruster 2004). Identification of the specimens as *Hypostomus niceforoi* (Fig. 2) is based on the presence of (1) long jaws with dentaries approaching a 180° angle, (2) many teeth (>60), and (3) a color pattern of dark spots on the



**Figure 1:** Map of Nicaragua showing the single sample locality for specimens of *Hypostomus* cf. *niceforoi* in Lake Nicaragua. Arrow points to the locality indicated by a black circle.

body, fins, and abdomen. Such long-jawed species of *Hypostomus* are known from fast-flowing rivers throughout the range of *Hypostomus*, but we know of no other species (besides *H. niceforoi*) with a color pattern like those of the Nicaragua specimens (LSUMZ 15096), with the possible exception of *H. bolivianus* (Pearson 1924).

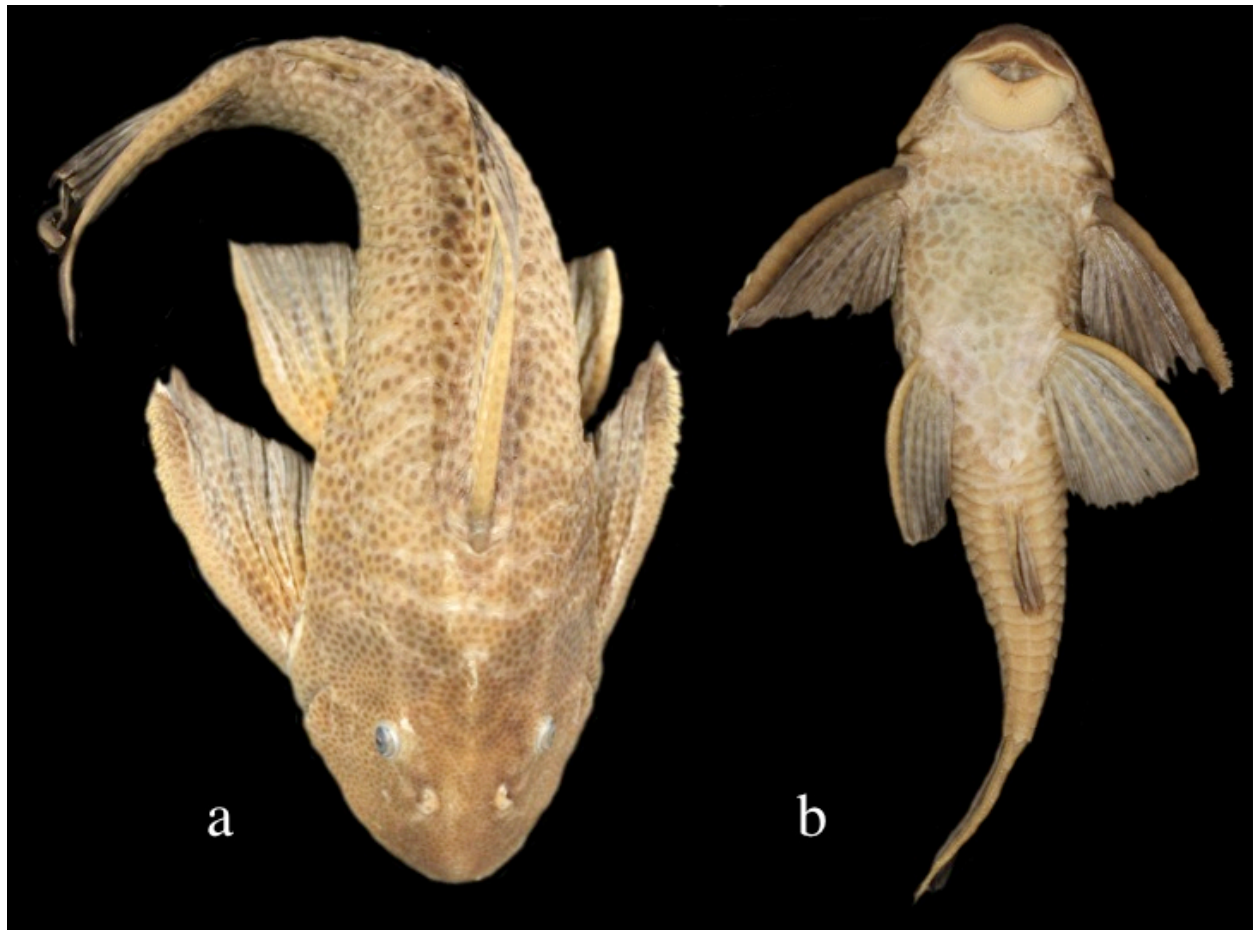
“Plecos” (as armored catfishes are generally known) are some of the most introduced invasive species from the aquarium trade. Most of these introduced species are members of *Pterygoplichthys*, which differ from *Hypostomus* by having 9–14 branched dorsal-fin rays (vs. seven in *Hypostomus*; Armbruster and Page 2006). The name “*Hypostomus plecostomus* (Linnaeus 1758)” is often applied to specimens in the aquarium trade, but most of

these specimens are currently recognized as members of *Pterygoplichthys*. *Hypostomus plecostomus* is described from brackish waters in Suriname and would likely not be a successful aquarium fish or transplant into freshwaters. It differs from the Nicaraguan

specimens (LSUMZ 15096) by having an unspotted abdomen and dentaries forming a nearly acute angle (Boeseman 1968). *Hypostomus aspidolepis* is the species with a range closest to Nicaragua, extending into the Río Térraba basin of Costa Rica (Bussing 2002; Angulo et al. 2013). *Hypostomus aspidolepis* was originally described in the genus *Hemiancistrus* because of the presence of hypertrophied odontodes set on evertible plates on the cheek (Evans 2002), and was recently moved to *Hypostomus* (Armbruster et al. 2015). In general, there are about 3–5 of these odontodes in *H. aspidolepis*, but the Nicaraguan specimens lacked hypertrophied, evertible cheek odontodes.

*Hypostomus niceforoi* (Fig. 3) was described from the Río Orteguasa (a tributary of the Río Japurá – Río Amazonas) of Colombia by Fowler (1943). Specimens resembling *H. niceforoi* have been examined by one of us (JWA) from Andean drainages from Venezuela to Peru (including from the Auburn University Museum collections: AUM 45537, 45615, 45623, 45635, 57497, 57512, and 44519), and the species appears to be replaced by *H. bolivianus* from the Madeira basin southwards; however, the species group is in need of revision. The other *Hypostomus* of the Andes include a likely undescribed species that has shorter jaws with the dentaries forming an angle approaching 90° (vs. nearly 180° in *H. niceforoi*; JWA pers. obs.) and species of the *H. cochliodon* species group, which have large, spoon-shaped teeth and dentaries forming angles of less than 90° (vs. villiform teeth; Armbruster 2005).

*Hypostomus niceforoi* is particularly abundant in streams around Villavicencio, Colombia (based on specimens examined by JWA at Museo de Historia Natural, Universidad Nacional de Colombia, Bogotá, ICNMHN). Villavicencio is an area that was an early exporter of aquarium



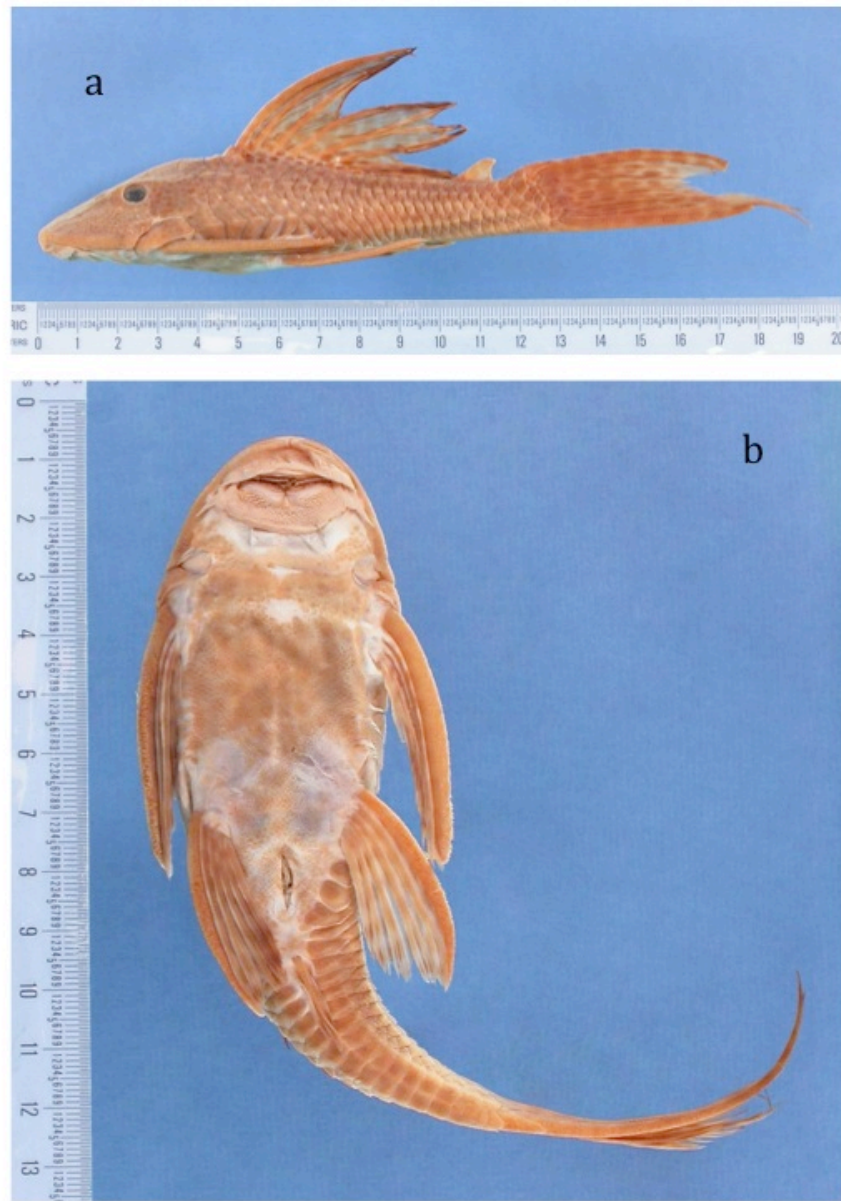
**Figure 2:** Dorsal (a) and ventral (b) view of *Hypostomus* cf. *niceforoi* from Lake Nicaragua, Nicaragua – formerly deposited at Louisiana State Museum of Zoology (LSUMZ 15096; a, 24cm SL; b, 20cm SL). Photos by C. McMahan.

fishes, and still exports fishes today. For example, “Orinoco Fish Exporters” has been in operation since 1970, and also serves as a major breeder and acclimatizing center of fishes. Armbruster (2005) implicated the aquarium industry in the potential introduction of *Lasiancistrus guacharote* (Valenciennes 1840) into the Orinoco River system around Villavicencio from the Lake Maracaibo basin. JWA previously identified specimens from the Rio Grande (on Texas/Mexican border) as *H. niceforoi* for Hoover et al. (2004) based on characters described above.

We choose to use the “cf.” designation for two reasons in our identification of LSUMZ 15096. First, lacking the specimens we can no longer share them with other experts. Second, in all likelihood *H. niceforoi* is a species complex that will be divided into multiple species in the future.

This is the first report of *H. cf. niceforoi* from Central America, as well as the first confirmed report of a loricariid in Nicaragua. At present we assume that the loricariids being captured in Lake Nicaragua are all *H. cf. niceforoi* pending future collection efforts.





**Figure 3:** Images of the holotype of *Hypostomus niceforoi* (ANSP 70511, 13.5 cm SL) in (a) lateral and (b) ventral view. Photos by K. Luckenbill.

As true in many places around the world, the establishment of armored catfishes in Nicaragua is likely related to the aquarium trade (Marenco 2010). Many loricariid species are commonly sold in Nicaraguan pet shops (CRM pers. obs.). The present report places *H. cf. niceforoi* in the Department of Rivas; however, some studies record sights and captures of what is likely *H. cf. niceforoi* around nearly the complete periphery of Lake Nicaragua (Marenco 2010). While the effects of *H. cf. niceforoi* on their biotic and abiotic environment has not been quantified, local fisherman claim that native fish populations have experienced declines since the introduction and discovery of armored catfish (authors, pers. obs.). One immediate and obvious negative effect to the local economy is that fisherman are severely damaging their fishing gear

when *H. cf. niceforoi* is captured (Marenco 2010). The armored and spiny bodies of these fishes become entangled in nets, typically causing tears when they are removed. Lake Nicaragua is also facing the potential of being cut in half by a proposed canal project (Academia de Ciencias de Nicaragua 2014), which will exacerbate environmental problems, including the spread of invasive species.

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