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Loricaria cataphracta: parental care and description of early larvae

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Two specimens of *Loricaria cataphracta* collected in the Essequibo River drainage of Guyana were carrying eggs on the breast and abdomen. The identity of these specimens, one male and one female, was confirmed by gathering meristic and morphometric data. This may be the first observation of both genders carrying eggs in the Loricariidae. Newly hatched larvae are described.

Introduction

There is a great diversity of morphology among the species of the family Loricariidae. Most species are known only from preserved material, but among those that have been observed alive, there is a great diversity of behavior also. The following examples are meant to describe the variety of loricariid spawning and parental care observed primarily in aquaria. Adhesive eggs are laid singly on plants and are not cared for in some Hypoptopomatinae (*Otocinclus*; Innes, 1935). Eggs are placed in holes constructed in stream banks and guarded in some Hypostominae (*Hypostomus*; Azevedo, 1938) and Ancistrinae (*Ancistrus*; Carter & Beadle, 1931).

More extensive parental care has been observed in the Loricariinae. Males of some *Rineloricaria* spp. guard the patch of adhesive eggs laid on rocks or logs, fanning them and removing fungused individuals (Sands, 1984). Similar parenting behavior has been noted for *Ricola*, *Sturisoma*, and *Sturisomatichthys* (Sands, 1984). Males of *Paraloricaria vetula* and *Loricariichthys anus* carry eggs under their enlarged lower lip (Breder & Rosen, 1966) as does *Loricariichthys maculatus* (= *Loricara typus*) (Lagler et al., 1962). *Loricaria piracicabae* and *L. simillima* carry eggs on the ventral surface of the body (Azevedo, 1938; Burgess, 1989).

Loricaria cataphracta has been reported to carry eggs on the ventral surface of the male (Ribeiro, 1912). Fuiman (1984) briefly mentioned strongly adhesive eggs in *L. cataphracta* which were carried on the abdomen of an adult. Burgess (1989) mentioned the need for confirmation of these observations. *Loricaria cataphracta* has been rarely, if ever, seen in the aquarium trade (Sands, 1984) so observations of spawning in captivity are unavailable.

The purpose of this paper is to document egg-carrying behavior in *L. cataphracta* in nature. In addition, meristics and morphometrics from specimens at the edge of the distribution and a description of the newly hatched larvae are presented.

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Fig. 1. *Loricaria cataphracta*, NYSM 51381, 122 mm SL; female, freshly caught, ventral view, showing cluster of ova adhering to breast and abdomen.

Loricaria cataphracta in Guyana

The name *Loricaria cataphracta* has been used for a wide variety of loricariids from a wide area of South America (Isbrücker, 1972). Isbrücker (1972) redefined *L. cataphracta* and described its distribution (Isbrücker, 1981) as the lower Amazon River (upstream to approximately Manaus), in the lowlands around the mouth of the Amazon, and in the Atlantic Ocean drainages north of the Guiana Shield westward to the Essequibo in Guyana.

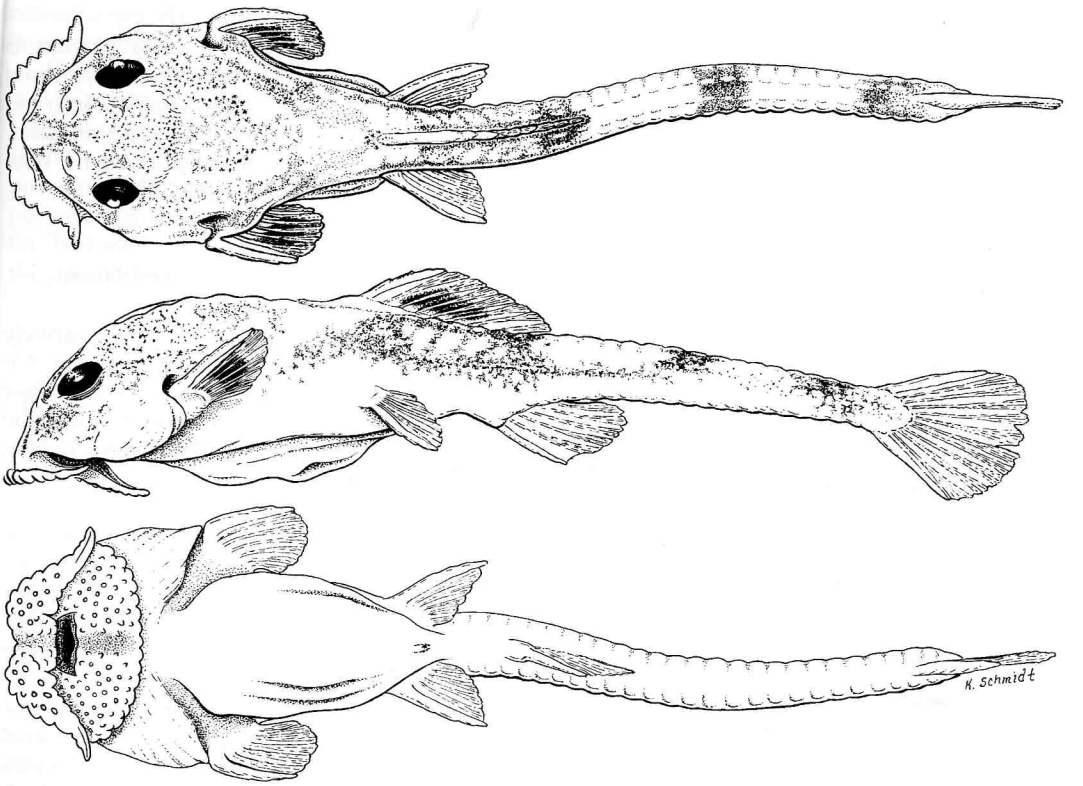

Fig. 2. *Loricaria cataphracta*, NYSM 51380, approx. 7.9 mm SL, newly hatched.

My collecting activity in the tidal Essequibo drainage over the last fifteen years has yielded five loricariine specimens with long caudal filaments, few teeth, and numerous long barbels on the lower lips, identified here as *L. cataphracta*. Since Isbrücker (1981) examined only six specimens of *L. cataphracta* from the Essequibo and because the nomenclatural history of this species has been very involved, I did counts and measurements following Isbrücker & Nijssen's (1978) methods to substantiate the identification.

Meristic and morphometric data (Table 1) clearly show that my specimens are *L. cataphracta*. My specimens differ from the Essequibo specimens examined by Isbrücker (1981) by having a larger cleithral width in some specimens, a much greater range of head depths, and somewhat different barbel lengths. These differences may be due to allometry since my specimens are relatively small compared to those examined by Isbrücker (1981) or may be related to small sample sizes examined from the Essequibo.

Parental care

Fuiman's (1984) observation was probably not based on *L. cataphracta* given that the specimens he saw were well out of range for the species (Fuiman, pers. comm.; Isbrücker, 1981). Ribeiro's (1912) observations may have been *L. cataphracta* from the mainstream Amazon, but Isbrücker (1981) listed this identification as needing confirmation. The New York State Museum (NYSM) specimens, however, confirm egg carrying behavior in *L. cataphracta*.

Two of my specimens (NYSM 51380, 118 mm SL; NYSM 51381, 122 mm SL) were captured with eggs adhering to the breast and abdomen (Fig. 1). These eggs were concentrated in a single layer and were only weakly attached to the fish. Although the eggs remained stuck together, the egg masses fell off both fishes when slightly agitated after preservation. Nineteen eggs were taken from NYSM 51380 most of which had eyed embryos clearly visible. Five newly hatched larvae were still present on the egg mass, thus allowing for a

description of this developmental stage. Thirty-four eggs of a similar developmental stage were taken from NYSM 51381 including two empty membranes. Eggs were pressed together and therefore not uniformly round but measurements of the most nearly circular eggs were 2.9-3.4 mm in diameter (preserved).

Dissection of these two adult specimens showed that NYSM 51381 is a male with regressed testes (confirmed by histological preparation) and that NYSM 51380 is a female with large ova in her ovaries. This may be the first observation of both genders carrying eggs in a loricariid.

Table 1. Morphometrics and meristics of *Loricaria cataphracta* from the Essequibo River, Guyana. Data from five NYSM specimens and two individuals collected in 1976-77 (Isbrücker, 1981). Broken fin elements were not included in the data.

	mean	range NYSM	range Isbrücker, 1981
Standard length (mm)	125.2	118-130	143-167
Percentage of standard length			
Head length	20.8	20.4-21.3	19.2-20.8
Predorsal length	29.4	28.6-31.2	27.0-27.8
Postdorsal length	62.5	58.8-62.5	62.5
Preanal length	52.6	50.0-55.5	52.6-55.5
Dorsal spine length	22.7	22.2-22.7	22.7
First dorsal ray length	20.8	20.4-22.2	21.7-22.2
Anal spine length	17.2	15.6-18.5	16.1-17.2
Pectoral spine length	18.2	16.9-19.6	18.5-19.6
Pelvic spine length	17.2	16.4-19.2	16.9-18.9
Upper caudal filament	111.1	90.9-142.8	200.0
Lower caudal filament	12.9	12.6-16.4	12.3-14.7
Percentage of head length			
Snout length	52.7	52.7-55.6	52.7
Lower lip width	18.7	14.7-23.8	17.5-18.2
Thorax length	71.4	71.4-76.9	76.9
Abdomen length	62.5	50.8-71.4	62.5-66.7
Orbit diameter	20.0	18.5-22.5	18.9-19.2
Interorbital distance	18.5	17.5-19.6	17.8-18.2
Cleithrum width	71.4	66.7-76.9	76.9
Supracleithrum width	58.8	52.6-66.7	52.6-55.5
Head width	71.4	66.7-76.9	71.4-76.9
Head depth	33.7	32.2-38.5	34.5-35.7
Body depth at dorsal fin	43.5	40.0-47.6	40.0-41.7
Body width at dorsal fin	58.8	55.5-66.7	55.5-58.5
Body width at anal fin	50.0	47.6-55.6	47.6-50.0
Caudal peduncle depth	5.1	4.6-5.6	5.1-5.6
Caudal peduncle width	14.9	14.1-17.9	14.5-15.2
Rictal barbel length	45.4	38.5-55.5	40.0
Lower lip barbel length	12.5	7.7-18.5	9.6-9.8
Meristics			
Lateral scutes	32.5	32-33	35-36
Caudal scutes	17.8	16-18	20-21
Thoracic scutes	6.6	6-7	7-9
Premaxillary teeth (left)	3.2	3-4	3-4
Premaxillary teeth (right)	3.2	3-4	4-5
Mandibular teeth (left)	6.6	5-9	7-8
Mandibular teeth (right)	6.4	5-8	7-8

Description of newly hatched larvae

The larval description is based on four relatively intact specimens (NYSM 51380) measuring 7.5-8.3 mm SL. The preanal part of the body is larger in proportion than in adults (Table 1) but the head length is similar to adults. Head length is 20 % SL and predorsal length is 43.5 % SL.

The lower lip is notched anteriorly (Fig. 2) and expanded posteriorly covering a smaller proportion of the body (14.5 % SL) than in adults. The lips are covered with papillae but, except for the postero-lateral corners of the anterior lips, papillae are not elongate as in adults. There are no teeth visible in the mouth.

Fin elements are developed and the anterior spines in the dorsal, pectoral, pelvic, and anal fins are differentiated from the rays but the spines are still flexible and therefore have not ossified. The elongate filament on the dorsal lobe of the caudal fin has not begun to develop. There is no evidence of scutes developing anywhere on the body.

Ventral surfaces are immaculate except for a few melanophores along the anterior edge of the yolk sac. Dorsal surface of the body has melanophores concentrated in three saddles. The first saddle begins approximately at the base of the first dorsal fin ray and extends posteriorly past the insertion of the dorsal fin. Melanophores are denser in the posterior part of this saddle. The second saddle is on the caudal peduncle about half way between the dorsal and caudal fins. The third saddle is located at the anterior base of the caudal fin. The saddles extend ventrally to about midbody. At that point there is a vague dark band that begins at the head, runs along midbody, and disappears on the caudal peduncle.

The dorsal surface of the head is weakly speckled with melanophores. There are discrete dark melanophores concentrated in two lines that begin anterior to the eye and run medially to the nares and out to the tip of the snout. Two broad dark blotches are located ventral to the eye and

extend anteriorly to the nares. The eyes are darkly pigmented.

Interradial membranes of the dorsal fin are darkly pigmented at the base. The pigment extends about half way to the dorsal margin in the anterior part of the fin and decreases in extent posteriorly. Pigment is also on the rays of the pectoral fins occupying the middle third of the fin. This pigment appears as a dark band across the pectoral fins.

Discussion

The egg-bearing specimens were collected on 12 and 13 January close to the end of the 'small' wet season in Guyana. Since the eggs were close to hatching, spawning must have occurred during the wet season. I have no information on how long hatching may take in this species although aquarium observations of some loricariines give hatching time as 8-20 days (Breder & Rosen, 1966). Spawning, therefore, probably occurred in late December or early January.

Isbrücker (1981) described mature males of *Loricaria* as having hypertrophied pectoral fin spines. I could see no such character in the egg-bearing male. The regressed testes suggest that enough time had elapsed since spawning for secondary sexual characters to recede (if that is possible for these fishes) or that the male was immature. This latter possibility, while unlikely, cannot be disproven with available specimens. More collecting is necessary to resolve these apparently conflicting observations.

The egg-bearing female had large ova in the ovaries. That observation would extend the spawning period into the beginning of the dry season. The clutch size (19-34 eggs) of this species is small. A given female carrying a clutch of eggs would increase her fecundity by having other individuals also carry a clutch of eggs. In loricariines it is usually the males that carry or care for eggs (Breder & Rosen, 1966; Burgess, 1989; Sands, 1984). My observation of a female carrying a clutch of eggs is therefore unusual, however this behavior may be more widespread than thought. How many observers, knowing that male loricariines carry the eggs, actually look at internal anatomy of the specimen to determine gender? This question is particularly relevant in those species with minimal or obscure secondary sexual characteristics.

Few descriptions of wild caught loricariid larvae are available, especially ones identified to species (Page et al., 1993; Machado-Allison & Lopez-Rojas, 1975; Lopez-Rojas & Machado-Allison, 1975). Fuiman (1984) briefly summarized loricariid development. The above descriptions and mine cover a wide range of genera whose relationships are not clear and therefore it is not possible at this time to make any additional useful statements about loricariid development.

Materials examined. Guyana: NYSM (New York State Museum) 51377, 1, 129 mm SL; Whyape Creek, north shore of Cuyuni River mouth; 23 Aug 1987. – NYSM 51378, 1, 127 mm SL; same locality; 17 Aug 1987. – NYSM 51380, 2, 118-130 mm SL; Murray Point, south bank of Mazaruni River about 5 miles west of its mouth; 12 Jan 1994. – NYSM 51381, 1, 122 mm SL; same locality; 13 Jan 1996. All specimens were taken in intertidal or upper subtidal water over silty substrate.

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