

Redescription of *Corydoras guapore* Knaack, 1961 (Siluriformes: Callichthyidae), a midwater Corydoradinae species from the rio Guaporé basin

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Corydoras guapore was described from the rio Guaporé, Rondônia State, Brazil, based only in three specimens, two of them merely examined alive in an aquarium and apparently not preserved posteriorly. The current location of these two paratypes is uncertain. In the original description, no standard diagnosis was presented and the descriptive information available is scarce and based only in external morphology. Thus, the aim of this study is to provide a redescription of *C. guapore* based in several topotypes. *Corydoras guapore* can be distinguished from its congeners by the presence of a short mesethmoid, with the anterior tip poorly developed; posterior margin of pectoral spine with conical serrations directed towards the origin of the spine; and by the lateral portion of caudal peduncle almost entirely blackened. Information about *C. guapore* ecology and conservation status are also provided.

Corydoras guapore foi descrita do rio Guaporé, estado de Rondônia, Brasil, com base em somente três exemplares, sendo dois deles apenas examinados vivos em um aquário e aparentemente não preservados posteriormente. A atual localização desses dois parátipos é incerta. Na descrição original, uma diagnose padrão não foi apresentada e as informações descritivas disponíveis são escassas e baseadas apenas em morfologia externa. Dessa forma, o objetivo desse estudo é fornecer uma redescricao de *C. guapore* baseada em vários topótipos. *Corydoras guapore* pode ser distinguida de suas congêneres pela presença de mesetmóide curto, com a extremidade anterior pouco desenvolvida, margem posterior do acúleo peitoral com serrilhas cônicas voltadas em direção à origem do acúleo, e pela porção lateral do pedúnculo caudal quase totalmente enegrecida. Informações sobre a ecologia e status de conservação de *C. guapore* também são fornecidas.

Keywords: “*Corydoras elegans*-group”, *Gastrodermus*, Homoplastic color patterns, Mato Grosso State, Taxonomy.

Introduction

Corydoras Lacépède, 1803 is the largest genus of Siluriformes, currently harboring more than 170 valid species (Reis, 2003; Eschmeyer, 2015). One of the more comprehensive studies regarding *Corydoras* species was presented by Nijssen (1970), in his revision of the *Corydoras* species from the Suriname. Additionally, the author proposed nine groups of species based mainly in color pattern and external morphology. One of the groups was the “*Corydoras hastatus*-group”, composed by three dwarf species: *C. australis* Eigenmann & Ward, 1907, *C. hastatus* Eigenmann & Eigenmann, 1888, and *C. pygmaeus* Knaack, 1966. Another group proposed by Nijssen (1970) was the “*Corydoras elegans*-group”, hosting three species, *C. elegans* Steindachner, 1876, *C. nanus* Nijssen & Isbrücker, 1967, and *C. pestai* Holly, 1940. Ten years later, Nijssen &

Isbrücker (1980) included the species of the “*Corydoras hastatus*-group” in the “*Corydoras elegans*-group” and additionally included *C. guapore*, *C. latus* Pearson, 1924, which was not hosted in any group in Nijssen’s (1970) work, and *C. undulatus* Regan, 1912 in the group.

In the molecular phylogenetic hypothesis presented by Alexandrou *et al.* (2011), some of the species of the “*Corydoras elegans*-group” *sensu* Nijssen & Isbrücker (1980) appeared in a larger monophyletic clade composed by two smaller clades assigned as lineages 4 and 5. Along with the species of the “*Corydoras elegans*-group”, *C. bilineatus* Knaack, 2002, *C. gracilis* Nijssen & Isbrücker, 1976, *C. napoensis* Nijssen & Isbrücker, 1986 and *C. nijsseni* Sands, 1989, and other unidentified species were also recovered in the same clade. These species possesses a very peculiar morphologic pattern that shares features between the typical short-snouted species from the lineage

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9 and the long-snouted species from the lineage 1 *sensu* Alexandrou *et al.* (2011). Despite the presence of a short mesethmoid with anterior tip poorly developed, which give a short and rounded aspect to the snout, the aforementioned species, with exception of *C. hastatus* and *C. pygmaeus*, possess the pectoral spine with conical serrations directed towards the origin of the spine (*vs.* perpendicularly inserted or directed towards the tip of the spine laminar serrations in the species of lineage 9), which is present in the long-snouted species.

Corydoras guapore was described by Knaack (1961) from the rio Guaporé in Rondônia, Brazil. The original description was based on the holotype and two live paratypes. Apparently, the paratypes were not posteriorly preserved or deposited in any museum or collection after the description and their current location is unknown. During collecting trips carried out by the Laboratório de Biologia de Peixes of the Universidade Estadual Paulista in the rio Guaporé, Mato Grosso State, in 2010, many specimens of *C. guapore* were captured. Since the original description is deficient concerning information about several morphological features, mainly the osteological ones, and was based on only three specimens, two of them only examined alive in tanks, the aim of this study is to provide a redescription of *C. guapore*.

Material and Methods

Measurements were obtained with a digital caliper to the nearest tenth of millimeter. Morphometric and meristic data were taken following Reis (1997), except for the length of the anal-fin spine, which is absent in all Corydoradinae. The pectoral spine length was included in the morphometric analysis and was taken from its base to its distal tip. Morphometrics are reported as percents of standard length (SL) and head length (HL). Homology of barbels follows Britto & Lima (2003). Specimens were cleared and stained (c&s) following the protocol of Taylor & van Dyke (1985). Osteological terminology was based on Reis (1998), except for the use of parieto-supraoccipital instead of supraoccipital (Arratia & Gayet, 1995) and compound pterotic instead of pterotic-supracleithrum (Aquino & Schaefer, 2002). The supra-preopercle *sensu* Huysentruyt & Adriaens (2005) will be treated here as a part of the hyomandibula according to Vera-Alcaraz (2013). Vertebral counts follow Britto *et al.* (2009).

Data about *Corydoras bilineatus*, *C. caudimaculatus* Rössel, 1961, *C. elegans*, *C. gracilis*, *C. mamore* Knaack, 2003, *C. nanus*, *C. napoensis*, *C. nijsseni*, *C. ourastigma* Nijssen, 1972, *C. paucerna* Knaack, 2004, *C. pygmaeus* and *C. undulatus* were obtained through their original descriptions and/or high resolution photographs of type-specimens hosted in the British Museum of Natural History, London. Photographs of other pertinent type specimens were available to examination through the All Catfishes Inventory Site (Morris *et al.*, 2006).

In the description, numbers in parenthesis represent the total number of specimens presenting the respective count. Institutional abbreviations are: AI, Asociación Ictiológica de La Plata, La Plata; ANSP, Academy of Natural Sciences of Drexel University, Philadelphia; BMNH, Natural History Museum, London; LBP, Laboratório de Biologia de Peixes da Universidade Estadual Paulista, Botucatu; MCP, Museu de Ciências e Tecnologia da Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre; MNRJ, Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro; MTD, Museum für Tierkunde, Dresden; MZUSP, Museu de Zoologia da Universidade de São Paulo, São Paulo; NRM, Naturhistoriska Riksmuseet, Stockholm; NUP, Coleção Ictiológica do Núcleo de Pesquisas em Limnologia, Ictiologia e Aquicultura da Universidade Estadual de Maringá, Maringá; ZMB, Zoologisches Museum von Humboldt-Universität, Berlin; ZUFMS-PIS, Coleção Zoológica de Referência da Universidade Federal de Mato Grosso do Sul, Campo Grande.

Results

Corydoras guapore Knaack, 1961 (Figs. 1-5; Table 1)



Fig. 1. Holotype of *Corydoras guapore*, ZMB 21406, 33.3 mm SL, Brazil, Rondônia State, main stream of the upper rio Guaporé. Lateral, dorsal and ventral views. Photo by Mark Allen, All Catfish Species Inventory (NSF DEB-0315963), copyright Museum für Naturkunde, Berlin.

Diagnosis. *Corydoras guapore* can be distinguished from its congeners, with exception of *C. bilineatus*, *C. elegans*, *C. gracilis*, *C. mamore*, *C. nanus*, *C. napoensis*, *C. nijsseni*, *C. paucerna* and *C. undulatus*, by having the following unique combination of features: mesethmoid short, with anterior tip poorly developed (*vs.* long, with well-developed anterior tip); serrations directed towards pectoral-spine origin (*vs.* perpendicularly inserted; or directed towards pectoral-spine tip); and conical serrations on posterior margin of pectoral spine (*vs.* laminar). *Corydoras guapore* can be distinguished from *C. bilineatus*, *C. elegans*, *C. gracilis*, *C. mamore*, *C. nanus*, *C. napoensis*, *C. nijsseni*, *C. paucerna* and *C. undulatus* by the presence of dorso- and ventrolateral body plates with vertically elongated or irregular brown blotches anteriorly to adipose fin, and lateral portion of caudal peduncle almost entirely blackened (*vs.* with two or three longitudinal black stripes in *C. bilineatus*, *C. elegans*, *C. napoensis*, *C. undulatus*; a thickened black stripe on dorsolateral body plates, ventrolateral body plates with irregular black spots in *C. gracilis*; irregular small black spots in *C. mamore* and *C. paucerna*; upper portion of dorsolateral body plates with intense black pigmentation, becoming diffuse toward ventrolateral body plates in *C. nijsseni*). Additionally, *C. guapore* can be distinguished from *C. hastatus* and *C. pygmaeus* by the presence of adipose fin with anterior portion hyaline and posterior portion blackened (*vs.* entirely hyaline); and the absence of a longitudinal black stripe on midline of flank (*vs.* presence of a slender diffuse longitudinal black stripe in *C. hastatus*; and a thicker conspicuous longitudinal black stripe in *C. pygmaeus*).

Description. Morphometric data presented in Table 1. Head compressed with convex dorsal profile; somewhat pentagonal in dorsal view. Snout short and rounded. Head profile convex from tip of snout to anterior nares; and slightly concave from this point to the tip of posterior process of parieto-supraoccipital. Dorsal profile of body slightly convex along dorsal-fin base. Body profile nearly straight from posterior portion of dorsal-fin to adipose-fin spine; markedly concave from this point to caudal-fin base. Ventral profile of body slightly convex from isthmus to pelvic girdle; nearly straight from pelvic girdle to base of first anal-fin ray; abruptly concave from this point to caudal-fin base. Body roughly elliptical in cross section at pectoral girdle, gradually becoming more compressed toward caudal fin.

Eye rounded, located meso-laterally on head; orbit delimited dorsally by lateral ethmoid, frontal and sphenotic, ventrally by infraorbitals. Anterior and posterior nares close to each other, only separated by flap of skin. Anterior naris tubular. Posterior naris relatively distant to antero-dorsal margin of orbit, separated from it by distance equal to twice the diameter of naris. Mouth small, subterminal, width nearly equal to bony orbit diameter.

Maxillary barbel long in size, reaching anteroventral limit of gill opening. Outer mental barbel slightly smaller than maxillary barbel. Inner mental barbel fleshy, its base slightly separated from its counterpart. Small rounded papillae covering entire surface of all barbels, upper and lower lips, and isthmus.

Mesethmoid short; anterior tip thickened and poorly developed, smaller than 50% of the bone length; with poorly-developed lateral *cornua*; posterior portion widened, partially exposed and bearing minute odontodes. Nasal slender, curved laterally, with inner margin laminar; posterior portion of outer margin laminar; mesial border contacting frontal and mesethmoid. Frontal elongated, narrow, with width slightly larger than half of entire length; anterior projection short, size smaller than nasal length. Frontal fontanel large, slender; posterior tip extension slightly entering anterior margin of parieto-supraoccipital. Parieto-supraoccipital wide, posterior process long and contacting nuchal plate; region of contact between posterior process and nuchal plate covered by thick layer of skin.

Table 1. Morphometric data of *Corydoras guapore*. N = number of specimens and SD = standard deviation.

	N	Low-High	Mean±SD
Standard length (mm)	20	27.4-33.6	29.4±1.3
Percents of standard length			
Depth of body	20	36.9-40.2	38.5±1.0
Predorsal distance	20	47.1-49.8	48.4±0.6
Prepelvic distance	20	49.1-52.7	51.2±1.0
Preanal distance	20	79.8-82.9	81.2±0.9
Preadipose distance	20	82.8-87.3	85.4±1.1
Length of dorsal spine	20	25.0-29.4	27.4±1.3
Length of pectoral spine	20	24.1-29.6	27.6±1.2
Length of adipose-fin spine	20	8.5-11.5	9.7±0.7
Depth of caudal peduncle	20	14.3-16.5	15.1±0.6
Length of dorsal-fin base	20	15.4-18.3	16.9±0.7
Dorsal to adipose distance	20	20.1-25.6	22.6±1.6
Maximum cleithral width	20	22.4-24.1	23.4±0.4
Head length	20	39.9-42.7	41.2±0.7
Length of maxillary barbel	20	14.5-19.4	16.9±1.3
Percents of head length			
Head depth	20	83.5-89.3	86.1±1.7
Least interorbital distance	20	43.7-49.1	46.4±1.4
Horizontal orbit diameter	20	21.8-26.1	24.4±0.9
Snout length	20	33.3-38.8	35.9±1.4
Least internarial distance	20	24.8-28.6	26.9±1.0

Two laminar infraorbitals with minute odontodes; infraorbital 1 large, ventral laminar expansion very reduced; anterior portion with poorly developed expansion (Fig. 2); infraorbital 2 small, thickened; with posterior laminar expansion well developed; posteroventral margin contacting posterodorsal ridge of hyomandibula, dorsal tip contacting sphenotic and compound pterotic (Fig. 3). Posterodorsal ridge of hyomandibula close to its articulation with opercle conspicuously slender; exposed, very reduced and bearing small odontodes; dorsal ridge of hyomandibula between compound pterotic and opercle covered by posterodorsal laminar expansion of infraorbital 2. Interopercle almost entirely exposed, somewhat triangular, anterior

projection well developed. Preopercle slender, elongated, with minute sparse odontodes on external surface. Opercle dorsoventrally elongated, width equal or smaller than length; free margin slightly convex, without serrations and covered by small odontodes. Anteroventral portion of cleithrum and posterolateral portion of scapulocoracoid exposed. Anteroventral and posteroventral suture between cleithrum and scapulocoracoid exposed; moderately developed odontodes sparse on exposed areas. Vertebral count 22(2); ribs 7(2), first pair conspicuously larger; complex vertebra slender in shape. Neural and haemal spines with laminar expansions on anterior margin of proximal region; expanded in distal tips.



Fig. 2. Topotype of *Corydoras guapore*, ZUFMS-PIS 4000, 33.6 mm SL, Brazil, Mato Grosso State, rio Guaporé. Dorsal, lateral and ventral views.

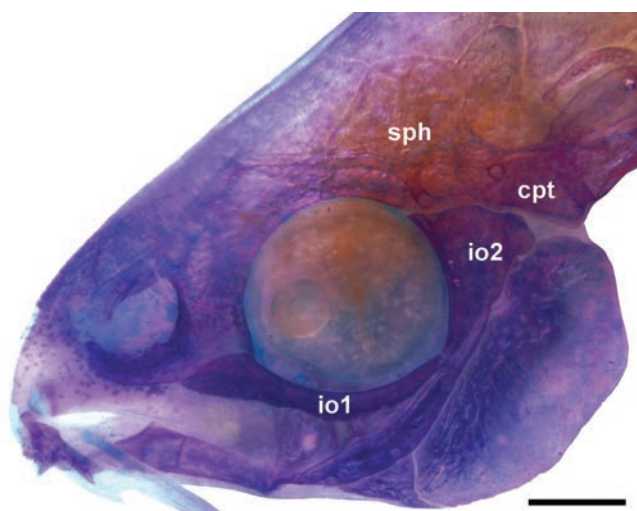


Fig. 3. Lateral view of the head of a cleared-and-stained specimen of *Corydoras guapore*, ZUFMS-PIS 4000, 28.8 mm SL. Abbreviations: io1: infraorbital 1, io2: infraorbital 2, sph: sphenotic, cpt: compound pterotic. Scale bar = 1 mm.

Four branchiostegals rays decreasing in size posteriorly. Hypobranchial 2 somewhat triangular, tip ossified and directed towards anterior portion, posterior margin cartilaginous; ossified portion well developed, about twice size of cartilaginous portion. Five ceratobranchials with expansions increasing posteriorly; ceratobranchial 1 with small process on anterior margin of mesial portion; ceratobranchial 3 notched on posterolateral margin; ceratobranchial 5 toothed on posterodorsal surface, 26 to 29(2) teeth aligned in one row. Four epibranchials with similar size; epibranchial 2 slightly larger than others, with small pointed process on laminar expansion of posterior margin; epibranchial 3 with triangular uncinat process on laminar expansion of posterior margin. Two wide pharyngobranchials (3 and 4), pharyngobranchial 3 with large triangular laminar expansion on posterior margin. Upper tooth plate oval; 26 to 31(2) teeth aligned in two rows on posteroventral surface.

Lateral-line canal entering neurocranium through compound pterotic, splitting into two branches before entering sphenotic: pterotic, with single pore, and preoperculo mandibular, with two pores. Sensory canal continuing through compound pterotic, entering sphenotic as temporal canal, which splits into two branches: one branch giving rise to infraorbital canal, other branch entering frontal through supraorbital canal, both with a single pore. Supraorbital canal not branched, running through nasal bone. Epiphyseal pore opening at supraorbital main canal, slightly directed towards frontal fontanel. Nasal canal with two pores. Infraorbital canal running through entire second infraorbital, extending to infraorbital 1 and opening into two pores. Preoperculo mandibular branch giving rise to preoperculo-mandibular canal, which runs through entire preopercle with three openings, leading to pores 3, 4, and 5, respectively.

Dorsal fin triangular, located just posterior to second dorsolateral body plate. Dorsal-fin rays II,7(2), II,8(18), posterior margin of dorsal-fin spine with 12 to 13 serrations directed towards dorsal-fin spine tip; serrations absent only on proximal region of posterior margin. Nuchal plate relatively large; exposed, with minute odontodes; spinelet short; spine relatively long, adressed distal tip surpassing last dorsal-fin branched ray origin; anterior margin with small odontodes. Pectoral fin triangular, its origin just posterior to gill opening. Pectoral-fin rays I,7(14), I,8(6); posterior margin of pectoral spine with 14 to 17 well-developed conical serrations along its entire length; serrations directed towards pectoral-spine origin (Fig. 4). Pelvic fin oblong, located just below second ventrolateral body plate, and at vertical through second branched dorsal-fin ray. Pelvic-fin rays i,5. Adipose fin roughly triangular, separated from base of last dorsal-fin ray by typically seven dorsolateral body plates. Anal fin triangular, located just posterior to 12th ventrolateral body plates, and at vertical through anterior margin of adipose-fin spine. Anal-fin rays ii,5(1), ii,6(19). Caudal-fin rays i,12,i, generally four dorsal and ventral procurrent rays; bilobed, lobes with similar size.



Fig. 4. Pectoral-fin spine of *Corydoras guapore*, ZUFMS-PIS 4000, 28.8 mm SL, showing the conical serrations directed towards pectoral-spine origin on inner margin of the left spine (7.5 mm long).

Two laterosensory canals on trunk; first ossicle tubular and second ossicle laminar. Body plates with minute odontodes scattered over exposed area, a conspicuous line of odontodes confined on posterior margins; dorsolateral body plates 23(2), 24(16), 25(2); ventrolateral body plates 21(17), 22(3); dorsolateral body plates along dorsal fin base 6; dorsolateral body plates between adipose and caudal fin 6(2), 7(8), 8(10); preadipose platelets 1(14), 2(6); small platelets covering base of caudal-fin rays; small platelets disposed dorsally and ventrally between junctions of lateral plates on posterior portion of caudal peduncle. Dorsal portion of snout, lateral ethmoid region, and upper lip region covered with small platelets. Ventral surface of trunk without platelets.

Color in alcohol. Ground color of the body yellowish, with top of the head and snout dark brown. Top of the head and snout, infraorbitals, opercle, preopercle, interopercle, compound pterotic, cleithrum, upper lip, maxillary and outer mental barbels covered by dark brown chromatophores. Dorso- and ventrolateral body plates with vertically elongated or irregular brown blotches anteriorly to adipose fin; lateral portion of caudal peduncle almost

entirely blackened. Dorsal fin with diffuse black spots on dorsal-fin rays, generally restricted to the upper half of the dorsal fin. Pectoral, pelvic and anal fins with black chromatophores on rays. Adipose fin with anterior portion hyaline; posterior portion darkened. Caudal fin with four to nine transversal black bars (Fig. 2).

Color in life. Similar to preserved specimens but with ground color of the body rosy. Top of the head and snout, infraorbitals, opercle, preopercle, interopercle, compound pterotic and cleithrum with irregular striated brownish dots. Fins whitish; black spots on dorsal-fin rays more evident. Body covered by a yellowish green iridescent coloration (Fig. 5).

Sexual dimorphism. Additionally to the presence of lanceolate genital papilla in males, which is common to all Corydoradinae (see Nijssen & Isbrücker, 1980; Britto, 2003), the males are generally smaller than females (Fig. 5b).

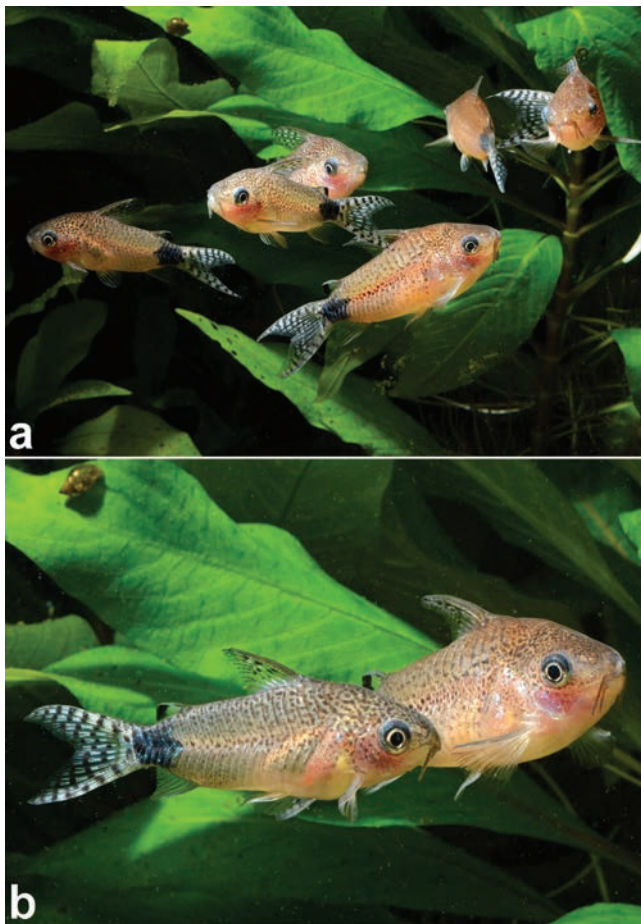


Fig. 5. Live uncatalogued specimens of *Corydoras guapore* in aquarium displaying their general color pattern. Also showing (a) a small breeding group of six specimens freely swimming in the midwater; and (b) a pair, the male on the left (between 20.0-30.0 mm SL), and the female on the right (approximately 40.0 mm SL). Photos by Hans-Georg Evers.

Geographic distribution. *Corydoras guapore* is only known from the upper rio Guaporé basin in Brazil (Fig. 6).

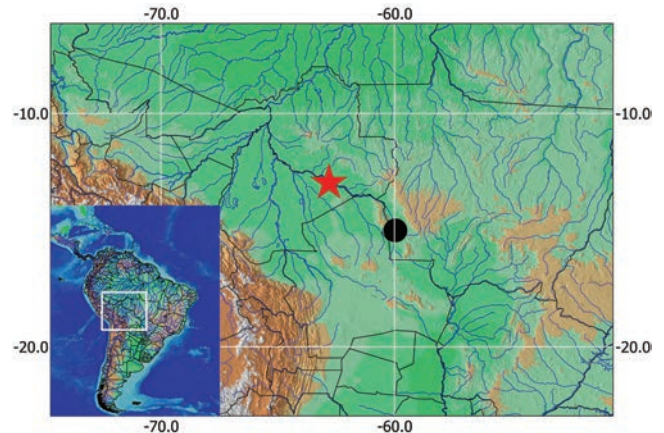


Fig. 6. Map showing geographic distribution of *Corydoras guapore*. Red star represents the approximate type-locality, rio Guaporé, Rondônia State, and the black circle represents the more recent record of the species, rio Guaporé, Mato Grosso State.

Ecological notes. *Corydoras guapore* is a free-swimming species, which occupies the middle of the water column in a small group when they feel safe (Fig. 5a), similar to the observed in *C. hastatus*. They form small breeding groups of up to 20 specimens associated to aquatic macrophytes, like *Eichhornia*. Unlike most of the *Corydoras* species which generally inhabit streams or the main channel of rivers, *C. guapore* is generally captured in lentic habitats as ponds and lakes (Hans-Georg Evers, *pers. comm.*). The specimens examined herein were captured close to the banks of the rio Guaporé, in Mato Grosso State (Cláudio Oliveira and Markos Alexandrou, *pers. comm.*) (Fig. 7).



Fig. 7. Collection site of *Corydoras guapore* in the rio Guaporé, Mato Grosso State, Brazil, around the geographic coordinates 15°01.0642'S 59°95.762'W. Photo by Markos Alexandrou.

Material examined. All from Brazil, Mato Grosso State, Municipality of Vila Bela da Santíssima Trindade, rio Guaporé, rio Madeira basin. LBP 10089, 80, 24.4-30.8 mm SL. ZUFMS-PIS 4000, 5, 26.9-33.6 mm SL, 2 c&s, 28.8-29.2 mm SL.

Conservation status. Despite the fact that the species is known only from its type-locality (rio Guaporé) it is probably widespread in the surroundings and no imminent threat is suspected, therefore, according to the International Union for Conservation of Nature (IUCN) categories and criteria (IUCN Standards and Petitions Subcommittee, 2014), *Corydoras guapore* can be classified as Least Concern (LC).

Discussion

The original description of *Corydoras guapore* was based only on three specimens, two of them only observed alive in a tank. Therefore, the morphological aspects of *C. guapore* available in the original description were based mainly on a single specimen. Despite the intention of subsequently donating the paratypes to the ZMB (Knaack, 1961: 135), the paratypes were never actually deposited in ZMB (Nijssen & Isbrücker, 1980: 214). There is no mention of preservation of the paratypes in Knaack's posterior publications and, apparently, these specimens were not deposited in any other museum or collection. At least two other species present the same situation regarding the paratypes. Knaack (1962) described two sympatric species with *C. guapore*, *C. haraldschultzi* and *C. sterbai*, and also mentioned the presence of living "paratypes", however, their actual location is still unknown as stated by Nijssen & Isbrücker (1980: 199 and 200, respectively).

Despite the clear distinction of *Corydoras guapore* from its congeners, Knaack (1961) did not provide a standard diagnosis for it, only presented some descriptive data like in all of his other descriptions. Additionally, except for the coding of *C. guapore* in Britto's (2003) data matrix, no additional morphological information about this species is currently available, probably due to the scarcity of comparative material, mainly type-specimens, for study since most of the paratypes and non-type specimens of the species described by Knaack were kept in his private collection, which is apparently lost (Hans-Georg Evers, *pers. comm.*).

The presence of homoplastic color patterns in *Corydoras* is well documented and discussed (e.g. Britto *et al.*, 2009; Alexandrou *et al.*, 2011). The color pattern of *C. guapore* is very similar to that observed in three known species, *C. caudimaculatus* also from the rio Guaporé basin, *C. ourastigma* from the rio Purus basin and *C. similis* Hieronimus, 1991 from the rio Madeira basin. Additionally, *C. guapore* color pattern strongly resembles the observed in an undescribed species

coded in the aquarium hobby as C66 (Fuller & Evers, 2005: 311), from the rio Branco basin (see more details about the "C-number" system and its species in Fuller & Evers, 2005: 280). *Corydoras guapore* can be clearly distinguished from *C. caudimaculatus* and *C. similis* by the presence of conical serrations on posterior margin of pectoral spine directed towards the origin of the spine (*vs.* laminar serrations directed towards pectoral-spine tip) and infraorbital 2 contacting sphenotic and compound pterotic (*vs.* contacting only sphenotic); from *C. ourastigma* and "C66" by the presence of conspicuously rounded snout (*vs.* pointed).

The possible presence of more than one genus among the species attributed to *Corydoras* is quite plausible. Britto (2003) presented a phylogenetic hypothesis based in morphological characters for Corydoradinae, finding *Brochis* Cope, 1871 in the same clade of some *Corydoras* species (see Britto, 2003: figs. 24, 25). The author pointed two options to maintain the monophyly of *Corydoras*, one of them was the resurrection and/or creation of at least four genera. The author, however, chose the second option, which consisted in placing *Brochis* as a synonymy of *Corydoras*, as a more conservative approach.

Alexandrou *et al.* (2011) also conducted an extensive phylogenetic analysis of the Corydoradinae but based in molecular data. The authors obtained a very elucidative cladogram showing nine lineages of Corydoradinae. The species related to the "*Corydoras elegans*-group" correspond to the lineages 4 and 5. The results obtained by Alexandrou *et al.* (2011) clearly corroborated the paraphyletism of *Corydoras*. However, since the paper does not have a taxonomic approach, the authors did not propose any changes in the classification of the group.

Recently, Vera-Alcaraz (2013) presented the more comprehensive phylogenetic hypothesis for the Callichthyidae, based in the combination of morphological and molecular data, finding a similar result to the presented by Alexandrou *et al.* (2011). The main difference in Vera-Alcaraz's (2013) hypothesis is the position of the clade containing the species related to the "*Corydoras elegans*-group" *sensu* Nijssen & Isbrücker (1980), which appears as sister group of a large clade formed by two smaller clades, one of them with *Aspidoras* Ihering, 1907 as the sister group of *Scleromystax* Günther, 1864, and both sister group of a large clade with the species attributed to *Hoplisoma* Swainson, 1838, which was proposed as valid. The species allocated in *Hoplisoma* by Vera-Alcaraz (2013) correspond to species of the lineages 6, 7, 8 and 9 *sensu* Alexandrou *et al.* (2011). Vera-Alcaraz's (2013) hypothesis clearly shows that the species related to the "*Corydoras elegans*-group" represent a distinct and well-delimited genus, thus the author proposed the resurrection of *Gastrodermus* Cope, 1878, which possess *C. elegans* as its type-species. However, since these are unpublished data from a PhD dissertation, these species will remain referred as *Corydoras* until its formal publication.

Comparative material examined. *Corydoras acutus*: **Peru**: Unknown department: MNRJ 3985, 2, 47.1-54.8 mm SL, Sansho-Caño. *Corydoras adolfoi*: **Brazil**: Amazonas: LBP 6863, 2, 27.5-31.7 mm SL, Igarapé Puranga. LBP 6871, 2, 32.2-32.5 mm SL, unnamed Igarapé. *Corydoras ambiacus*: **Peru**: Loreto: MCP 26178, 1, 42.5 mm SL, rio Pacaya; MCP 26209, 10 of 19, 25.0-33.3 mm SL, Caño Yarina. Ucayali: MZUSP 26053, 2, 41.8-47.2 mm SL, Iamiriacochoa. *Corydoras approuaguensis*: **French Guyana**: Cayenne: MZUSP 27895-6, 2, 43.0-46.1 mm SL, paratypes of *C. approuaguensis* Nijssen & Isbrücker, 1983, rio Approuague. *Corydoras areio*: **Brazil**: Mato Grosso do Sul: ZUFMS-PIS 1314, 15, 34.4-41.9 mm SL, 2 c&s, 38.1-38.5 mm SL, rio Periquito. *Corydoras aurofrenatus*: **Paraguay**: Concepción: NRM 23529, 10 of 33, 31.4-45.7 mm SL, Arroyo Laguna Penayo where it crosses the road Concepción-Paso Barreto. *Corydoras bifasciatus*: **Brazil**: Pará: MZUSP 38976, 16, paratypes, 23.6-30.0 mm SL, creek at left bank of the rio Cururu. *Corydoras blochi*: **Brazil**: Roraima: MZUSP 8580, 3, 31.0-42.6 mm SL, paratypes of *C. blochi* Nijssen, 1971, Igarapé on Fazenda Canadá, tributary to the rio Uraricoera. *Corydoras bondi*: **Guyana**: Barima-Waini: ROM 66202, 7 of 134, 33.8-39.9 mm SL, 3 c&s of 134, 36.7-38.6 mm SL, Waikerebi Creek. *Corydoras brevirostris*: **Venezuela**: Bolívar: LBP 3080, 10, 23.8-27.7 mm SL, 3 c&s, 25.8-27.9 mm SL, rio Orinoco. *Corydoras britskii*: **Brazil**: Mato Grosso do Sul: ZUFMS-PIS 862, 12, 72.0-78.0 mm SL, marginal lagoon to rio Vermelho. *Corydoras carlae*: **Brazil**: Paraná: NUP 711, 1, 47.9 mm SL, rio Tormenta; NUP 4425, 1 c&s, 45.0 mm SL, rio Tormenta. *Corydoras cochui*: **Brazil**: Goiás: MZUSP 89055, 6, 18.7-23.6 mm SL, rio do Peixe II. Tocantins: MZUSP 35838, 4 of 6, 16.1-18.5 mm SL, rio Javaés. *Corydoras condiscipulus*: **French Guyana**: Cayenne: MZUSP 38957, 7, 34.1-40.3 mm SL, paratypes of *C. condiscipulus* Nijssen & Isbrücker, 1980, Cumuri Creek. *Corydoras davidsandsi*: **Brazil**: Amazonas: MZUSP 110066, 4 of 40, 36.0-41.9 mm SL, 2 c&s of 40, 40.9-42.1 mm SL, rio Inambú. *Corydoras difluviatilis*: **Brazil**: São Paulo: MZUSP 75268, 1, 39.8 mm SL, holotype of *C. difluviatilis* Britto & Castro, 2002, rio Paulicéia. *Corydoras diphyes*: **Paraguay**: Alto Paraná: ANSP 169756, 2, 40.7-43.1 mm SL, drainage ditches north of km 250 (2 km east of Juan E. O'Leary on route 7). *Corydoras ehrhardti*: **Brazil**: Paraná: NUP 11255, 15, 36.5-46.8 mm SL, rio São Pedro. *Corydoras elegans*: **Peru**: Ucayali: MZUSP 26017, 6, 25.9-28.3 mm SL, Lobocochoa. *Corydoras ephippifer*: **Brazil**: Amapá: MZUSP 31605, 2, 44.9-49.1 mm SL, rio Cupixi. *Corydoras flaveolus*: **Brazil**: São Paulo: MZUSP 424, 1, 33.4 mm SL, holotype of *C. flaveolus* Ihering, 1911, tributaries to the rio Piracicaba. *Corydoras fowleri*: **Peru**: Loreto: LBP 12462, 9, 44.3-59.9 mm SL, 1 c&s, 50.4 mm SL, tributary to the rio Ampiyacu. *Corydoras garbei*: **Brazil**: Minas Gerais: MNRJ 18089, 14, 19.2-25.3 mm SL, 2 c&s, 25.9-27.4 mm SL, lagoa Perta-Pé. *Corydoras gossei*: **Brazil**: Rondônia: MZUSP 38977, 6, 48.4-53.4 mm SL, paratypes of *C. gossei* Nijssen, 1972, Igarapé do 13, tributary to the rio Mamoré. *Corydoras griseus*: **Guyana**: Potaro-Siparuni: MZUSP 108896, 4 of 13, 31.5-36.2 mm SL, 2 c&s of 13, 30.6-34.5 mm SL, stream tributary to the Kuribrong stream. *Corydoras gryphus*: **Brazil**: Paraná: MNRJ 40770, 1, 32.3 mm SL, holotype of *C. gryphus* Tencatt, Britto & Pavanelli, 2014, rio Paraná (near Ponte da Amizade). NUP 14676,

3 c&s, 27.7-32.4 mm SL, paratypes of *C. gryphus* rio Paraná (near Ponte da Amizade). *Corydoras hastatus*: **Brazil**: Mato Grosso: NUP 6862, 116, 13.1-20.7 mm SL, baía Caiçara. *Corydoras julii*: **Brazil**: Piauí: NUP 16225, 1, 46.8 mm SL, rio Atalaia. *Corydoras lacrimostigmata*: **Brazil**: Paraná: MNRJ 40725, 1, 31.8 mm SL, holotype of *C. lacrimostigmata* rio Maria Flora; NUP 14657, 3 c&s, 30.9-34.5 mm SL paratypes of *C. lacrimostigmata* rio Nestor. *Corydoras longipinnis*: **Argentina**: Santiago del Estero: AI 221, 1, 59.5 mm SL, holotype of *C. longipinnis* Knaack, 2007, rio Sali. Tucumán: NUP 14440, 2 c&s, 29.9-33.4 mm SL, rio Pampa-Mayo. *Corydoras lymnades*: **Brazil**: Minas Gerais: MNRJ 15765, 6, 15.8-17.7 mm SL, 2 c&s, 18.1-18.4 mm SL, rio Peruaçu; MNRJ 40186, 1, 29.7 mm SL, holotype of *C. lymnades* Tencatt, Vera-Alcaraz, Britto & Pavanelli, 2013, rio Guarda-Mor. *Corydoras maculifer*: **Brazil**: Tocantins: NUP 8970, 2, 42.0-46.0 mm SL, ribeirão Xambioazinho. *Corydoras melanistius*: **Guyana**: Unknown region: BMNH 1864.1.21.86, 1, 35.0 mm SL, lectotype of *C. melanistius* Regan, 1912, designated by Nijssen & Isbrücker, 1967, rio Essequibo. *Corydoras multimaculatus*: **Brazil**: Minas Gerais: MCP 29025, 2, 20.1-25.4 mm SL, rio Peruaçu. *Corydoras nattereri*: **Brazil**: São Paulo: MZUSP 110255, 4 of 31, 32.0-32.8 mm SL, 2 c&s of 31, 32.3-34.4 mm SL, rio Paraitinga. *Corydoras paleatus*: **Uruguay**: Canelones: NRM 54230, 1, 53.5 mm SL, rio Sarandí. *Corydoras panda*: **Peru**: Huánuco: ROM 55815, 6, 26.5-39.7 mm SL, unknown stream somewhere above Panguana in Llullapichis drainage. *Corydoras pantanalensis*: **Brazil**: Mato Grosso: NUP 10188, 1 c&s, 46.4 mm SL, Baía Sinhá Mariana. Mato Grosso do Sul: NUP 12593, 21, 38.7-51.2 mm SL, tributary to the rio Miranda. *Corydoras potaroensis*: **Guyana**: Potaro-Siparuni: ROM 61526, 3 of 15, 35.0-44.8 mm SL, 2 c&s of 15, 32.6-35.1 mm SL, rio Potaro. *Corydoras similis*: **Brazil**: Acre: LBP 10648, 7, 21.4-34.3 mm SL, rio Iquiri. *Corydoras splendens*: **Brazil**: Goiás: NUP 12990, 1, 43.7 mm SL, tributary to the rio Araguaia. Mato Grosso: NUP 10195, 1 c&s, 54.6 mm SL, Pai Caetano lake. *Corydoras stenocephalus*: **Brazil**: Amazonas: MNRJ 3625, 3, 31.2-62.3 mm SL, rio Javari. *Corydoras treitlii*: **Brazil**: Maranhão: NUP 16224, 3, 21.5-45.6 mm SL, rio Medonho. *Corydoras trilineatus*: **Brazil**: Acre: MZUSP 30857, 3 of 25, 40.9-44.1 mm SL, 2 c&s of 25, 44.2-43.8 mm SL, rio Tarauacá. *Corydoras tukano*: **Brazil**: Amazonas: MZUSP 82100, 40.9 mm SL, holotype of *C. tukano* Britto & Lima, 2003, rio Tiquié. *Corydoras zygatus*: **Brazil**: Acre: MZUSP 30858, 4 of 15, 41.7-47.3 mm SL, rio Tarauacá.

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