

A new *Corydoras* Lacépède, 1803 (Siluriformes: Callichthyidae) from the rio Araguaia basin, Brazil, with comments about *Corydoras araguaiaensis* Sands, 1990

Luiz Fernando Caserta Tencatt¹ and Marcelo Ribeiro de Britto²

A new species of *Corydoras* is described from the rio Araguaia basin, Goiás, Brazil. The new species can be distinguished from its congeners by presenting the following features: infraorbital 1 with very large ventral laminar expansion; infraorbital 2 contacting compound pterotic; flanks densely covered by irregular black spots; and ventral surface of trunk densely covered by coalescent relatively well-developed platelets. It is also discussed the possibility that *C. araguaiaensis* comprehends a complex of species.

Uma espécie nova de *Corydoras* é descrita da bacia do rio Araguaia, Goiás, Brasil. A espécie nova pode ser distinguida de suas congêneres por apresentar as seguintes características: infraorbital 1 com expansão laminar ventral muito grande; infraorbital 2 em contato com o pterótico composto; flancos densamente cobertos por manchas pretas irregulares e superfície ventral do tronco densamente coberta por plaquetas coalescentes relativamente bem desenvolvidas. Discute-se também a possibilidade de *C. araguaiaensis* compreender um complexo de espécies.

Keywords: C65, Corydoradinae, *Corydoras* sp. “Guaraná”, Goiás State, Taxonomy.

Introduction

The Callichthyidae armored catfishes are easily diagnosed from other Siluriformes by the presence of two longitudinal series of dermal plates on flanks (Eigenmann & Eigenmann, 1890; Reis, 1998). The family currently comprises more than 200 species, including *Corydoras* Lacépède, 1803, the most species-rich genus of Siluriformes, with more than 170 valid species (Reis, 2003; Eschmeyer, 2015). Since the 1940's, many efforts to understand the taxonomy and phylogenetic relationships of the species of *Corydoras* have been made (e.g., Gosline, 1940; Nijssen, 1970; Nijssen & Isbrücker, 1980; Britto, 2003; Alexandrou *et al.*, 2011), however, the knowledge of interrelations among *Corydoras* species is still poorly known (Britto *et al.*, 2007).

Currently, only three species of *Corydoras* are recorded from the rio Araguaia basin: *C. araguaiaensis* Sands, 1990, *C. cochui* Myers & Weitzman, 1954, and *C. maculifer* Nijssen & Isbrücker, 1971 (Eschmeyer, 2015). Alexandrou *et al.* (2011) studied the community structure of mimetic lineages of *Corydoras* propitiated

by ecological and phylogenetic aspects, showing relations and patterns between Müllerian co-mimics of certain regions. In that work, *C. araguaiaensis* is proposed as member of a mimetic group along with *C. maculifer* and an undescribed species coded as C122 (see more details about the “C-number” system and its species in Fuller & Evers, 2005: 280). The most obvious way to recognize each mimetic morphotype is the snout morphology. There are at least three conspicuous types of snouts, the typical long snout pattern, present in the species of the lineage 1, as *C. maculifer*, the straight or intermediate long snout pattern, present in the species of the lineage 8, as C122, and the short snout pattern, present in the species of the lineages 4, 5, 6, 7, and 9, as *C. araguaiaensis*.

Generally, the mimetic pairs or groups are composed by one representative of each snout pattern (see Alexandrou *et al.*, 2011: 3, fig. 2). However, since the short snout pattern is present in conspicuously different lineages, it is possible that two or more short-snouted species may also present homoplastic color patterns, as the observed for *Corydoras guapore* Knaack, 1961, from the lineage 4, and *C. caudimaculatus* Rössel, 1961, from the lineage 9, both from

¹Universidade Estadual de Maringá, Programa de Pós-Graduação em Ecologia de Ambientes Aquáticos Continentais. Av. Colombo, 5790, 87020-900 Maringá, PR, Brazil. luiztencatt@hotmail.com (corresponding author)

²Universidade Federal do Rio de Janeiro, Museu Nacional, Departamento de Vertebrados, Setor de Ictiologia. Quinta da Boa Vista s/n, São Cristóvão, 20940-040 Rio de Janeiro, RJ, Brazil. mrbritto2002@yahoo.com.br

the rio Guaporé basin (see Alexandrou *et al.*, 2011: suppl. fig. 2). After the analysis of some *Corydoras* specimens captured by Hans-Georg Evers during an expedition in Brazil, a new short-snouted species with similar color pattern to *C. araguaiaensis* was revealed, which is described herein. Additionally some comments about the taxonomic status of *C. araguaiaensis* were also provided.

Material and Methods

Measurements were obtained using digital calipers to the nearest tenth of millimeter. Morphometric and meristic data were taken following Reis (1997) with modifications of Tencatt *et al.* (2013). Morphometrics are reported as percentages of standard length (SL) and head length (HL). Homology of barbels follows Britto & Lima (2003). Some specimens were cleared and stained (c&s) according to 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), compound pterotic instead of pterotic-supracleithrum (Aquino & Schaefer, 2002), and scapulocoracoid instead of coracoid (Lundberg, 1970). Nomenclature of latero-sensory canals and preopercular pores are according to Schaefer & Aquino (2000) and Schaefer (1988), respectively. The supra-preopercle *sensu* Huysentruyt & Adriaens (2005) will be treated here as a part of the hyomandibula according to Vera-Alcaraz (2013). Vertebral counts followed Britto *et al.* (2009).

Comparative data of *Corydoras esperanzae* Castro, 1987, *C. evelynae* Rösse, 1963, *C. leopardus* Myers, 1933, *C. melanotaenia* Regan, 1912, *Corydoras multiradiatus* (Orcés-Villagomez, 1960), *C. orphnopterus* Weitzman & Nijssen, 1970, *C. rabauti* La Monte, 1941, *C. schwartzi* Rösse, 1963, and *C. xinguensis* Nijssen, 1972, were obtained through their original descriptions and/or high resolution photographs of type-specimens available from Morris *et al.* (2006).

In the description, numbers between brackets represent the total number of specimens with those counts. Numbers with an asterisk refer to the counts of the holotype. Institutional abbreviations are: Asociación Ictiológica de La Plata (AI), La Plata; Academy of Natural Sciences of Drexel University (ANSP), Philadelphia; Natural History Museum (BMNH), London; Laboratório de Biologia de Peixes da Universidade Estadual Paulista “Júlio de Mesquita Filho” (LBP), Botucatu; Museu de Ciências e Tecnologia da Pontifícia Universidade Católica do Rio Grande do Sul (MCP), Porto Alegre; Museum of Comparative Zoology (MCZ), Harvard University, Cambridge; Museu Nacional, Universidade Federal do Rio de Janeiro (MNRJ), Rio de Janeiro; Museu de Zoologia da Universidade de São Paulo (MZUSP), São Paulo; Naturhistoriska Riksmuseet (NRM), Stockholm; Coleção Ictiológica do Núcleo de Pesquisas em Limnologia, Ictiologia e Aquicultura da Universidade Estadual de Maringá (NUP), Maringá; Royal Ontario Museum (ROM), Toronto; National Museum of Natural

History, Smithsonian Institution (USNM), Washington, D.C. Coleção Zoológica de Referência da Universidade Federal de Mato Grosso do Sul (ZUFMS-PIS), Campo Grande.

Results

Corydoras eversi, new species

urn:lsid:zoobank.org:act:541C78B5-98B6-4FBF-89A3-6961C9EA74D2

Figs. 1, 2a, c, 3-5

Corydoras cf. *araguaiaensis* ‘C65’.-Alexandrou *et al.*, 2011: 22 (supplement).

Corydoras sp. C65.-Fuller & Evers, 2005: 282 [checklist], 309 [illustration].

Corydoras sp. ‘Guarana’ [*sic*].-Fuller & Evers, 2005: 310 [illustration].

Holotype. MNRJ 43195, 44.5 mm SL, Brazil, Goiás, Montes Claros de Goiás, unnamed stream tributary to the rio Araguaia, 15°53’10”S 51°41’34”W, 21 Mar 1998, H.-G. Evers & P.V. da Silva.

Paratypes. MZUSP 117333, 6, 23.4-35.8 mm SL; NUP 17309, 5, 24.8-42.9 mm SL; NUP 17310, 3 c&s, 42.5- 45.3 mm SL; ZUFMS-PIS 4062, 5, 32.2-39.2 mm SL, same data as holotype.

Diagnosis. *Corydoras eversi* can be distinguished from its congeners, with exception of *C. aeneus* (Gill, 1858), *C. britskii* (Nijssen & Isbrücker, 1983), *C. difluviatilis* Britto & Castro, 2002, *C. eques* Steindachner, 1876, *C. garbei* Ihering, 1911, *C. melanotaenia*, *C. multiradiatus*, *C. rabauti*, *C. splendens* (Castelnau, 1855), and *C. zygatus* Eigenmann & Allen, 1942, by the presence of infraorbital 1 with very large ventral laminar expansion (*vs.* poorly-, or moderately-developed ventral expansion); and infraorbital 2 contacting compound pterotic (*vs.* not contacting). The new species can be distinguished from *C. aeneus*, *C. britskii*, *C. difluviatilis*, *C. eques*, *C. garbei*, *C. melanotaenia*, *C. multiradiatus*, *C. rabauti*, *C. splendens*, and *C. zygatus* by presenting flanks densely covered by irregular black spots (*vs.* background color of flanks orange yellow with dorsolateral body plates entirely or almost entirely blackened in *C. aeneus*, *C. britskii*, *C. melanotaenia*, *C. multiradiatus*, *C. rabauti*, *C. splendens*, and *C. zygatus*; background color of flanks orange yellow with flanks almost entirely blackened in *C. eques*; midline of flank with a longitudinal series of large rounded blotches, remaining areas with black spots in *C. difluviatilis* and *C. garbei*); and ventral surface of trunk densely covered by coalescent relatively well-developed platelets (*vs.* ventral surface of trunk naked; or covered by sparse and relatively small platelets).

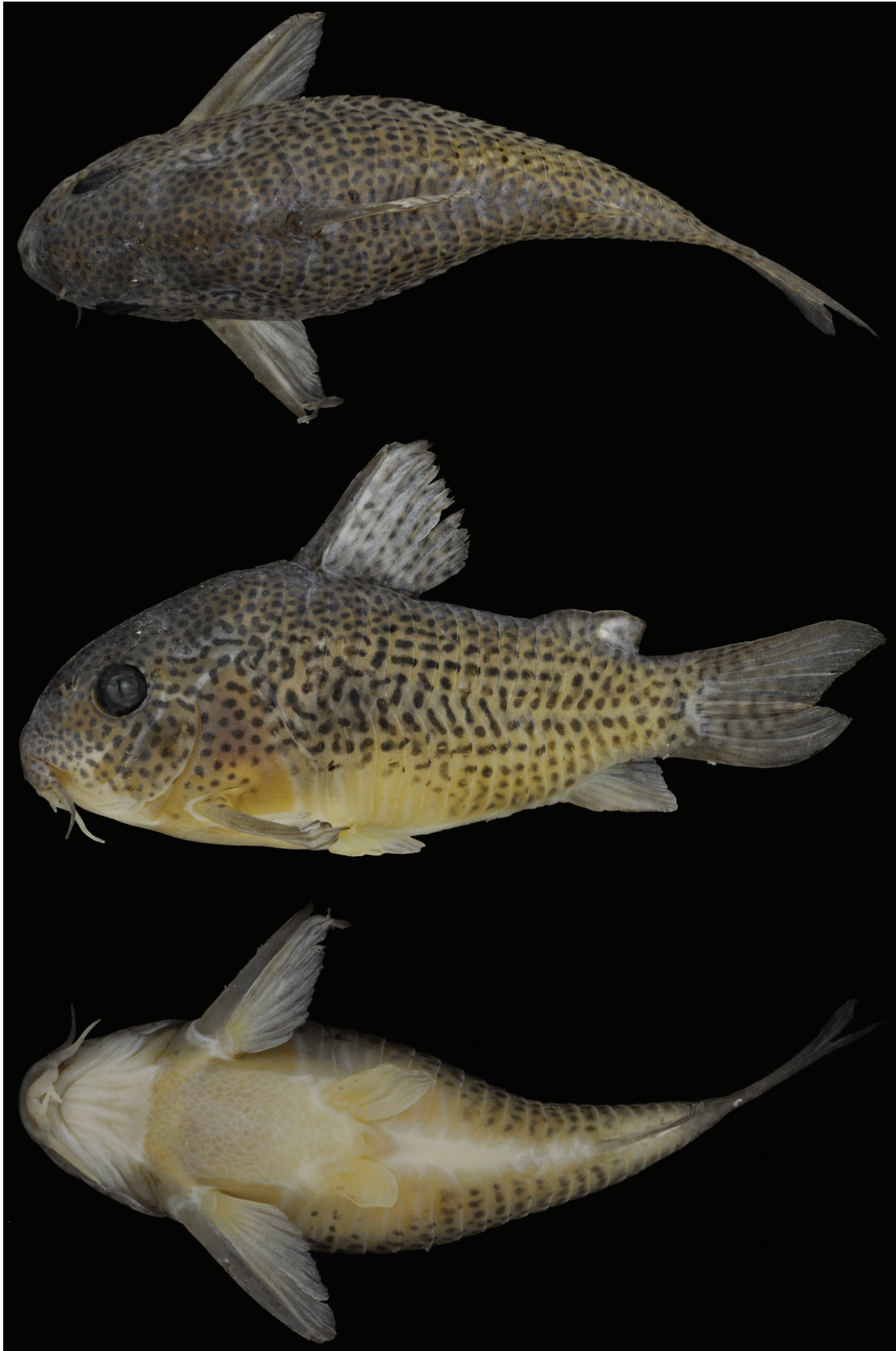


Fig. 1. *Corydoras eversi*, holotype, MNRJ 43195, 44.5 mm SL, Brazil, Goiás, Montes Claros de Goiás, unnamed stream tributary to the rio Araguaia, 15°53'10"S 51°41'34"W. Dorsal (top), lateral (middle) and ventral (bottom) views. Photo by Celso Ikedo.

Description. Morphometric data presented in Table 1. Head compressed with convex dorsal profile; triangular in dorsal view. Snout short and rounded. Head profile convex from tip of snout to anterior nares; ascending nearly straight from this point to tip of posterior process of parieto-supraoccipital; region just posterior to eye slightly concave in some specimens. Profile slightly convex along dorsal-fin base. Postdorsal-fin body profile nearly straight to adipose-fin spine; concave from this point to caudal-fin base. Ventral profile of body slightly convex from isthmus to pelvic girdle. Profile nearly straight from pelvic girdle to base of first anal-fin ray; concave until caudal-fin base. Body roughly elliptical in cross section at pectoral girdle, gradually becoming more compressed toward caudal fin.

Eye rounded, located dorso-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 anterodorsal margin of orbit, separated from it by distance equal to twice of naris diameter. Mouth small, subterminal, width nearly equal to bony orbit diameter. Maxillary barbel moderate in size, not reaching anteroventral limit of gill opening. Outer mental barbel slightly larger than maxillary barbel. Inner mental barbel fleshy, with base close to its counterpart. Small rounded papillae covering entire surface of all barbels, upper and lower lips, and isthmus.

Table 1. Morphometric data of holotype and 19 paratypes of *Corydoras eversi*. SD = standard deviation.

	Holotype	Low-High	Mean±SD
Standard length (mm)	44.5	23.4-45.3	-
Percents of standard length			
Depth of body	43.1	40.9-45.7	42.7±1.1
Predorsal distance	49.7	48.9-54.3	51.6±1.2
Prepelvic distance	47.4	46.4-53.0	48.7 ±2.0
Preanal distance	83.1	77.7-87.2	82.7±2.0
Preadipose distance	89.0	84.9-98.8	87.9±2.9
Length of dorsal spine	22.9	21.6-30.4	26.7±2.7
Length of pectoral spine	25.4	25.2-32.8	28.7±2.1
Length of adipose-fin spine	6.1	5.2-9.3	7.5±1.0
Depth of caudal peduncle	15.1	14.6-17.2	15.9±0.7
Length of dorsal-fin base	17.1	16.8-20.1	18.2±0.9
Dorsal to adipose distance	27.0	18.0-27.0	22.0±1.9
Maximum cleithral width	30.1	28.0-31.9	30.0±1.0
Head length	44.3	43.5-48.0	45.5±1.2
Length of maxillary barbel	14.4	9.6-17.0	12.1±1.9
Percents of head length			
Head depth	91.9	84.4-94.8	89.0±2.8
Least interorbital distance	34.0	31.4-36.3	33.4±1.3
Horizontal orbit diameter	20.8	19.2-24.3	22.4±1.6
Snout length	35.0	31.5-38.0	35.3±1.6
Least internarial distance	18.8	14.0-18.8	16.2±1.5

Mesethmoid short; anterior tip poorly developed, smaller than 50% of bone length (see Britto, 2003: 123, character 1, state 1; fig. 1B); posterior portion relatively narrow, partially exposed and bearing minute odontodes. Nasal slender, curved laterally, with inner margin laminar; mesial border contacting frontal and mesethmoid. Frontal elongated, narrow, with width slightly smaller than half of entire length; anterior projection short, size smaller than nasal length. Frontal fontanel large, oval; 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.

Two laminar infraorbitals with minute odontodes; infraorbital 1 large, ventral laminar expansion well developed; anterior portion with well-developed expansion (Fig. 2a); infraorbital 2 small, slender; with posterior laminar expansion well developed; posteroventral margin contacting posterodorsal ridge of hyomandibula, dorsal tip contacting sphenotic and compound pterotic (Fig. 2c). Posterodorsal ridge of hyomandibula close to its articulation with opercle oblong; exposed, relatively thick; dorsal ridge of hyomandibula between compound pterotic and opercle exposed; exposed areas bearing small odontodes. Interopercle entirely or almost entirely covered by thick layer of skin, somewhat triangular, anterior projection well-developed. Preopercle relatively thick, elongated, minute odontodes sparse on external surface. Opercle conspicuously elongated dorso-ventrally, width smaller than half of its length; free margin smoothly convex, without serrations and covered by small odontodes. Anteroventral portion of cleithrum and posterolateral portion of scapulocoracoid exposed; minute odontodes sparse on exposed areas. Vertebral count 20 (2), 21 (1); ribs 6 (3), first pair conspicuously large; complex vertebra compact in shape. Neural and haemal spines with expanded in distal tips.

Four branchiostegal 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 postero-lateral margin; ceratobranchial 5 toothed on postero-dorsal surface, 37 to 46 (3) 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 curved mesially uncinat process on laminar expansion of posterior margin. Two wide pharyngobranchials (3 and 4), pharyngobranchial 3 with irregular laminar expansion on posterior margin. Upper tooth plate oval; 34 to 43 (3) teeth aligned in two rows on postero-ventral surface.

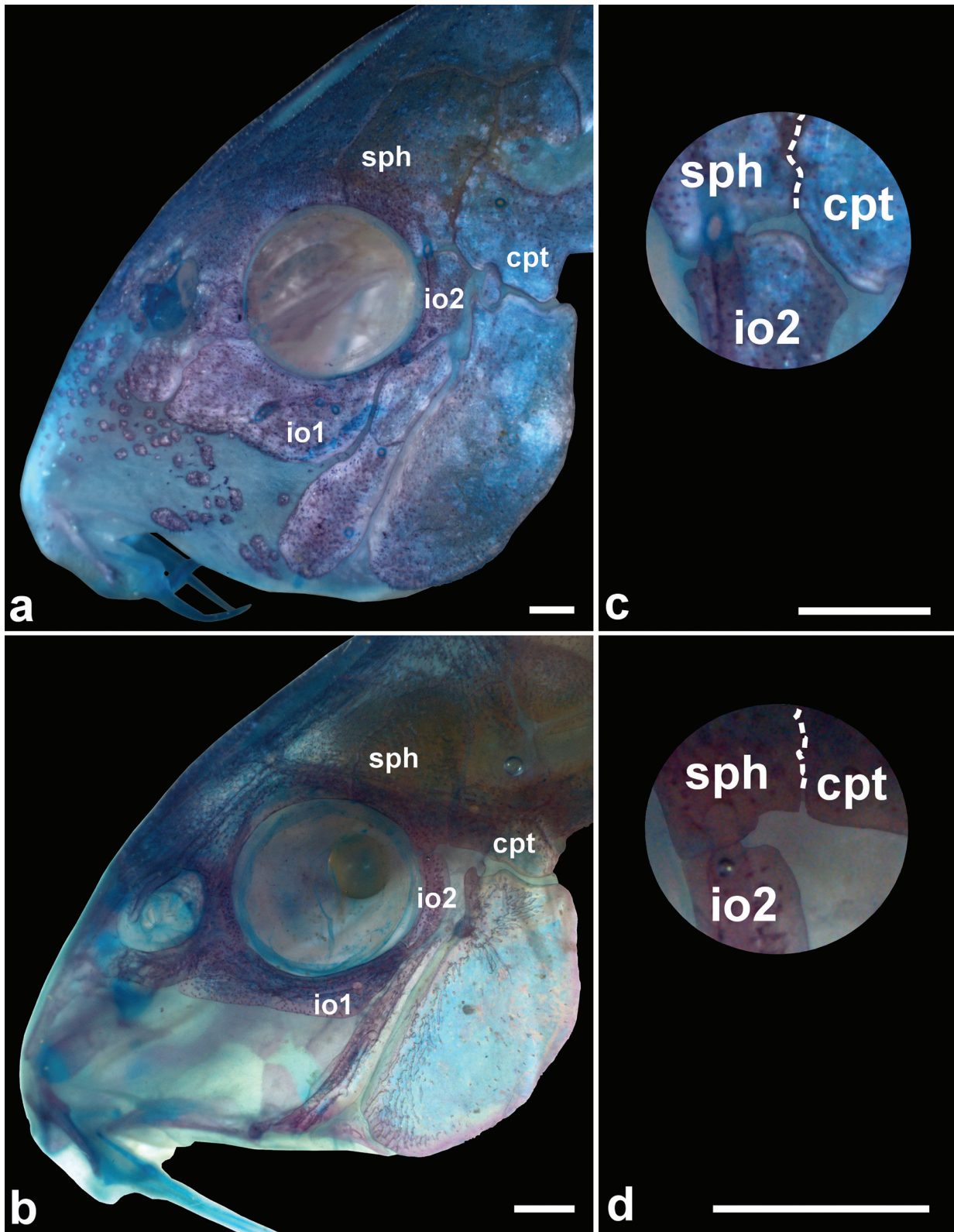


Fig. 2. Lateral view of the head of c&s specimens of (a, c) *Corydoras eversi*, paratype, NUP 17310, 42.5 mm SL, showing the well-developed ventral expansion of the infraorbital 1 and the platelets on the snout (a) and infraorbital 2 in contact with compound pterotic (c); and (b, d) *Corydoras araguaiaensis*, MZUSP 87155, 31.8 mm SL, showing the moderately-developed ventral expansion of the infraorbital 1 (b) and infraorbital 2 not in contact with compound pterotic (d). The dotted lines in (c) and (d) represent the suture between sphenotic and compound pterotic. Abbreviations: io1: infraorbital 1, io2: infraorbital 2, sph: sphenotic, cpt: compound pterotic. Scale bar = 1.0 mm.

Lateral-line canal entering neurocranium through compound pterotic, splitting into two branches before entering sphenotic: pterotic branch with a single pore; preoperculomandibular branch conspicuously reduced, with a single pore opening close to postotic main canal. 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 single pore. Supraorbital canal not branched, running through nasal bone. Epiphyseal pore opening at supraorbital main canal. Nasal canal with three openings, first on posterior edge, second on posterolateral portion and third on anterior edge. Infraorbital canal running through entire second infraorbital, extending to infraorbital 1 and opening into two or three pores. Preoperculomandibular 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 (1), II,8* (19), posterior margin of dorsal-fin spine with five to 14 very reduced serrations directed towards tip of spine; serrations absent proximally. Nuchal plate moderately developed; exposed, with minute odontodes; spinelet short; spine moderately developed, adpressed distal tip reaching to or slightly surpassing origin of last dorsal-fin branched ray; anterior margin with small odontodes. Pectoral fin triangular, its origin just posterior to gill opening. Pectoral-fin rays I,7 (10), I,8* (10); posterior margin of pectoral spine with 23 to 32 small serrations along its entire length; serrations directed towards tip of spine (Fig. 3). Pelvic fin oblong, located just below first ventrolateral body plate, and at vertical through first branched dorsal-fin ray. Pelvic-fin rays i,5. Adipose fin roughly triangular, separated from base of last dorsal-fin ray by generally 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 (6), ii,6* (13). Caudal-fin rays i,7,i (1), i,11,i* (1), i,12,i (18), generally four dorsal and ventral precurrent rays; bilobed, dorsal lobe generally slightly larger than ventral lobe.

Three or four laterosensory canals on trunk; first ossicle tubular, second ossicle laminar, third and fourth lateral-line canals, if present, encased in third and fourth dorsolateral body plates, respectively. Body plates with minute odontodes scattered over exposed area, a conspicuous line of odontodes confined on posterior margins; dorsolateral body plates 21 (2), 22 (9), 23* (9); ventrolateral body plates 18 (1), 19 (8), 20 (10), 21* (1); dorsolateral body plates along dorsal-fin base 5* (6), 6 (14); dorsolateral body plates between adipose- and caudal-fin 6 (10), 7* (9), 8 (1); preadipose platelets 2 (3), 3 (16), 4* (1); 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. Anterior margin of orbit, above lateral ethmoid, snout,

region surrounding ventral margin of preopercle, and upper lip covered with relatively large platelets bearing odontodes (Fig. 2a). Ventral surface of trunk covered by coalescent relatively well-developed platelets (Fig. 4); region between pelvic and anal fins with platelets in some specimens.

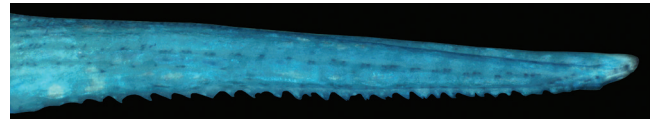


Fig. 3. Right pectoral spine (11.4 mm long) of *Corydoras everisi*, paratype, NUP 17310, 45.3 mm SL, showing the serrations on posterior margin.

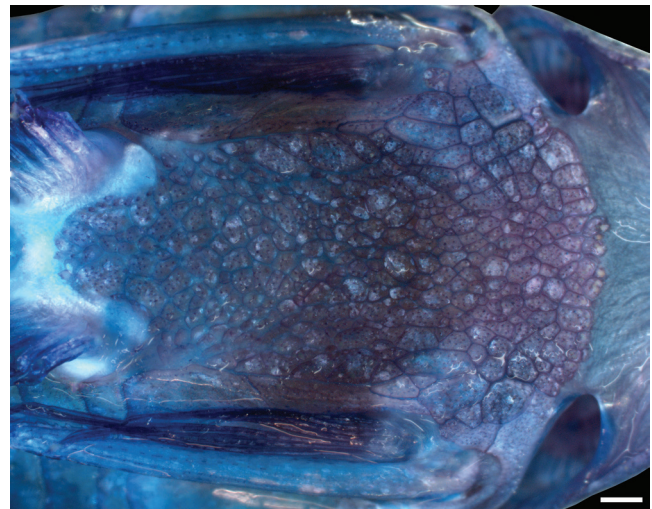


Fig. 4. Ventral surface of the trunk of *Corydoras everisi*, paratype, NUP 17310, 44.4 mm SL, showing the relatively large coalescent platelets covering the area between pectoral and pelvic girdles. Scale bar = 1.0 mm.

Color in alcohol. Overall color of body in Fig. 1. Ground color of body brownish yellow, with top of head and snout dark brown. Ventral margin of orbit, above infraorbital 1, blackened. Maxillary barbel and anterior portion of outer mental barbel covered by black chromatophores. Dorsal and lateral portion of body, with exception of small region of ventrolateral body plates surrounding pelvic fin, densely covered by irregular black spots; spots arranged longitudinally on flanks, forming irregular stripes. Ventral region of body close to pectoral-fin spine origin with black spots in some specimens. Ground color of fins grayish brown. All fins covered by irregular black spots; pectoral, pelvic, anal, and caudal fins with black spots diffuse or absent in some specimens. Caudal fin generally with scattered spots, not forming transversal black bars; with faded spots arranged in up to six transversal slender black bars in few specimens.

Color in life. Very similar to preserved specimens but with ground color of body intense orange; body covered by greenish yellow iridescent coloration (Fig. 5).



Fig. 5. Aquarium specimen of *Corydoras eversi*, nearly 37.0 mm SL, showing its peculiar bright orange color pattern. Photo by Hans-Georg Evers.

Sexual dimorphism. Presence of lanceolate genital papilla in males, which occurs in all Corydoradinae (see Nijssen & Isbrücker, 1980; Britto, 2003). The males of the new species present first and second branched dorsal-fin rays slightly larger than in females. Additionally, the males of *Corydoras eversi* present pointed oblong pelvic fin, while in females the pelvic fin is rounded. In *Corydoras* females, the rounded pelvic fin is generally used to make a ventral pouch to hold the eggs during spawning (H.-G. Evers pers. comm.).

Distribution. *Corydoras eversi* is known from its type locality, an unnamed stream tributary to the rio Araguaia (Fig. 6).

Ecological notes. The specimens examined herein were captured in a clear water stream, with sandy ground and fast flowing. After capture the specimens are light orange. This color remains in aquarium when the water conditions are adequate to its biological aspects. In the type locality of the new species no other congener were observed in syntopy (H.-G. Evers pers. comm.).

Etymology. *Corydoras eversi* is named in honor of Hans-Georg Evers, a dear friend and great enthusiast in the fishkeeping hobby, especially in the breeding of *Corydoras* species. Hans collected the specimens of *C. eversi* that apparently originated all the stock present in the hobby until the present day and also the specimens used herein for the description.

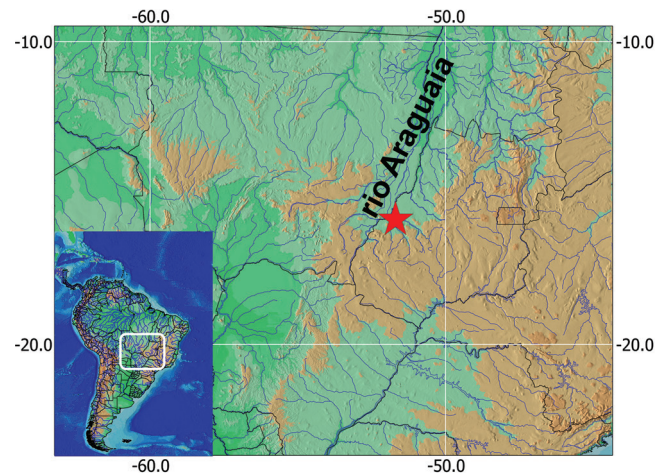


Fig. 6. Map showing the type locality (red star) of *Corydoras eversi*, an unnamed stream tributary to the rio Araguaia, Goiás State.

Conservation status. At the time of the capture of *Corydoras eversi*, the type locality presented high degree of deforestation and presence of nearby cattle farming. There was an encampment of the ‘Movimento dos Trabalhadores Rurais Sem Terra - (MST)’ just a few kilometers away from the collection site (Hans-Georg Evers pers. comm.). Despite the type locality presents, at least in the year of 1998, nearby human and cattle occupation and severe deforestation, in addition to the scarcity of the known material of *C. eversi*, apparently, no additional collecting

trip has been performed in the region since 1998. Therefore, the current situation of the type locality is unknown and, with the available data, it is not possible to determine if any of the aforementioned potential threats has directly affected the new species. Additionally, it is very possible that the new species may be further spread than the type locality region, potentially occurring in other creeks and streams of the region. Thus, it seems like the most appropriate conservation status according to the International Union for Conservation of Nature (IUCN) categories and criteria (IUCN Standards and Petitions Subcommittee, 2014), is Least Concern (LC).

Remarks. *Corydoras eversi* is known by exporters and in the fishkeeping hobby as *Corydoras* sp. “Guaraná” due to the intense and shiny orange pigmentation displayed by live specimens, which is very similar to the Brazilian lemonade. Evers (1998) coded the new species as C65, according to the “C-number” system proposed by Evers (1993).

Discussion

The new species present a color pattern similar to *C. albolineatus* Knaack, 2004, *C. apiaka* Espíndola, Spencer, Rocha & Britto, 2014, *C. araguaiaensis*, *C. haraldschultzi* Knaack, 1962, *C. maculifer*, *C. multimaculatus* Steindachner, 1907, *C. polystictus* Regan, 1912, and *C. xinguensis* Nijssen, 1972. *Corydoras eversi* can be clearly diagnosed from *C. haraldschultzi* and *C. maculifer* by the presence of short mesethmoid (*vs.* long) and serrations on posterior margin of pectoral spine directed towards the tip of the spine (*vs.* directed towards pectoral-spine origin). From *C. albolineatus*, *C. apiaka*, *C. araguaiaensis* and *C. polystictus*, the new species can be distinguished by the presence of infraorbital 2 in contact with compound pterotic (Fig. 2c) (*vs.* not in contact (Fig. 2d)). The new species differs from *C. multimaculatus* and *C. xinguensis* by the presence of ventral laminar expansion of infraorbital 1 well developed (*vs.* moderately developed) and ventral surface of the trunk densely covered by coalescent relatively well developed platelets (*vs.* covered by sparse relatively small platelets).

Corydoras eversi presents osteological pattern similar to the species from clade IX *sensu* Britto (2003). The presence of a well-developed ventral laminar expansion in the infraorbital 1 corresponds to the state 3 of character 15 of Britto’s (2003) phylogeny, a synapomorphy of the species located in clade IX. This clade is composed of species previously allocated in *Brochis* Cope, 1871, in addition to *C. aeneus*, *C. eques*, *C. rabauti*, and *C. zygatus*. *Corydoras melanotaenia* also appeared correlated with the aforementioned species in the phylogenetic hypothesis conducted by Alexandrou *et al.* (2011). As presented in the diagnosis, the species mentioned above can be promptly distinguished from *C. eversi* by their peculiar general color pattern, with uniform background color and dark dorsal

region, clearly different from the densely spotted pattern of the new species. Additionally, *C. coppenamensis*, *C. diffluviatilis*, *C. garbei*, and *C. lymnades* also present a well-developed ventral laminar expansion in the first infraorbital. The new species can be clearly distinguished from these species by the presence of ventral surface of trunk densely covered by relatively large coalescent platelets (*vs.* ventral surface of trunk naked; or covered by sparse and relatively small platelets).

The presence of relatively well-developed coalescent platelets in the ventral surface of the trunk of *Corydoras eversi* (Fig. 4) is an uncommon condition only displayed by few congeners, such as *C. araguaiaensis*, *C. esperanzae*, *C. evelynae*, *C. fowleri* Böhlke, 1950, *C. julii* Steindachner, 1906, *C. leopardus*, *C. orphnopterus*, *C. schwartzi*, and *C. trilineatus* Cope, 1872. The new species can be distinguished from *C. evelynae*, *C. orphnopterus*, and *C. schwartzi* by the absence of a concentration of a transversal black stripe (“mask”) across the eye (*vs.* presence). *Corydoras eversi* differs from *C. julii*, *C. leopardus*, and *C. trilineatus* by the absence of a conspicuous longitudinal black midlateral stripe bordered dorsally and ventrally by an unpigmented area (*vs.* presence). From *C. araguaiaensis*, the new species differs by the presence of infraorbital 1 with ventral laminar expansion well developed (Fig. 2a) (*vs.* moderately developed (Fig. 2b)) and relatively large platelets bearing odontodes on snout (*vs.* plates generally absent; when present, plates are scarce and restrict to the anterior margin of orbit, above lateral ethmoid). From *C. fowleri*, it can be distinguished by having short and rounded snout (*vs.* long and conspicuously pointed). Finally, *C. eversi* can be distinguished from *C. esperanzae* by the presence of black spots on the body (*vs.* absence).

Despite the great general resemblance between *Corydoras eversi* and *C. araguaiaensis*, both species present clearly different morphology, mainly in osteological features, as mentioned above. However, even the similar color pattern presents some conspicuous differences. The spots are smaller and more numerous in the new species (Fig. 1) whereas *C. araguaiaensis* presents larger and less numerous spots (Fig. 7). The caudal-fin color pattern is diffuse in *C. eversi*, with faded spots (Fig. 1), forming diffuse conspicuously slender transversal black bars only in few specimens, contrary to *C. araguaiaensis* which presents conspicuous and thicker transversal black bars on caudal fin (Fig. 7).

Evers (1993) proposed a coding system for the Corydoradinae to avoid the creation of *nomina nuda* by using trade names. Some potentially new species from the rio Araguaia basin with similar color pattern to *Corydoras araguaiaensis* were coded in this system, including *C. eversi*. Additionally, a species from the rio Cristalino basin, Mato Grosso State, very similar to *C. araguaiaensis* but with larger spots and more intense black pigmentation on anterior portion of dorsal fin, was considered new and coded as C45 (Fig. 8). Initially, C45 appears to be easily

distinguished from *C. araguaiaensis* by its color pattern, but after a deep analysis the general morphology proved to be very similar, with mixed morphotypes, making all the aforementioned potential diagnostic features present some degree of overlap. By this reason, a clear diagnosis between *C. araguaiaensis* and C45 was not possible and they were treated herein as a single taxon. However, since the original description of *C. araguaiaensis* lacks many important information, mainly skeletal, beyond the existence of two different morphotypes, the possibility that *C. araguaiaensis* comprehends a complex of species is reasonable. A complete revisionary study of *C. araguaiaensis*, including a molecular approach, is needed to elucidate its taxonomic status.

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 aeneus*: **Trinidad-Tobago:** Unknown department. USNM 1116, lectotype of *Hoplosoma aeneum* Gill, 1858, 38.2 mm SL, Island of Trinidad, West Indies. *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 *Corydoras approuaguensis* Nijssen & Isbrücker, 1983, rio Approuague. *Corydoras araguaiaensis*: **Brazil:** Mato Grosso. MCP 40230, 2, 35.3-44.2 mm SL, rio Paciguara;



Fig. 7. *Corydoras araguaiaensis*, MZUSP 87155, 45.8 mm SL, showing the general color pattern of the species in lateral view. Photo by Celso Ikedo.



Fig. 8. Uncatalogued aquarium specimen of *Corydoras araguaiaensis* attributed to C45, showing the general color pattern of the species in lateral view. Photo by Hans-Georg Evers.

MCP 40243, 3 of 5, 33.9-38.1 mm SL, unnamed stream tributary to the ribeirão Gameleira; MCP 40270, 1, 27.0 mm SL, ribeirão Santana; MZUSP 87155, 4 of 33, 24.9-46.7 mm SL, 2 c&s, 27.6-31.8 mm SL, Corixo da Saudade. *Corydoras* cf. *araguaiaensis* (C45): MZUSP 86269, 63, 24.1-49.3 mm SL, 2 c&s, 29.9-36.3 mm SL, Corixão do Meio. *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, Periquito stream. *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 *Corydoras 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 brevisrostris*: **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 *Corydoras condiscipulus* Nijssen & Isbrücker, 1980, Cumuri Creek. *Corydoras crimmeni*: **Brazil**: Uncertain state. MZUSP 52490, 1, 36.1 mm SL, holotype of *Corydoras crimmeni* Grant, 1998, aquarium specimens said to be from near the town of Boa Vista, Roraima, possibly from the rio Branco. *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 *Corydoras difluviatilis* Britto & Castro, 2002, Paulicéia stream. *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, Lobococha. *Corydoras ephippifer*: **Brazil**: Amapá. MZUSP 31605, 2, 44.9-49.1 mm SL, rio Cupixi. *Corydoras eques*: **Brazil**: Amazonas. MCZ 8204, 4 of 12, 37.6-44.4 mm SL, paratypes of *Corydoras eques* Steindachner, 1876, rio Amazonas at Codajás. *Corydoras flaveolus*: **Brazil**: São Paulo. MZUSP 424, 1, 33.4 mm SL, holotype of *Corydoras 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, Perta-Pé lagoon. *Corydoras gossei*: **Brazil**: Rondônia. MZUSP 38977, 6, 48.4-53.4 mm SL, paratypes of *Corydoras 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, igarapé tributary to the rio Kuribrong. *Corydoras gryphus*: **Brazil**: Paraná. MNRJ 40770, 1, 32.3 mm SL, holotype of *Corydoras gryphus* Tencatt, Britto & Pavanelli, 2014, rio Paraná (near Ponte da Amizade). NUP 14676, 3 c&s, 27.7-32.4 mm SL, paratypes of

Corydoras gryphus Tencatt, Britto & Pavanelli, 2014, rio Paraná (near Ponte da Amizade). *Corydoras guapore*: **Brazil**: Mato Grosso. ZUFMS-PIS 4000, 5, 26.9-33.6 mm SL, 2 c&s, 28.8-29.2 mm SL, rio Guaporé. *Corydoras hastatus*: **Brazil**: Mato Grosso. NUP 6862, 116, 13.1-20.7 mm SL, baía Caiçara. *Corydoras inolicana*: **Brazil**: Amazonas. MZUSP 45717, 1, 47.6 mm SL, holotype of *Corydoras inolicana* Burgess, 1993, rio Içana. *Corydoras julii*: **Brazil**: Piauí. NUP 16225, 1, 46.8 mm SL, rio Atalaia. *Corydoras kanei*: **Brazil**: Uncertain state. MZUSP 52489, 1, 36.6 mm SL, holotype of *Corydoras kanei* Grant, 1998, aquarium specimens said to be from near the town of Boa Vista, Roraima, possibly from the rio Branco. *Corydoras lacrimostigmata*: **Brazil**: Paraná. MNRJ 40725, 1, 31.8 mm SL, holotype of *Corydoras lacrimostigmata* Tencatt, Britto & Pavanelli, 2014, rio Maria Flora; NUP 14657, 3 c&s, 30.9-34.5 mm SL paratypes of *Corydoras lacrimostigmata* Tencatt, Britto & Pavanelli, 2014, rio Nestor. *Corydoras longipinnis*: **Argentina**: Santiago del Estero: AI 221, 1, 59.5 mm SL, holotype of *Corydoras longipinnis* Knaack, 2007, rio Sali. Tucumán: NUP 14440, 2 c&s, 29.9-33.4 mm SL, Pampa-Mayo stream. *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 *Corydoras 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 *Corydoras 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, Sarandí stream. *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 parallelus*: **Brazil**: Amazonas. MZUSP 45716, 1, 47.4 mm SL, holotype of *Corydoras parallelus* Burgess, 1993, rio Içana. *Corydoras pinheiroi*: **Brazil**: Rondônia. MZUSP 48099, 1, 54.3 mm SL, holotype of *Corydoras pinheiroi* Dinkelmeyer, 1995, stream tributary to the rio Ribeiro, at Guajará-Mirim. *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 robineae*: **Brazil**: Amazonas. MZUSP 27175, 1, 33.7 mm SL, holotype of *Corydoras robineae* Burgess, 1983, rio Aiuna. *Corydoras sararensis*: **Brazil**: Mato Grosso. MZUSP 48100, 1, 40.9 mm SL, holotype of *Corydoras sararensis* Dinkelmeyer, 1995, rio Sararé. *Corydoras seussi*: **Brazil**: Rondônia. MZUSP 49323, 10, 44.3-54.0 mm SL, paratypes of *Corydoras seussi* Dinkelmeyer, 1996, small stream tributary to the rio Pacas-Novos (= Pacaás Novos), near Guajará-Mirim. *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 *Corydoras tukano* Britto & Lima, 2003, rio Tiquié. *Corydoras zygatus*: **Brazil**: Acre. MZUSP 30858, 4 of 15, 41.7-47.3 mm SL, rio Tarauacá.

Acknowledgments

The Núcleo de Pesquisas em Limnologia, Ictiologia e Aquicultura (Nupélia) of the Universidade Estadual de Maringá and the Laboratório de Zoologia da Universidade Federal de Mato Grosso do Sul provided logistical support. The authors are grateful to Carlos Lucena (MCP), Cláudio Oliveira (LBP), Mário de Pinna, Aléssio Datovo, and Osvaldo Oyakawa (MZUSP) and Otávio Froehlich (*in memoriam*) (ZUFMS-PIS) for hosting museum visits and loaning of material. We also thank Hernán López-Fernández, Don Stacey and Erling Holm (ROM), Jorge Casciotta and Adriana Almirón (AI), Juan Mirande (Fundación Miguel Lillo), and Sven Kullander (NRM) for the loaning and/or donation of several specimens analyzed in this paper. To Andressa Oliveira, Francisco Severo-Neto and Thomaz Sinani (ZUFMS-PIS), Carlos Lucena and Héctor Vera-Alcaraz, Cláudio Oliveira, Ricardo Britzke, Fábio Roxo, Bruno Melo, and Gabriel Silva (LBP), Osvaldo Oyakawa and Túlio Teixeira (MZUSP) for gently welcome LFCT during museum visits. To Fernando Paiva and Lucas Blanco by permitting the use and by the assistance in the image capture laboratory of the Universidade Federal de Mato Grosso do Sul. To Hans-Georg Evers by sending the type-specimens and general information about *Corydoras eversi*. To Robert 'Rob' McLure for the pleasant late-night talks on *Corydoras* and for kindly reviewing the English language of this paper. To Celso Ikedo for taking the photos used in the figures 1 and 7. Financial support to LFCT was provided by Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq, process #141061/2014-6), and MRB by Fundação Carlos Chagas Filho de Amparo a Pesquisa do Estado do Rio de Janeiro (FAPERJ, process #E-111.268/2014).

References

- Alexandrou, M. A., C. Oliveira, M. Maillard, R. A. R. McGill, J. Newton, S. Creer & M. I. Taylor. 2011. Competition and phylogeny determine community structure in Müllerian mimics. *Nature*, 469: 84-89.
- Aquino, A. E. & S. A. Schaefer. 2002. The temporal region of the cranium of loricarioid catfishes (Teleostei: Siluriformes): morphological diversity and phylogenetic significance. *Zoologischer Anzeiger*, 241: 223-244.
- Arratia, G. & M. Gayet. 1995. Sensory canals and related bones of Tertiary siluriform crania from Bolivia and North America and comparison with recent forms. *Journal of Vertebrate Paleontology*, 15: 482-505.
- Böhlke, J. E. 1950. A new catfish of the genus *Corydoras* from the Peruvian Amazon. *The Fish Culturist*, 30: 26-27.
- Britto, M. R. 2003. Phylogeny of the subfamily Corydoradinae Hoedeman, 1952 (Siluriformes: Callichthyidae), with a definition of its genera. *Proceedings of the Academy of Natural Sciences of Philadelphia*, 153: 119-154.
- Britto, M. R. & R. M. C. Castro. 2002. New corydoradine catfish (Siluriformes: Callichthyidae) from the upper Paraná and São Francisco: the sister group of *Brochis* and most of *Corydoras* species. *Copeia*, 2002: 1006-1015.
- Britto, M. R. & F. C. T. Lima. 2003. *Corydoras tukano*, a new species of corydoradine catfish from the rio Tiquié, upper rio Negro basin, Brazil (Ostariophysi: Siluriformes: Callichthyidae). *Neotropical Ichthyology*, 1: 83-91.
- Britto, M. R., F. C. T. Lima & M. H. Hidalgo. 2007. *Corydoras ortegai*, a new species of corydoradine catfish from the lower rio Putumayo in Peru (Ostariophysi: Siluriformes: Callichthyidae). *Neotropical Ichthyology*, 5: 293-300.
- Britto, M. R., W. B. Wosiacki & L. F. A. Montag. 2009. A new species of Corydoradinae catfish (Ostariophysi: Siluriformes: Callichthyidae) from Rio Solimões Basin, Brazil. *Copeia*, 2009: 684-689.
- Castelnau, F. 1855. Poissons. Pp. 1-112. In: Animaux nouveaux ou rares recueillis pendant l'expédition dans les parties centrales de l'Amérique du Sud, de Rio de Janeiro à Lima, et de Lima au Para; exécutée par ordre du gouvernement Français pendant les années 1843 à 1847. Paris, Chez P. Bertrand.
- Castro, D. M. 1987. The fresh-water fishes of the genus *Corydoras* from Colombia, including two new species (Pisces, Siluriformes, Callichthyidae). *Boletín Ecológico*, 16: 23-57.
- Cope, E. D. 1871. Some anatomical points of importance in the classification of the silurids of the Amazon. *Proceedings of the Academy of Natural Sciences of Philadelphia*, 23: 112-113.
- Cope, E. D. 1872. On the fishes of the Ambyiacu River. *Proceedings of the Academy of Natural Sciences of Philadelphia*, 23: 250-294.
- Dinkelmeyer, J. 1995. Zwei neue Arten von Panzerwelsen der Gattung *Corydoras* Lacépède, 1803 aus Brasilien (Pisces, Siluriformes, Callichthyidae). *Aquaristik aktuell*, 1995: 60-61.
- Eigenmann, C. H. & W. R. Allen. 1942. Fishes of western South America 1. The intercordilleran and Amazonian lowlands of Peru. 2. The high pampas of Peru, Bolivia, and Northern Chile with a revision of the Peruvian Gymnotidae, and of the genus *Orestias*. Lexington, The University of Kentucky, 494p.
- Eigenmann, C. H. & R. S. Eigenmann. 1890. A revision of the south american Nematognathi or cat-fishes. *Occasional Papers of the California Academy of Sciences*, 1: 1-508.
- Eschmeyer, W. N. (Ed.). 2015. Catalog of fishes: genera, species, references. San Francisco, CA, California Academy of Sciences. 3v., ill. Available from <http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp> (29 May 2015).
- Evers, H.-G. 1993. C-Nummern für Panzerwelse. *Die Aquarien- und Terrarienzeitschrift (DATZ)*, 46: 755-758.
- Evers, H.-G. 1998. Ein neuer Panzerwels aus Zentralbrasilien. *Die Aquarien- und Terrarienzeitschrift (DATZ)*, 51: 604-605.
- Fuller, I. A. M. & H.-G. Evers. 2005. Identifying Corydoradinae catfish. *Aspidoras-Brochis-Corydoras-Scleromystax & C-numbers*. Kidderminster, Ian Fuller Enterprises; Rodgau, A.C.S. GmbH (Aqualog), 384p.
- Gill, T. N. 1858. Synopsis of the fresh water fishes of the western portion of the island of Trinidad. *W. I. Annals of the Lyceum of Natural History of New York*, 6: 363-430.
- Gosline, W. A. 1940. A revision of the Neotropical catfishes of the family Callichthyidae. *Stanford Ichthyological Bulletin*, 2: 1-36.

- Huysentruyt, F. & D. Adriaens. 2005. Descriptive osteology of *Corydoras aeneus* (Siluriformes: Callichthyidae). *Cybium*, 29: 261-273.
- Ihering, R. von. 1911. Algumas especies novas de peixes d'agua doce (Nematognatha) (*Corydoras*, *Plecostomus*, *Hemipsilichthys*). *Revista do Museo Paulista*, 8: 380-404.
- International Union for Conservation of Nature (IUCN). Standards and Petitions Subcommittee. 2014. Guidelines for using the IUCN Red List Categories and Criteria. Version 11. Prepared by the Standards and Petitions Subcommittee. Gland, Switzerland, IUCN, 87p. Available from <http://www.iucnredlist.org/documents/RedListGuidelines.pdf>. (14 July 2015).
- Knaack, J. 1961. Ein neuer Panzerwels aus Brasilien (*Corydoras guapore*) (Pisces, Teleostei, Callichthyidae). *Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin (n. f.)*, 1: 135-138.
- Knaack, J. 1962. Zwei neue Panzerwelse, *Corydoras haraldschultzi* und *Corydoras sterbai* (Pisces, Teleostei, Callichthyidae). *Senckenbergiana Biologica*, 43: 129-135.
- Knaack, J. 2004. Beschreibung von sechs neuen Arten der Gattung *Corydoras* La Cépède, 1803 (Teleostei: Siluriformes: Callichthyidae). *Zoologische Abhandlungen (Dresden) - Staatliches Museum für Tierkunde in Dresden*, 54: 55-105.
- Lacépède, B. G. E. 1803. *Histoire naturelle des poissons*. Paris, Chez Plassan, t. 5, 803p.
- La Monte, F. R. 1941. A new *Corydoras* from Brazil. *Zoologica, Scientific Contributions of the New York Zoological Society*, 26: 5-6.
- Lundberg, J. G. 1970. The evolutionary history of North American catfishes, family Ictaluridae. Unpubl. Ph. D. Dissertation, University of Michigan, Ann Arbor, Michigan, 524p.
- Morris, P. J., H. M. Yager & M. H. Sabaj Pérez. (Ed.). 2006. ACSImagebase: a digital archive of catfish images compiled by participants in the All Catfish Species Inventory [WWW image Database]. Available from <http://acsi.acnatsci.org/base/> (Date of access - 29 May 2015).
- Myers, G. S. 1933. New importations. Leopard *Corydoras*. *The Aquarium, Philadelphia*, 2: 188-189.
- Nijssen, H. 1970. Revision of the Surinam catfishes of the genus *Corydoras* Lacépède, 1803 (Pisces, Siluriformes, Callichthyidae). *Beaufortia*, 18: 1-75.
- Nijssen, H. 1972. Records of the catfish genus *Corydoras* from Brazil and French Guiana with descriptions of eight new species (Pisces, Siluriformes, Callichthyidae). *Netherlands Journal of Zoology*, 21: 412-433.
- Nijssen, H. & I. J. H. Isbrücker. 1971. Two new species of the catfish genus *Corydoras* from Brazil and Peru (Pisces, Siluriformes, Callichthyidae). *Beaufortia*, 18: 183-189.
- Nijssen, H. & I. J. H. Isbrücker. 1980. A review of the genus *Corydoras* Lacépède, 1803 (Pisces, Siluriformes, Callichthyidae). *Bijdragen tot de Dierkunde*, 50: 190-220.
- Orcés-Villagomez, G. 1960. Peces ecuatorianos de la familia Callichthyidae, con la descripción de una especie nueva. *Ciencia y Naturaleza*, 3: 1-6.
- Regan, C. T. 1912. A revision of the South-American siluroid fishes of the genus *Corydoras*, with a list of the specimens in the British Museum (Natural History). *Annals and Magazine of Natural History*, 10: 209-220.
- Reis, R. E. 1997. Revision of the Neotropical catfish genus *Hoplosternum* (Ostariophysi: Siluriformes: Callichthyidae), with the description of two new genera and three new species. *Ichthyological Exploration of Freshwaters*, 7: 299-326.
- Reis, R. E. 1998. Anatomy and phylogenetic analysis of the neotropical callichthyid catfishes (Ostariophysi, Siluriformes). *Zoological Journal of the Linnean Society*, 124: 105-168.
- Reis, R. E. 2003. Family Callichthyidae (Armored catfishes). Pp. 291-309. In: Reis, R. E., S. O. Kullander & C. J. Ferraris, Jr. (Orgs.). *Check list of the freshwater fishes of South and Central America*. Porto Alegre, Edipucrs.
- Rössel, F. 1961. *Corydoras caudimaculatus* ein neuer Panzerwels aus Brasilien (Pisces, Teleostei, Callichthyidae). *Senckenbergiana Biologica*, 42: 49-50.
- Rössel, F. 1963. Neue und seltene *Corydoras*-Arten aus Brasilien (Pisces, Teleostei, Callichthyidae). *Senckenbergiana Biologica*, 44: 359-363.
- Schaefer, S. A. 1988. Homology and evolution of the opercular series in the loricatorid catfishes (Pisces: Siluroidei). *Journal of Zoology*, 214: 81-93.
- Schaefer, S. A. & A. E. Aquino. 2000. Postotic laterosensory canal and pterotic branch homology in catfishes. *Journal of Morphology*, 246:212-227.
- Steindachner, F. 1876. *Ichthyologische Beiträge (V)*. *Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften und der Literatur Abhandlungen der Mathematisch-Naturwissenschaftlichen Klasse*, 74: 49-240.
- Steindachner, F. 1906. Das w. M. Hefrat F. Steindachner berichtet über zwei neue *Corydoras*-Arten aus dem Parnahyba- und Parahum-Flusse im Staate Piauhy welche von ihm während der zoologischen Expedition der Kaiserl. Anzeiger der Kaiserlichen Akademie der Wissenschaften, *Matematisch-Naturwissenschaftlichen Klasse*, 43: 478-480.
- Steindachner, F. 1907. Das w. M. Hefrat F. Steindachner berichtet über eine neue *Coridoras* [sic]-Art aus dem Rio Preto, einem sekundären Nebenflusse des Rio San Francisco, und eine *Xenocara*-Art aus dem Parnahyba bei Victoria und Sa. Filomena. *Anzeiger der Kaiserlichen Akademie der Wissenschaften, Matematisch-Naturwissenschaftlichen Klasse*, 44: 290-293.
- Taylor, W. R. & G. C. Van Dyke. 1985. Revised procedures for staining and clearing small fishes and other vertebrates for bone and cartilage study. *Cybium*, 9: 107-119.
- Tencatt L. F. C., H. S. Vera-Alcaraz, M. R. Britto & C. S. Pavanelli. 2013. A new *Corydoras* Lacépède, 1803 (Siluriformes: Callichthyidae) from the rio São Francisco basin, Brazil. *Neotropical Ichthyology*, 11: 257-264.
- Vera-Alcaraz, H. S. 2013. *Relações filogenéticas das espécies da família Callichthyidae (Ostariophysi, Siluriformes)*. Unpublished Ph.D. Thesis, Pontificia Universidade Católica do Rio Grande do Sul, Porto Alegre, 362p.
- Weitzman, S. H. & H. Nijssen. 1970. Four new species and one new subspecies of the catfish genus *Corydoras* from Ecuador, Colombia and Brazil (Pisces, Siluriformes, Callichthyidae). *Beaufortia*, 18: 119-132.

Submitted May 11, 2015

Accepted September 20, 2015 by Fernando Carvalho