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Revision of the species of the genus *Cathorops* (Siluriformes: Ariidae) from Mesoamerica and the Central American Caribbean, with description of three new species

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The ariid genus *Cathorops* includes species that occur mainly in estuarine and freshwater habitats of the eastern and western coasts of southern Mexico, Central and South America. The species of *Cathorops* from the Mesoamerica (Atlantic slope) and Caribbean Central America are revised, and three new species are described: *C. belizensis* from mangrove areas in Belize; *C. higuchii* from shallow coastal areas and coastal rivers in the Central American Caribbean, from Honduras to Panama; and *C. kailolae* from río Usumacinta and lago Izabal basins in Mexico and Guatemala. Additionally, *C. aguadulce*, from the río Papaloapan basin in Mexico, and *C. melanopus* from the río Motagua basin in Guatemala and Honduras, are redescribed and their geographic distributions are revised.

O gênero de ariídeos *Cathorops* inclui espécies que habitam principalmente águas doces e estuarinas das plataformas orientais e ocidentais do sul do México, Américas do Sul e Central. Neste estudo, se apresenta uma revisão das espécies de *Cathorops* da Mesoamérica (bacias do Atlântico) e Caribe centroamericano, incluindo a descrição de três espécies novas: *C. belizensis*, de áreas de manglar em Belice; *C. higuchii*, de águas costeiras rasas e rios costeiros do Caribe centroamericano, desde Honduras até o Panamá; e *C. kailolae*, das bacias do rio Usumacinta e lago Izabal no México e Guatemala. Adicionalmente, se redescrevem *C. aguadulce*, da bacia do rio Papaloapan no México, e *C. melanopus*, da bacia do rio Motagua na Guatemala e Honduras, apresentando-se uma revisão de suas distribuições geográficas.

Key words: *Cathorops aguadulce*, *C. belizensis, C. higuchii*, *C. kailolae*, *C. melanopus*, Sexual dimorphism.

Introduction

Ariid catfishes are widely distributed in tropical and temperate continental shelves all over the world, mainly inhabiting coastal waters and estuarine regions, or in some cases confined to freshwaters (Kailola, 2004; Marceniuk & Menezes, 2007). The neotropical genus *Cathorops* Jordan & Gilbert, 1882 includes species that occur mainly in estuarine and freshwater habitats in the eastern and western shelves of southern Mexico, Central and South America. The species belonging to *Cathorops* have been traditionally distinguished by the absence of vomerine tooth plates and presence of one pair of small oval accessory tooth plates bearing molariform teeth. The genus comprises 14 valid species (Marceniuk & Ferraris, 2003; Betancur-R. & Acero P., 2005; Marceniuk, 2007a), although a higher number of species has been recognized, but not named by Marceniuk (1997). Monophyly of the genus was first recognized by Marceniuk (1997) and later confirmed through cladistic analyses by Marceniuk (2003), using osteological characters and Betancur-R. (2003), Betancur-R. & Acero P. (2005), and Betancur-R. *et al*. (2007), using mitochondrial, nuclear and morphological evidence. Recently, Marceniuk & Menezes (2007) presented a revision of the genera of the family Ariidae, redefining *Cathorops* with six exclusive and eleven non-exclusive derived anatomical characters. Independently, Betancur-R. *et al*. (2007), in their revision of the New World Ariidae, listed ten morphological and two amino acid synapomorphies for the genus *Cathorops* and recognized two subgenera: *Precathorops*, for *C. dasycephalus*, and *Cathorops* for the remaining species. Although Marceniuk (2003) and Marceniuk & Menezes (2007) provided no subgeneric classification for *Cathorops*, their morphological evidence supports the basal position of *C. dasycephalus* and thus the division of the genus into two main lineages.

Cathorops aguadulce (Meek, 1904) was described from the río Papaloapan basin in Mexico, but is currently recognized as occurring also in río Panuco to laguna de Términos in Mexico, río Usumacinta basin in Mexico and Guatemala, and lago Izabal basin in Guatemala (Miller *et al*., 2005). The type locality of

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Cathorops melanopus (Günther, 1864) is the río Motagua in Guatemala, but is commonly recognized as the only species of *Cathorops* described for the entire Caribbean portion of Central America (Regan, 1907; Meek & Hildebrand, 1923; Miller, 1966; Gilbert & Kelso, 1971; Castro-Aguirre *et al*., 1999).

In this study, we provide a revision of the species of *Cathorops* from the Atlantic slope of Mesoamerica and the Central American Caribbean, including the description of three new species and the redescription of *C. aguadulce* and *C. melanopus*, with revision of their geographical distributions.

Material and Methods

This study is based on the analysis of 50 morphometric and 6 meristic characters. Measurements were taken according to Marceniuk (2007b). Gill rakers counts reported were made only on lateral surfaces of the epibranchial and the ceratobranchial (= upper and lower limbs of gill arches, respectively). The dorsomedian groove of neurocranium referred herein is formed by mesial depression of the frontals and extends posteriorly to the anterior portion of supraoccipital. Bivariate scatterplots were used in the analyses of morphometric data and ranges and modal data used in the analysis of meristic data. Measurements are given as percentages of standard length (SL), unless stated otherwise. Individual measurements are given for the holotypes (except of *C. melanopus*), followed by the mean and the range, for males and females separately. The meristic values for the holotypes are indicated in parentheses in the descriptions. Sex of specimens was determined by examination of the gonad morphology under magnification (gonads of *C. aguadulce* and *C. melanopus* were not examined). Whenever possible, variables in which differences were found between males and females are discussed under the sexual dimorphism section of each species. Diagnosis sections include a combination of characters which allows differentiating each species described from the other members of *Cathorops*. Individual comparative diagnoses separating each species from other species from Mesoamerica and the Caribbean, including *Cathorops mapale* species group from Colombia and Venezuela, are also presented. Usage of "nuchal plate" in text refers to the fusion of the anterior and the medial nuchal plates (Higuchi, 1982; Royero, 1987).

The institutional abbreviations used are as follows: AMNH - American Museum of Natural History, New York, USA; AUM - Auburn University Museum, Auburn, Alabama, USA; BMNH - The Natural History Museum, London, England; ECO-SC - El Colegio de la Frontera Sur (ECOSUR), San Cristobal de las Casas, Chiapas, Mexico; FMNH - Field Museum of Natural History, Chicago, USA; MZUSP - Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil; STRI - Smithsonian Tropical Research Institute, Balboa, Panama; UF - University of Florida, Florida Museum of Natural History, Florida, USA; UMMZ - University of Michigan, Museum of Zoology, Michigan, USA; USNM - National Museum of Natural History, Smithsonian Institution, Washington, D.C., USA.

Cathorops (Cathorops) aguadulce (Meek, 1904)

Figs. 1 and 2

Galeichthys aguadulce Meek, 1904: 9, pl. 4. Type locality: río Tesechoacán at Pérez, Veracruz, río Papaloapan basin, Mexico. Holotype: FMNH 4678.

Cathorops aguadulce; Taylor & Menezes, 1978 [only name]; Castro-Aguirre *et al.*, 1999 (in part): 148–149 [remarks and distribution, Mexico, río Papaloapan basin]; Marceniuk & Ferraris, 2003: 449 [distribution, Mexico, río Papaloapan basin]; Acero P., 2003: 837 [only name]; Kailola, 2004: 132 [only name]; Miller *et al.*, 2005 (in part): 170 [description and distribution, Mexico, from río Panuco to río Coatzacoalcos]; Marceniuk & Menezes, 2007 (in part): 42 [distribution, Mexico, río Papaloapan basin]; Betancur-R. *et al.*, 2007:349 [only name]; Betancur-R. & Willink, 2007 (in part) [key features and distribution, Mexico, río Panuco to río Papaloapan].

Material examined. FMNH 4678, 1, 227.0 mm SL, Mexico, río Tesechoacán at Pérez, Veracruz, río Papaloapan basin, holotype of *Galeichthys aguadulce* Meek 1904; UMMZ 210777, 1, 152.0 mm SL, Mexico, Oaxaca, río Papaloapan, ca 100 m below bridge to Papaloapan; UMMZ 97483, 5, 134.0-187.0 mm SL, Mexico, Veracruz, río Papaloapan, 2 miles W of San Cristobal. UMMZ 186482, 1, 190 mm SL, Mexico, Veracruz, Estero tributary to Bahia Tecolutla, on Tecolutla-Nautla hwy 2.8 mi SSE Tecolutla (ferry landing, S side) at Rancho, río Tecolutla basin.

Diagnosis. *Cathorops aguadulce* is distinguished from all congeners by the fleshy papillae intercalated with gill rakers on first two gill arches (*vs.* papillae absent in the remaining species, except in *C. kailolae*) (Fig. 3), posterior margin of pectoral-fin spine with long and conspicuous serrations (*vs.* short and inconspicuous serrations in all other species, except in *C. kailolae*, *C. melanopus*, *C. multiradiatus*, and *C. tuyra*) (Fig. 2), 14-16 gill rakers on first arch (*vs.* 19-23 in *C. agassizii*, 17-22 in *C. arenatus*, 19-20 in *C. belizensis*, 18-21 in *C. higuchii*, 37-40 in *C. hypophthalmus*, 20-24 in *C. mapale*, 19-22 in *C. tuyra*, and 17-21 in *C. spixii*) (Table 1), and snout length 9.3-11.6% SL (*vs.* 5.0-9.0% SL in the remaining species, except in *C. hypophthalmus*) (Fig. 4).

Cathorops aguadulce is further distinguished from *C. belizensis* by possessing a longer supraoccipital process (11.5-16.3 *vs.* 8.8-10.5% SL), larger orbital diameter (4.6-6.9 *vs.* 3.6-4.4% SL), and shorter interorbital distance (9.9-12.3 *vs.* 12.9-15.1% SL). *Cathorops aguadulce* is additionally distinguished from *C. higuchii* by having 13-16 gill rakers on second arch (*vs*. 17-21), and a larger orbital diameter (4.6-6.9 *vs.* 3.3-4.4% SL). *Cathorops aguadulce* also differs from *C. kailolae* by having a longer distance from tip of snout to dorsal-fin origin (39.0-40.7 *vs*. 33.1-38.0% SL) (Fig. 5). *Cathorops aguadulce* is additionally distinguished from *C. mapale* species group in possessing 13-16 gill rakers on second arch (*vs*. 17-21). *Cathorops aguadulce* is further distinguished from *C. melanopus* by having a longer distance from tip of snout to dorsal-fin origin (39.0-40.7 *vs*. 30.0-32.6% SL), and longer distance from tip of snout to posterior margin of dorsomedian groove of neurocranium (22.9-26.4 *vs*. 17.9-19.1% SL).

Fig. 1. *Cathorops aguadulce*, holotype, FMNH 4678, 227.0 mm SL (body in lateral view). Mexico, Veracruz, río Papaloapan basin, río Tesechoacán at Pérez.

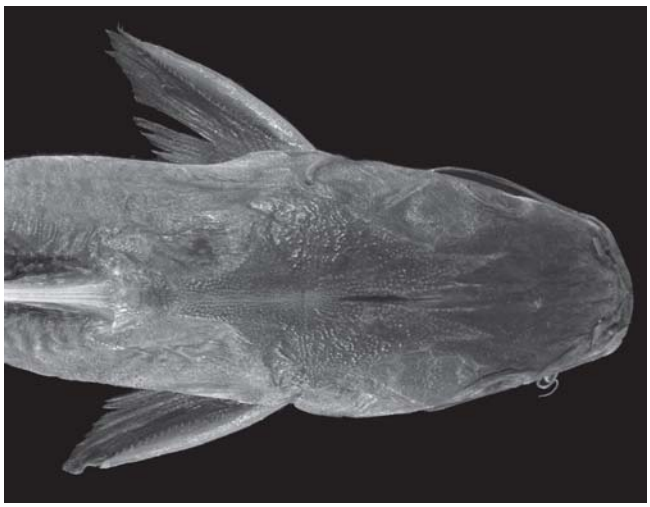

Fig. 2. *Cathorops aguadulce*, holotype, FMNH 4678, 227.0 mm SL (head in dorsal view). Mexico, Veracruz, río Papaloapan basin, río Tesechoacán at Pérez.

Table 1. Meristics for *Cathorops aguadulce*, *C. belizensis*, *C. higuchii*, *C. kailolae* and *C. melanopus*. Data in parentheses indicate modes.

	C. aguadulce n = 2	*C. belizensis* n =13	*C. higuchii* n = 26	*C. kailolae* n = 26	*C. melanopus* n = 8
			Number of rays		
Pectoral-fin	10	10-11 (10)	10	9-11 (10)	10
Dorsal-fin	7	7	7	7	7
Pelvic-fin	6	6	6	6	6
Anal-fin	21	18-21 (20)	19-24 (22)	20-24 (22)	19-20 (20)
			Number of gill rakers		
First arch	14-16	19-20 (20)	18-21 (20)	14-16 (15)	16-18 (17)
Second arch	13-16	16-20 (18)	17-21 (19)	13-16 (14)	16-18 (16)

Description. (Tables 1 and 2). Head long and depressed, profile slightly convex at level of frontals and supraoccipital. Body broader rather than deeper on pectoral girdle area. Cephalic shield rugose, relatively short and narrow on lateral ethmoid, frontal, supracleithrum, and epioccipital areas. Osseous bridge formed by lateral ethmoid and frontal long and slender, evident under skin. Dorsomedian groove of neurocranium formed by frontals and supraoccipital, relatively deep and long, its margins well marked and progressively narrower posteriorly. Supraoccipital process relatively long and narrow on posterior portion, profile straight. Nuchal plate crescent-shaped, short and relatively wide. Snout long, rounded on transverse section. Anterior and posterior nostrils close to one another. Eye lateral and large. Interorbital distance short, distance between nostrils and orbit long. Maxillary barbel surpassing base of pectoral-fin spine, external mental barbel surpassing margin of gill membrane, internal mental barbel reaching margin of gill membrane.

Mouth narrows, lower jaw arched. Lips thick, lower lip thicker than upper lip. Vomerine tooth plates absent. One pair of elongated and narrow accessory tooth plates, small and distant from each other. Accessory tooth plates with small and few molariform teeth. Premaxilla quite narrow and moderately long.

Soft pectoral-fin rays 10. Pectoral-fin spine thick and short; anterior margin without granules or serrations; posterior margin with long and conspicuous serrations along almost its entire length. Soft dorsal-fin rays 7. Dorsal-fin spine relatively short, longer than pectoral-fin spine; anterior margin smooth; posterior margin serrated along almost its entire length. Pelvic fin high, with 6 rays. Anal fin high and short at base, with 21 rays. Upper and lower lobes of caudal fin long, upper lobe longer than lower lobe. Caudal peduncle high.

Acicular gill rakers on first arch 14-16 (14), 4 or 5 (5) on upper limb, 10 or 11 (10) on lower limb. Spike-shaped gill rakers on second arch 13-16 (13), 3 to 5 (3) on upper limb, 10 or 11 (10) on lower limb. Mesial surfaces of all gill arches with developed gill rakers. Lateral and mesial surfaces of first and second gill arches with fleshy papillae intercalated with gill rakers, papillae more developed on second arch.

Coloration in Alcohol. Dorsal and lateral portions of head brown, ventrally light beige. Body with same brown color, progressively lighter towards lateral line and rather light beige under lateral line. Maxillary barbel dark, mental barbels light; adipose fin dark, and other fins brown.

Sexual dimorphism. Sex of specimens was not examined (see Material and Methods).

Distribution. *Cathorops aguadulce* was described based on material from río Tesechoacán, río Papaloapan basin in Veracruz, Mexico. Without considering the populations from the río Usumacinta/río Grijalva and río Polochic/Lago Izabal watersheds (see remarks), Miller *et al.* (2005, Map 6.144) suggested that *C. aguadulce* occurs from río Coatzacoalcos northwestwards to río Panuco as well as in the Gulf of Mexico (Fig. 6). The species inhabits large to medium-sized rivers, lagoons and small drainages; typically freshwaters, but also occurring in marine waters (Miller *et al.*, 2005).

Table 2. Morphometrics for *Cathorops aguadulce*. Standard length is expressed in millimeters, other measurements are percents of standard length. Ranges include paratypes only.

	Holotype	n	Mean	Range
Standard length (mm)	227.0	8	-	134.0-227.0
Head length	26.0	-	-	-
Snout length	9.3	7	10.6	9.3-11.6
Distance between anterior nostrils	4.0	-	-	-
Distance between posterior nostrils	4.9	-	-	-
Distance between anterior nostril and orbit	6.9	-	-	-
Distance between posterior nostril and orbit	5.5	-	-	-
Orbital diameter	4.6	8	6.0	4.6-6.9
Interorbital distance	11.8	8	11.1	9.9-12.3
Maxillary barbel length	25.9	8	29.5	25.9-32.1
External mental barbel length	18.5	2	19.4	18.5-20.4
Internal mental barbel length	12.8	2	13.3	12.8-13.9
Distance from snout to maxillary barbel	1.8	-	-	-
Distance from snout to external mental barbel	3.8	-	-	-
Distance from snout to internal mental barbel	3.4	-	-	-
Mouth width	9.5	-	-	-
Premaxilla length	1.4	-	-	-
Premaxilla width	5.4	-	-	-
Width of cephalic shield at lateral ethmoid area	11.8	-	-	-
Width of cephalic shield at frontal area	6.5	-	-	-
Width of cephalic shield at supracleithrum area	17.3	-	-	-
Distance between lateral ethmoid and supracleithrum	21.2	7	22.2	21.2-22.8
Distance between snout and post. margin of dorsomedian groove of neurocranium	25.4	7	24.9	22.9-26.4
Supraoccipital process length	12.1	7	13.9	11.5-16.3
Supraoccipital process width	2.5	2	2.5	2.5-2.6
Nuchal-plate length	5.7	-	-	-
Nuchal-plate width	6.3	-	-	-
Body depth	17.8	-	-	-
Body width	19.2	-	-	-
Distance from snout to pectoral fin	22.9	-	-	-
Distance from snout to dorsal fin	39.7	7	39.9	39.0-40.7
Distance from snout to pelvic fin	53.3	7	53.4	51.0-56.1
Distance from snout to adipose fin	74.5	7	76.6	74.5-79.9
Distance from snout to anal fin	69.2	7	66.7	63.8-69.4
Caudal-peduncle depth	8.0	7	8.0	7.7-8.3
Pectoral-fin spine length	17.2	-	-	-
Dorsal-fin spine length	18.2	7	19.2	17.5-21.9
Pelvic-fin base length	3.9	-	-	-
Pelvic-fin height	17.1	2	17.0	17.0-17.1
Adipose-fin base length	5.5	7	6.6	4.9-8.0
Adipose-fin height	3.1	-	-	-
Anal-fin base length	16.5	7	17.4	16.4-19.7
Anal-fin height	17.1	-	-	-
Caudal-fin upper lobe length	34.4	-	-	-
Caudal-fin lower lobe length	29.1	-	-	-

Vernacular names. Aguadulce Sea Catfish or bagre aguadulce.

Remarks. The entities examined from the río Usumacinta and lago Izabal basins, formerly treated as *Cathorops aguadulce* (*e.g.* Castro-Aguirre *et al.*, 1999; Miller *et al.*, 2005; Betancur-R. and Willink, 2007), are treated herein as *C. kailolae* (see below). *Cathorops aguadulce* and *C. kailolae* form a species complex, which is diagnosed by the presence of fleshy papillae on the mesial and lateral surfaces of first two gill arches (Fig. 3). More material examination is required to determine whether the popu-

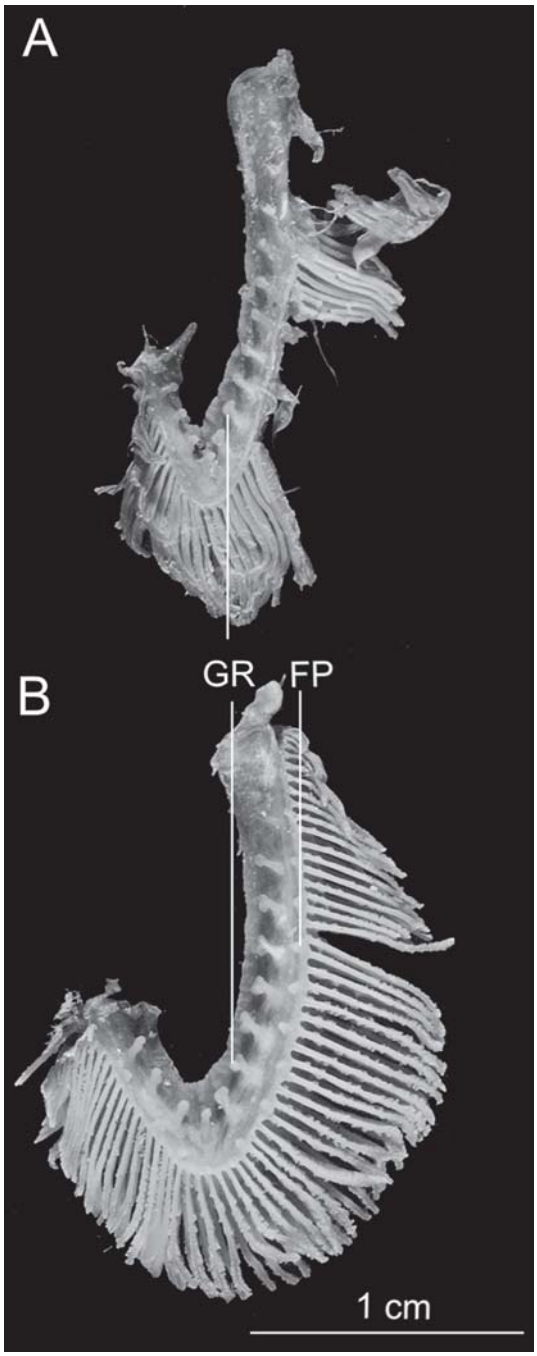

Fig. 3. Second gill arch of (A) *Cathorops melanopus* (UMMZ 197336, 188.0 mm SL), and (B) *C. kailolae* (UMMZ 186482, 190.0 mm SL). Lateral view. Abbreviations: GR - gill rakers; FP - fleshy papillae.

lations reported by Miller *et al.* (2005, Map 6.144) from other localities (*i.e.* río Panuco, río Tecolutla, río Coatzacoalcos, and Gulf of Mexico) should be separated.

***Cathorops (Cathorops) belizensis*, new species**
Figs. 7 and 8

Cathorops spixii (non Agassiz); Taylor & Menezes, 1978: (in part) [description and distribution, Belize]
Cathorops sp; Greenfield & Thomerson, 1997 [description, Belize].

Holotype. USNM 286399, 175.0 mm SL (female), Belize, Belize City, mangrove swamps St. John´s college, 2 Aug 1971, D. W. Greenfield and J. E. Thomerson.
Paratypes. USNM 385181, 9 (8, 147.0-240.0 mm SL), collected with holotype; FMNH 95978, 52 (3, 207–248 mm SL), collected with holotype; FMNH 77783, 27 (4, 168–218 mm SL), Belize, 500 yards off Belize City, 1 Aug 1971 D.W. Greenfield.

Diagnosis. *Cathorops belizensis* is distinguished from all congeners by having 19-20 gill rakers on first arch (*vs*. 14-16 in *C. aguadulce*, 14-15 in *C. fuerthii*, 37-40 in *C. hypophthalmus*, 14-16 in *C. kailolae*, 13-16 in *C. manglarensis*, 16-18 in *C. melanopus*, and 14-18 in *C. taylori*), 18-21 anal-fin rays (*vs*. 22-25 in *C. fuerthii*, 22-23 in *C. hypophthalmus*, 25-27 in *C. multiradiatus*, 24-27 in *C. manglarensis*, 22-25 in *C. spixii*, and 22-23 in *C. steindachneri*), posterior margin of pectoral-fin spine with short and inconspicuous serrations (*vs*. long and conspicuous serrations in *C. aguadulce*, *C. kailolae*, *C. melanopus*, *C. multiradiatus*, and *C. tuyra*), orbital diameter 3.6-4.4% SL (*vs.* 4.6-7.1% SL in *C. agassizii*, 4.6-6.9% SL in *C. aguadulce*, 3.0-3.5% SL in *C. hypophthalmus*, 4.6-6.6% SL in *C. kailolae*, 5.0-6.1% SL in *C. liropus*, 4.5-5.0% SL in *C. melanopus*, and 4.6-5.9% SL in *C. taylori*), interorbital distance 12.9-15.1% SL (*vs*. 9.9-12.3% SL in *C. aguadulce*, 15.7-16.3% SL in *C. hypophthalmus*, 8.9-12.3% SL in *C. kailolae*, 11.1-12.1% SL in *C. melanopus*), and dorsal-fin spine length 29.4-33.3% of distance from tip of snout to pelvic-fin origin (*vs*. 33.4-53.03%, except in *C. taylori*, and *C. tuyra*).

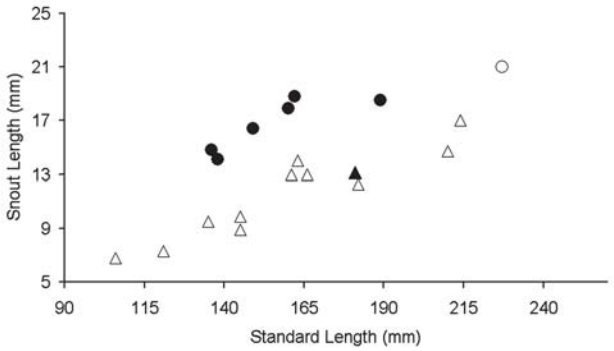

Fig. 4. Plot of standard length against snout length for *Cathorops aguadulce* (holotype, open circle; non-type specimens, filled circle) and *C. kailolae* (holotype, filled triangle; paratypes and non-type specimens, open triangle).

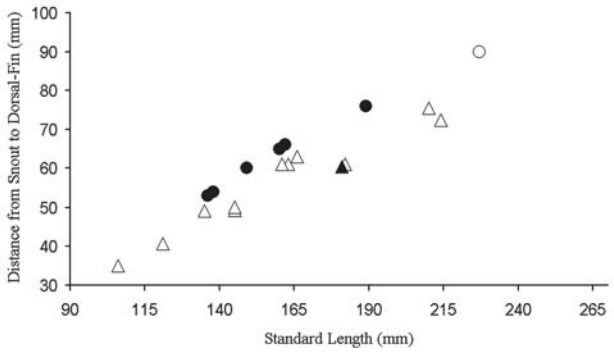

Fig. 5. Plot of standard length against distance from snout to dorsal fin for *Cathorops aguadulce* (holotype, open circle; non-type specimens, filled circle) and *C. kailolae* (holotype, filled triangle; paratypes and non-type specimens, open triangle).

Cathorops belizensis is additionally distinguished from *C. aguadulce* by possessing a shorter snout (6.9-8.9 *vs.* 9.3-11.6% SL), shorter supraoccipital process (8.8-10.5 *vs.* 11.5-16.3% SL), and by lacking fleshy papillae intercalated with gill rakers on first two arches (*vs*. papillae present). *Cathorops belizensis* is further distinguished from *C. higuchii* by its remarkably granulated cephalic shield (*vs.* slightly granulated cephalic shield), shorter dorsal-fin spine (15.9-17.6 *vs.* 18.6-22.2% SL) (Fig. 9), dorsal-fin spine as long as pectoral-fin spine (*vs.* dorsal-fin spine longer than pectoral-fin spine), and shorter nuchal plate (5.6-6.4 *vs.* 6.3-7.5% SL). *Cathorops belizensis* also differs from *C. kailolae* by possessing a greater distance between anterior nostrils (5.1-6.1 *vs.* 3.2-4.5% SL), greater distance between posterior nostrils (5.9-7.6 *vs.* 4.1-5.3% SL), shorter dorsal-fin spine (15.9-17.6 *vs.* 19.3-24.9% SL), broader mouth (10.0-13.2 *vs.* 8.1-10.0% SL), wider premaxilla (6.3-11.9 *vs.* 4.3-5.4% SL), shorter lower lobe of caudal-fin (25.5-28.2 *vs.* 29.2-34.3% SL), pelvic fin paler (*vs.* pelvic fin totally or partially dark), and by lacking fleshy papillae intercalated with gill rakers on first two arches (*vs*. papillae present). *Cathorops belizensis* is additionally distinguished from *C. mapale* species group in having a shorter supraoccipital process (8.8-10.5 *vs.* 10.6-14.9% SL), shorter nuchal plate (5.6-6.4 *vs.* 6.6-7.9% SL), and shorter dorsal-fin spine (15.9-17.6 *vs.* 18.5-24.2% SL), dorsal-fin spine as long as pectoral-fin spine (*vs.* dorsal-fin spine longer than pectoral-fin spine). *Cathorops belizensis* may be further distinguished from *C. melanopus* in having a longer head (25.8-31.9 *vs.* 22.3-23.0% SL), longer snout (6.9-8.9 *vs.* 5.3-5.5% SL), greater distance between lateral cornu of lateral ethmoid and external limb of supracleithrum (22.2-26.4 *vs.* 19.3-19.6% SL), greater distance between anterior nostrils (5.1-6.1 *vs.* 3.6-4.4% SL), greater between posterior nostrils (5.9-7.6 *vs.* 4.4-5.1% SL), broader mouth (10.0-13.2 *vs.* 8.9-9.7% SL), wider premaxilla (6.3-11.9 *vs.* 5.1-5.8% SL), and pelvic fin paler (*vs.* pelvic fin with intense black pigmentation).

Description. (Tables 1 and 3). Head very long and depressed, profile slightly convex at level of frontals and supraoccipital. Body wider rather than deeper on pectoral girdle area. Cephalic shield long and rugose, wide on lateral ethmoid, frontal, supracleithrum, and epioccipital areas. Osseous bridge formed by lateral ethmoid and frontal long and slender, quite evident

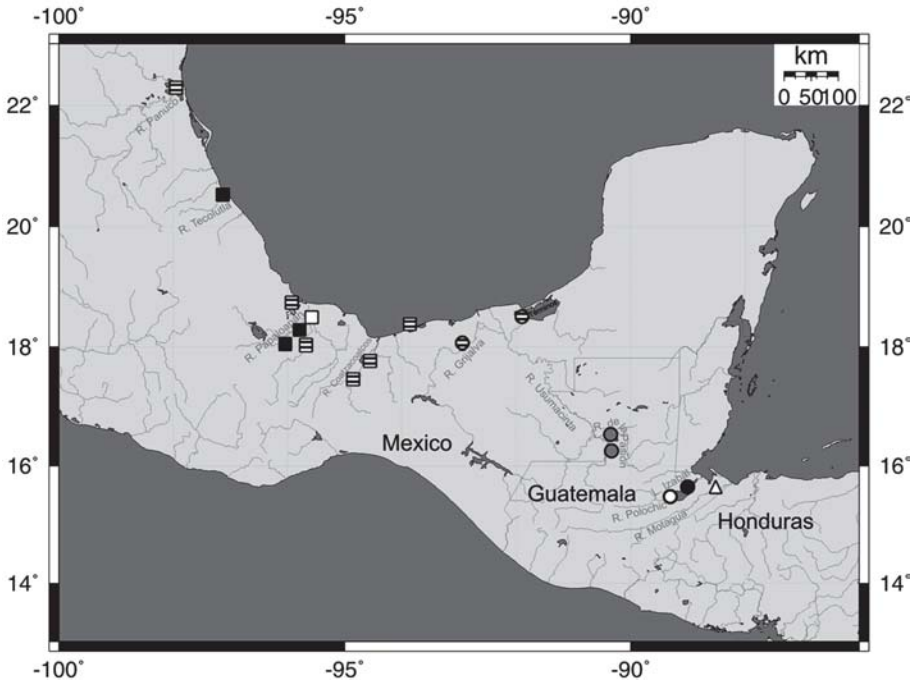

Fig. 6. Distribution of freshwater species of *Cathorops* in Mesoamerica. *C. aguadulce* [open square, holotype; filled square, non-types; hatched square, from Miller *et al*. (2005, Map 6.144)]; *C. kailolae* [open circle, holotype; filled circle, paratypes; gray circle, non-types; hatched circle, from Miller *et al*. (2005, Map 6.144)], and *Cathorops melanopus* (triangle). Some symbols represent more than one locality or lot of specimens (from www.aquarius.geomar.de).

under skin. Dorsomedian groove of neurocranium formed by frontals and supraoccipital deep and relatively large, its margins well marked and progressively narrower posteriorly. Supraoccipital process relatively short and wide on posterior portion, profile straight. Nuchal plate crescent-shaped, short and wide. Snout long and rounded on transverse section. Anterior and posterior nostrils quite distant from one another. Eyes lateral and small. Interorbital distance long, distance between nostrils and orbit moderate. Maxillary barbel reaching base of pectoral-fin spine, external mental barbel reaching margin of gill membrane, internal mental barbel not reaching margin of gill membrane.

Mouth broad, lower jaw arched. Lips wide, lower lip thicker than upper lip. Vomerine tooth plates absent. One pair of oval shaped accessory tooth plates, moderate in size and distant from one another. Accessory tooth plates with large molariform teeth. Premaxilla broad and short. Dentary with well pronounced posterior projection, with sharp teeth on anterior portion, molariform teeth on posterior portion and few conical teeth on intermediate portion.

Soft pectoral-fin rays 10-11 (10). Pectoral-fin spine relatively short and slender; anterior margin with few granules on basal two thirds, distal third with short serrations; posterior margin straight on basal fourth, distal three quarters with short serrations. Soft dorsal-fin rays 7. Dorsal-fin spine short and slender, as long as pectoral-fin spine; anterior margin with few granules

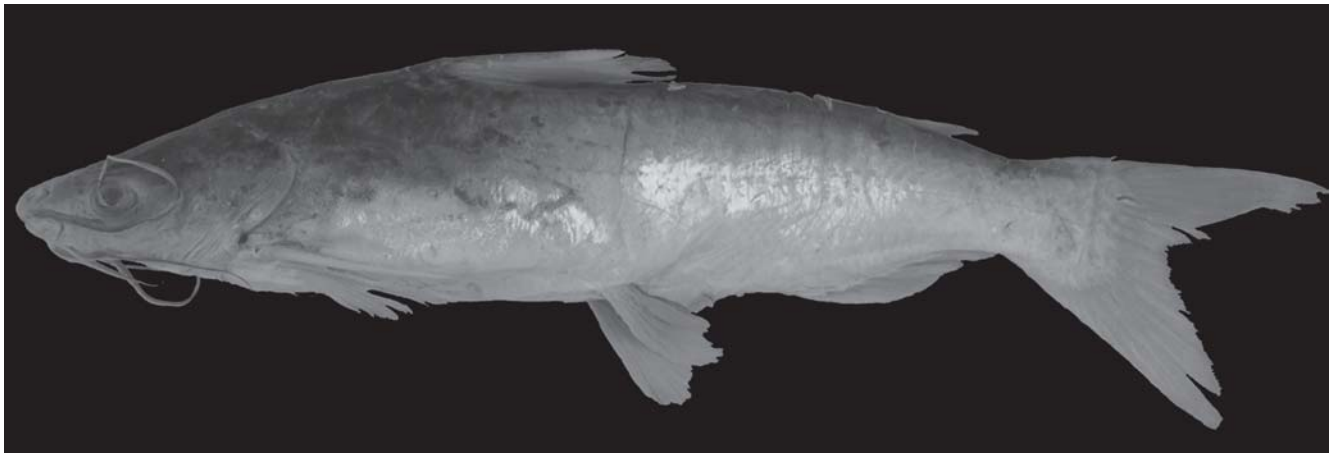

Fig. 7. *Cathorops belizensis*, holotype, USNM 286399, 175.0 mm SL (body in lateral view). Belize, Belize City, mangrove swamps St. John´s college.

on basal two thirds, distal third with short serrations; posterior margin serrated along almost its entire length. Pelvic fin high, with 6 rays. Anal fin low and short at base, with 18-21 (21) rays. Upper and lower lobes of caudal-fin quite short, upper lobe longer than lower lobe. Caudal peduncle high.

Acicular gill rakers on first arch 19-20 (20), 6 or 7 (6) on upper limb, 12 to 14 (14) on lower limb. Spike shaped gill rakers on second arch 16-19 (19), 6 or 7 (6) on upper limb, 11 to 13 (13) on lower limb. Mesial surfaces of all gill arches with developed gill rakers. Lateral and mesial surfaces of first and second gill arches without fleshy papillae intercalated with gill rakers.

Coloration in Alcohol. Head dark brown on dorsal and lateral portions, ventrally light cream. Body with same dark brown coloration on dorsal portion, progressively lighter towards lateral line and light cream under lateral line. Barbels light, fins light beige.

Sexual dimorphism. Sexual dimorphism was observed in two females (175.0-240.0 mm SL) and seven males (147.0-211.0 mm SL) with respect to following morphological features (see also Table 3). Males with relatively larger heads than females, as evidenced by greater distance between lateral cornu of lateral eth-

Table 3. Morphometrics for *Cathorops belizensis*. Standard length is expressed in millimeters, other measurements are percents of standard length. Ranges include paratypes only.

	Holot.	Males			Females			Uncertain	
		n	Mean	Range	n	Mean	Range	n	Range
Standard length (mm)	175.0	9	-	147.0-211.0	2	-	175.0-240.0	5	192.0-248.0
Head length	25.8	9	30.8	29.4-31.9	2	27.9	25.8-30.0	5	27.0-30.0
Snout length	7.1	9	7.7	6.9-8.9	2	7.8	7.1-8.4	5	7.7-8.7
Distance between anterior nostrils	5.1	9	5.8	5.4-6.1	2	5.6	5.1-6.1	4	5.4-5.7
Distance between posterior nostrils	5,9	9	7.1	6.6-7.6	2	6.7	5.9-7.6	4	6.8-7.3
Distance between anterior nostril to orbit	6.7	7	7.1	6.7-7.5	2	6.8	6.7-6.8	-	-
Distance between posterior nostril to orbit	4.9	9	5.1	4.7-5.4	2	4.9	4.9-4.9	4	4.6-5.0
Orbital diameter	3.9	9	4.3	3.9-4.4	2	3.8	3.6-3.9	5	3.9-4.3
Interorbital distance	13.2	9	14.5	13.9-15.1	2	13.1	13.0-13.2	4	12.9-14.2
Maxillary barbel length	31.8	9	30.9	24.7-35.0	2	28.0	24.3-31.8	5	26.1-31.0
External mental barbel length	21.9	9	19.8	15.6-24.6	2	18.0	14.2-21.9	5	19.3-21.0
Internal mental barbel length	13.9	9	12.6	10.7-14.1	2	12.0	10.1-13.9	5	12.1-13.7
Distance from snout to maxillary barbel	3.1	7	2.1	1.6-2.6	2	3.2	3.1-3.3	-	-
Distance from snout to external mental barbel	3.3	7	3.2	2.0-4.9	2	3.3	3.3-3.4	-	-
Distance from snout to internal mental barbel	2.3	7	2.4	1.5-4.5	2	2.7	2.3-3.1	-	-
Mouth width	10.1	9	11.5	10.6-12.1	2	11.6	10.1-13.2	5	10.0-11.8
Lower-jaw length	3.0	7	2.5	1.6-3.4	2	2.2	1.4-3.0	-	-
Premaxilla length	1.4	7	1.4	1.1-2.0	2	1.2	0.9-1.4	-	-
Premaxilla width	6.3	7	8.3	7.2-11.9	2	7.0	6.3-7.7	-	-
Distance between accessory tooth plates	5.0	7	6.5	4.4-7.9	2	5.7	5.0-6.3	-	-
Length of accessory tooth plates	4.3	7	3.3	2.6-4.6	2	5.0	4.3-5.7	-	-
Width of accessory tooth plates	1.8	7	1.3	0.9-2.0	2	2.1	1.8-2.4	-	-
Width of cephalic shield at lateral ethmoid area	12.3	9	13.6	13.3-14.0	2	12.5	12.3-12.6	4	12.1-13.1
Width of cephalic shield at frontals area	6.8	9	6.9	6.6-7.3	2	6.5	6.2-6.8	4	6.2-7.1
Width of cephalic shield at epioccipital area	12.6	7	11.6	11.3-12.5	2	11.9	11.2-12.6	-	-
Width of cephalic shield at supracleithrum area	17.5	9	17.9	17.4-18.9	2	17.8	17.5-18.0	4	16.7-18.0
Distance between lateral ethmoid and supracleithrum	22.2	7	25.8	24.8-26.4	2	22.9	22.2-23.7	-	-
Distance between snout and post. margin of dorsomedian groove of neurocranium	23.6	7	26.8	26.3-27.3	2	25.4	23.6-27.1	-	-
Supraoccipital process length	10.5	9	9.5	8.8-10.1	2	10.5	10.5-10.5	5	9.3-10.1
Supraoccipital process width	3.1	9	2.7	2.6-3.0	2	3.0	2.9-3.1	5	2.8-3.2
Nuchal-plate length	6.2	7	6.2	6.0-6.4	2	5.9	5.6-6.2	-	-
Nuchal-plate width	7.3	9	7.1	6.2-7.7	2	6.9	6.5-7.3	5	6.9-7.6
Body depth	16.9	8	18.3	17.1-19.6	2	16.9	16.9-17.0	5	17.1-19.3
Body width	20.5	9	21.7	20.8-23.5	2	21.0	20.5-21.5	5	19.7-22.3
Distance from snout to pectoral fin	22.4	9	28.8	26.9-31.1	2	24.7	22.4-27.1	5	22.5-28.6
Distance from snout to dorsal fin	33.5	9	39.1	37.3-40.7	2	36.3	33.5-39.0	4	38.1-40.4
Distance from snout to pelvic fin	52.6	9	53.2	50.0-55.3	2	53.2	52.6-53.8	5	51.2-54.1
Distance from snout to adipose fin	79.4	9	77.9	76.3-79.9	2	78.7	78.1-79.4	5	74.9-79.2
Distance from snout to anal fin	68.5	9	68.5	66.1-70.7	2	68.5	68.5-68.6	5	65.1-68.6
Caudal-peduncle height	8.5	9	7.8	7.2-8.1	2	8.2	7.8-8.5	5	6.9-8.2
Pectoral-fin spine length	17.3	9	16.1	13.7-18.0	2	16.9	16.5-17.3	4	16.7-17.5
Dorsal-fin spine length	17.5	8	16.9	15.9-17.6	2	17.3	17.0-17.5	-	-
Pelvic-fin base length	3.7	7	3.7	3.3-4.0	2	4.1	3.7-4.6	-	-
Pelvic-fin height	14.6	7	12.3	11.8-12.7	2	13.9	13.3-14.6	-	-
Adipose-fin base length	4.8	9	6.3	5.3-7.2	2	5.7	4.8-6.5	5	5.5-7.5
Adipose-fin height	3.8	7	3.8	3.5-4.4	2	3.9	3.8-4.0	-	-
Anal-fin base length	17.5	9	17.9	16.6-18.6	2	18.1	17.5-18.6	5	17.0-18.4
Anal-fin height	13.0	7	12.0	10.7-13.4	2	11.7	10.5-13.0	-	-
Caudal-fin upper lobe length	31.5	7	29.5	28.2-31.5	2	31.5	31.5-31.5	-	-
Caudal-fin lower lobe length	27.8	6	26.9	25.9-28.2	2	26.7	25.5-27.8	-	-

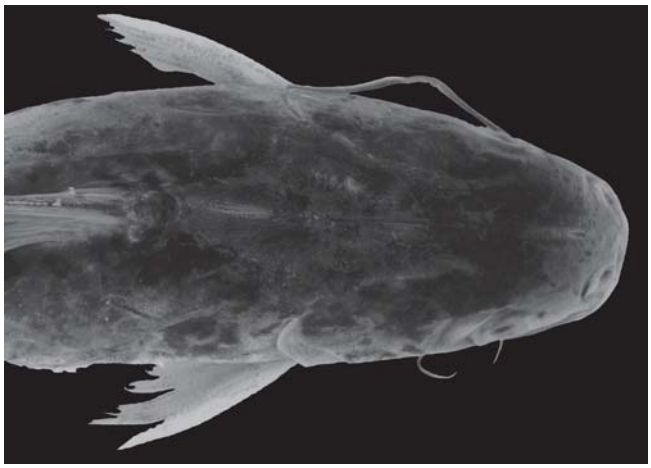

Fig. 8. *Cathorops belizensis*, holotype, USNM 286399, 175.0 mm SL (head in dorsal view). Belize, Belize City, mangrove swamps St. John´s college.

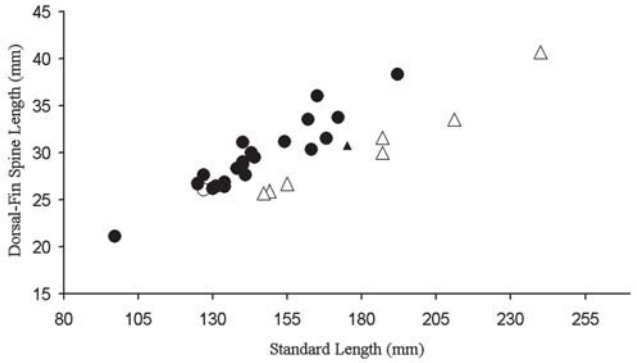

Fig. 9. Plot of standard length against dorsal-fin spine length, for *Cathorops belizensis* (holotype, filled triangle; paratypes, open triangle) and *C. higuchii* (holotype, open circle; paratypes, filled circle).

moid and external limb of supracleithrum, greater interorbital distance, and wider cephalic shield on lateral ethmoids and frontal areas. Anterior portion of body longer in males than in females, as evidenced by distance from tip of snout to pectoral, dorsal and adipose fins and by longer distance from tip of snout to posterior margin of dorsomedian groove of neurocranium. Males with deeper and wider body than females.

Premaxilla wider in males than in females (Fig. 10). Accessory tooth plates remarkably longer and wider in females and consequently more distant from one another in males (Fig. 10). Males with smaller and fewer molariform teeth on accessory tooth plates than females. Accessory tooth plates totally or partially covered by epithelial tissue in males. Dentary in females with longer posterior projection and larger and with more molariform teeth on its posterior portion than males (Fig. 10).

Pelvic fin and supraoccipital process longer in females than in males. Females with deeper caudal peduncle and longer upper lobe of caudal fin than males. Males with larger orbital diameter, longer adipose fin, and longer barbels than females.

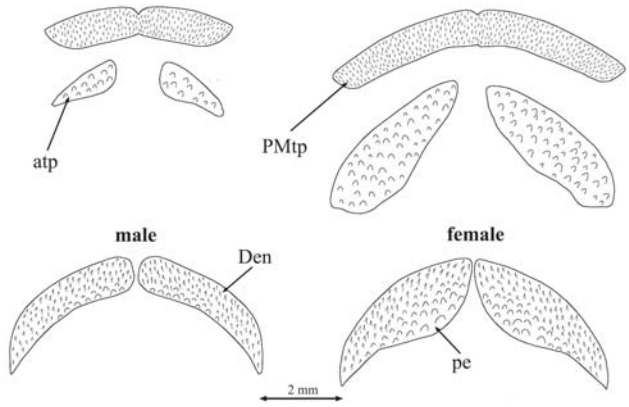

Fig. 10. Tooth plates of *Cathorops belizensis*. Abbreviations: atp - accessory tooth plates; Den - dentary; pe - posterior expansion; PMtp - premaxillary tooth plates.

Distribution. *Cathorops belizensis* is described from the mangrove channels near St. John´s College at Belize city, Belize (Fig. 11).

Etymology. The specific epithet *belizensis* derives from the type locality of the species, Belize City.

Vernacular names. Belizean Sea Catfish or bagre de Belize.

Cathorops (Cathorops) higuchii, new species

Figs. 12 and 13

Arius melanopus (non Günther); Steindachner, 1876: 29 [description, Panama]; Meek & Hildebrand, 1923: 124 [description, Panama from Toro Point, Mindi Reef and Colón]; Miller, 1966: 795 (in part) [distribution]; Gilbert & Kelso, 1971: 23 [only name, Costa Rica].

Cathorops spixii (non Agassiz); Taylor & Menezes, 1978: 7 (in part) [description and distribution, Honduras to Panama].

Holotype. USNM 79363, 129.0 mm SL (male), Panama, Colón Reef, 23 Mar 1912, S. E. Meek and S. F. Hildebrand.

Paratypes. USNM 286763, 5 (1, 140.0 mm SL), Honduras, río Cruta, Caratasca lagoon, 15º26'N 83º41'W, 11 Apr 1967, G. C. Miller; USNM 286764, 3, 130.0-140.0 mm SL, Honduras, Caratasca lagoon to río Cruta, 15º26'N 83º41'W, 11 Apr 1967, G. C. Miller; USNM 286766, 3 (2, 97.0-141.0 mm SL), Honduras, río Cruta, Caratasca lagoon, 15º21'N 83º34'W, 10 Apr 1967, G. C. Miller; USNM 385182, 25 (3, 125.0-192.0 mm SL), collected with holotype; USNM 38645, 6 (3, 144.0-165.0 mm SL), Panama, Colón, Aspinwall, Mar-Apr 1884; USNM 79346, 3 (2, 162.0-168.0 mm SL), Panama, Colón, Mindi Reef, Mindi, canal zone, 7 Apr 1911, S. E. Meek and S. F. Hildebrand; USNM 79415, 1, 134.0 mm SL, Panama, Mindi Reef, Mindi, canal zone, 7 Apr 1911, S. E. Meek and S. F. Hildebrand; USNM 79345, 3 (1, 140.0 mm SL), Panama, Toro Point, canal zone, 12 Apr 1911, S. E. Meek and S. F. Hildebrand; USNM 79355, 16 (2, 127.0-143.0 mm SL), Panama, Toro Point, canal zone, 12 Apr 1911, S. E. Meek and S. F. Hildebrand; USNM 79365, 1, 138.0 mm SL, Panama, Toro Point, canal zone, 12

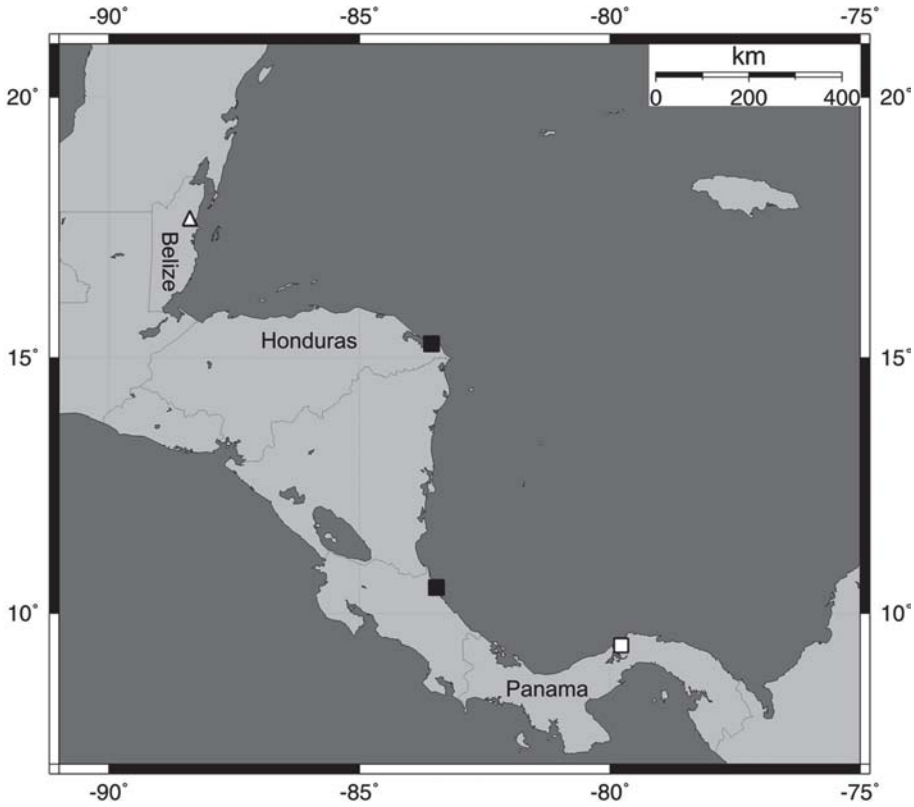

Fig. 11. Distribution of marine and estuarine species of *Cathorops* in the Central American Caribbean. *Cathorops belizensis* (triangle) and *C. higuchii* (open square, holotype and some paratypes; filled square, other paratypes). Some symbols represent more than one locality or lot of specimens (from www.aquarius.geomar.de).

Apr 1911, S. E. Meek and S. F. Hildebrand; USNM 79366, 1, 172.0 mm SL, Panama, Toro Point, canal zone, 24 Jan 1912, S. E. Meek and S. F. Hildebrand; USNM 79348, 1, 163.0 mm SL, Panama, Colón, Fox Bay, 5 Jan 1911, S. E. Meek and S. F. Hildebrand; UF 16243, 1, 180.0 mm SL, Costa Rica, Limón, Tortuguero, 19 Aug 1963, C. R. Gilbert.

Diagnosis. *Cathorops higuchii* can be distinguished from all congeners by having 18-21 gill rakers on first arch (*vs*. 14-16 in *C. aguadulce*, 14-15 in *C. fuerthii*, 37-40 in *C. hypophthalmus*, 14-16 in *C. kailolae*, and 13-16 in *C. manglarensis*), slightly granulated cephalic shield (Fig. 13) (*vs*. remarkably granulated cephalic shield in the remaining species, except in *C. taylori*), and orbit diameter 11.7-18.9% of external mental barbel length (*vs*. 26.2-51.8% in *C. agassizii*, 24.8% in *C aguadulce*, 19.6-27.7% in *C. dasycephalus*, 8.8-9.1% in *C. hypophthalmus*, 24.8-37.6% in *C. kailolae*, 23.8-47.6% in *C. liropus*, 26.4-42.0% in *C. taylori*, and 23.4-24.8% in *C. steindachneri*).

Cathorops higuchii is further distinguished from *C. aguadulce* by having 17-21 gill rakers on second arch (*vs*. 13-16), shorter snout (6.1-8.0 *vs*. 9.3-11.6% SL), smaller orbital diameter (3.3-4.4 *vs*. 4.6-6.9% SL), and by lacking fleshy papillae intercalated with gill rakers on first two gill arches (*vs*. papillae present). *Cathorops higuchii* additionally differs from *C. belizensis* by having a longer dorsal-fin spine (18.6-22.2 *vs*. 15.9-17.6% SL) (Fig. 9), dorsal-fin spine longer than pectoral-fin spine (*vs*. dorsal-fin spine as long as pectoral-fin spine), dorsal-fin spine length 35.6-43.3% of distance from tip of snout to pelvic-fin origin (*vs*. 29.4-33.3), and longer nuchal plate (6.3-7.5 *vs*. 5.6-6.4% SL). *Cathorops higuchii* is further distinguished from *C. kailolae* in possessing a wider posterior portion of supraoccipital process (2.7-3.3 *vs*. 1.9-2.6% SL), longer accessory tooth plates (2.6-4.7 *vs*. 1.3-2.5% SL), wider premaxilla (5.7-7.7 *vs*. 4.3-5.4% SL), smaller orbital diameter (3.3-4.4 *vs*. 4.6-6.6% SL), and by lacking fleshy papillae intercalated with gill rakers on first two gill arches (*vs*. papillae present). *Cathorops higuchii* is additionally distinguished from *C. mapale* species group in possessing supraoccipital process length 3.1-4.5 in maxillary barbel length (*vs*. 2.0-2.8) (Fig. 14), and supraoccipital process length 2.1-3.1 in external mental barbel length (*vs*. 1.2-1.9). *Cathorops higuchii* also differs from *C. melanopus* by having a longer snout (6.1-8.0 *vs*. 5.3-5.5% SL), longer distance from tip of snout to posterior margin of dorsomedian groove of neurocranium (20.9-26.3 *vs*. 17.9-19.1% SL), smaller orbital diameter (3.3-4.4 *vs*. 4.5-5.0% SL), larger distance between lateral cornu of lateral ethmoid and external limb of the supracleithrum (20.4-25.9 *vs*. 19.3-19.6% SL), and pelvic fin paler (*vs*. pelvic fin with intensive black pigmentation).

Description. (Tables 1 and 4). Head moderately long and depressed, profile slightly convex at level of frontals and supraoccipital. Body wider rather than deeper on pectoral girdle area. Cephalic shield relatively short, slightly rugose, wide on lateral ethmoid, frontal, and supracleithrum areas, relatively broad at frontal area. Osseous bridge formed by lateral ethmoid and frontal long and slender, quite evident under skin. Dorsomedian groove of neurocranium formed by frontals and supraoccipital

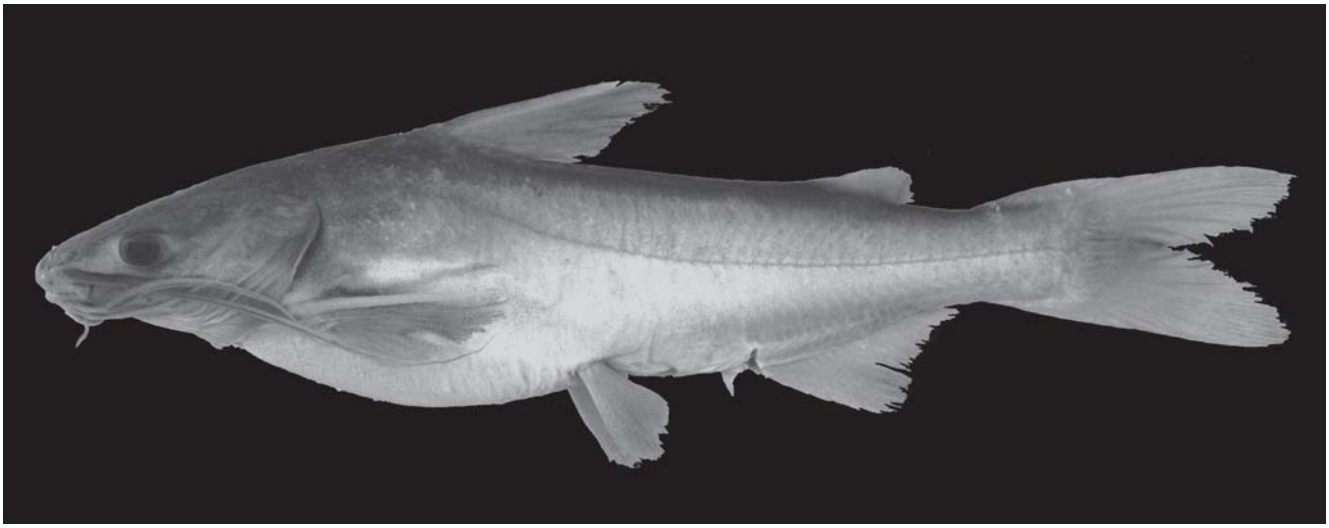

Fig. 12. *Cathorops higuchii*, holotype, USNM 79363, 129.0 mm SL (body in lateral view). Panama, Colón Reef.

relatively deep and large, its margins well marked and progressively narrower posteriorly. Supraoccipital process relatively short and broad on posterior portion, profile straight. Nuchal plate crescent-shaped, long and wide. Snout short, rounded on transverse section. Anterior and posterior nostrils moderately distant from one another. Eye lateral and small. Interorbital distance relatively long, distance between nostrils and orbit moderate. Maxillary barbel reaching proximal half of pectoral-fin spine, external mental barbel surpassing margin of gill membrane, internal mental barbel reaching margin of gill membrane.

Mouth relatively narrow, lower jaw arched. Lips thick, lower lip thicker than upper lip. Vomerine tooth plates absent. One pair of oval shaped accessory tooth plates of moderate size, distant from one another. Accessory tooth plates with large molariform teeth. Premaxilla relatively long and wide. Dentary with well pronounced posterior projection, with sharp teeth on anterior portion, molariform teeth on posterior portion, few conical teeth on intermediate area.

Soft pectoral-fin rays 10. Pectoral-fin spine long and slender; anterior margin with few granules on basal two thirds, distal third with short serrations; posterior margin straight on basal fourth, distal three quarters with short serrations. Soft dorsal-fin rays 7. Dorsal-fin spine long and slender, longer than pectoral-fin spine; anterior margin with few granules on basal two thirds,

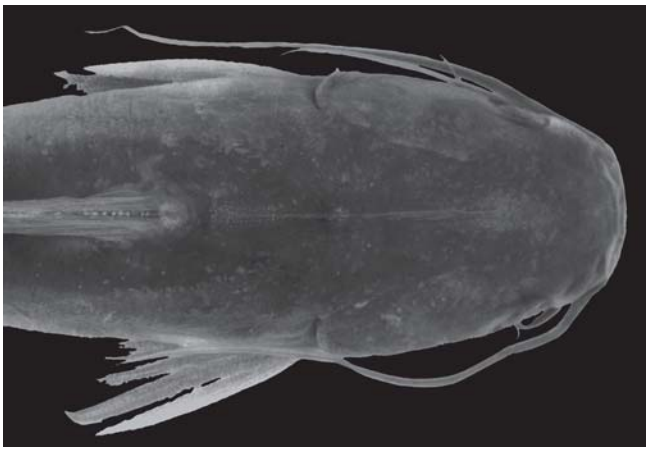

Fig. 13. *Cathorops higuchii*, holotype, USNM 79363, 129.0 mm SL (head in dorsal view). Panama, Colón Reef.

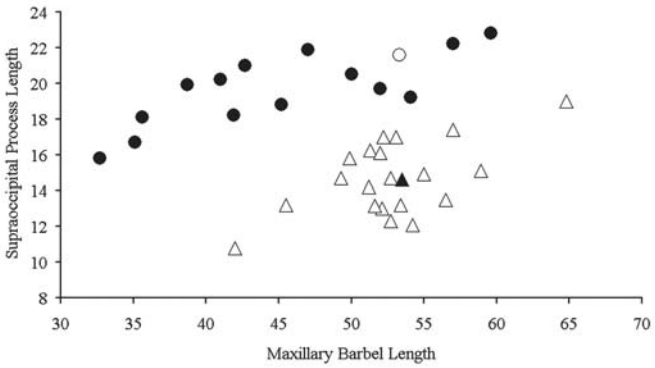

Fig. 14. Plot of maxillary barbel length against supraoccipital process length for *Cathorops higuchii* (holotype, filled triangle; paratypes, open triangle) and *C. mapale* (holotype, open circle; non-type specimens, filled circle).

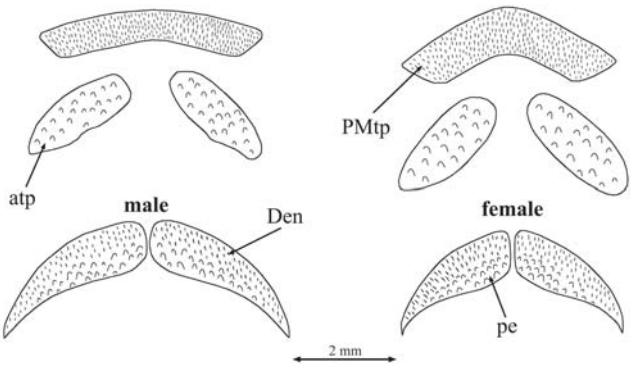

Fig. 15. Tooth plates of *Cathorops higuchii*. Abbreviations: atp - accessory tooth plates; Den - dentary; pe - posterior expansion; PMtp - premaxillary tooth plates.

distal third with short serrations: posterior margin serrated along almost its entire length. Pelvic fin high, with 6 rays. Anal fin high and relatively long at base, with 19-24 (19) rays. Upper and lower lobes of caudal fin of moderate length, upper lobe longer than lower lobe. Caudal peduncle high.

Acicular gill rakers on first arch 18-21 (19), 5 to 7 (6) on upper limb, 12 to 14 (13) on lower limb. Spike shaped gill rakers on second arch 17-21 (18), 5 to 7 (5) on upper limb, 12 to 16 (13) on lower limb. Mesial surfaces of all gill arches with developed gill rakers. Lateral and mesial surfaces of first and second gill arches without fleshy papillae intercalated with gill rakers.

Coloration in alcohol. Head medium to light brown on dorsal and lateral portions, ventrally light beige. Body with same brown coloration on dorsal portion, progressively lighter towards lateral line and light beige under lateral line. Maxillary barbel dark, mental barbels lighter, fins dark beige.

Sexual Dimorphism. Sexual dimorphism was observed in eleven females (97.0-192.0 mm SL) and ten males (125.0-163.0 mm SL), with respect to the following morphological features (Table 4). Head relatively longer in males than in females, as evidenced by greater distances from tip of snout to pectoral-, dorsal- and anal-

Table 4. Morphometrics for *Cathorops higuchii*. Standard length is expressed in millimeters, other measurements are percents of standard length. Ranges include paratypes only.

		Males			Females		
	Holotype	n	Mean	Range	n	Mean	Range
Standard length (mm)	129.0	11	-	125.0-163.0	11	-	97.0-192.0
Head length	23.3	11	26.0	23.3-28.5	11	24.6	23.3-26.0
Snout length	8.0	11	7.1	6.3-8.0	11	6.7	6.1-8.0
Distance between anterior nostrils	5.1	11	4.9	4.6-5.7	11	4.7	4.0-5.3
Distance between posterior nostrils	6.7	11	6.0	5.3-7.1	11	5.9	5.1-6.5
Distance between anterior nostril to orbit	6.4	11	6.8	6.2-7.7	11	6.7	6.1-7.2
Distance between posterior nostril to orbit	4.7	11	4.9	4.6-5.7	11	4.9	4.7-5.2
Orbital diameter	4.1	11	3.9	3.3-4.3	11	3.7	3.4-4.4
Interorbital distance	12.7	11	13.3	12.6-14.7	11	12.9	12.1-13.8
Maxillary barbel length	41.5	11	37.6	30.6-42.2	11	36.8	31.5-43.3
External mental barbel length	29.0	11	26.2	22.5-30.3	11	25.5	20.2-29.4
Internal mental barbel length	17.4	11	17.1	13.7-19.3	11	16.8	13.8-19.6
Distance from snout to maxillary barbel	1.6	11	1.9	0.8-2.7	11	2.4	1.4-3.2
Distance from snout to external mental barbel	3.0	11	3.9	3.3-4.6	11	4.0	3.2-5.1
Distance from snout to internal mental barbel	2.9	11	3.0	2.5-3.9	11	3.0	2.4-4.0
Mouth width	9.5	11	9.8	8.8-10.8	11	9.7	8.5-11.3
Lower-jaw length	2.3	11	2.0	1.5-2.9	11	1.8	1.0-2.2
Premaxilla length	1.9	11	1.4	0.9-1.9	11	1.5	1.3-1.7
Premaxilla width	7.7	11	7.0	6.2-7.7	11	6.7	5.7-7.7
Distance between accessory tooth plates	5.3	11	5.3	4.3-6.6	11	4.9	4.1-5.9
Length of accessory tooth plates	3.8	11	3.4	2.8-3.8	11	3.6	2.6-4.7
Width of accessory tooth plates	1.6	11	1.1	0.7-1.6	11	1.6	0.8-2.2
Width of cephalic shield at lateral ethmoid area	12.4	11	12.7	12.2-13.6	11	12.4	11.9-13.0
Width of cephalic shield at frontals area	7.7	11	7.2	6.3-7.7	10	7.2	6.9-7.8
Width of cephalic shield at epioccipital area	11.2	11	12.1	11.2-12.8	11	12.2	11.6-13.4
Width of cephalic shield at supracleithrum area	17.6	11	17.7	17.0-18.6	11	17.8	16.9-18.3
Distance between lateral ethmoid and supracleithrum	20.8	10	22.7	20.8-25.0	11	22.4	20.4-25.9
Distance between snout and post. margin of dorsomedian groove of neurocranium	21.5	11	23.7	21.5-26.3	11	22.5	20.9-25.6
Supraoccipital process length	11.3	11	9.9	9.0-11.3	11	10.5	9.1-12.1
Supraoccipital process width	3.0	11	2.9	2.7-3.1	11	3.0	2.7-3.3
Nuchal-plate length	6.3	11	6.6	6.3-7.2	11	6.8	6.3-7.5
Nuchal-plate width	7.4	11	7.5	7.2-8.2	11	7.4	7.2-7.9
Body depth	17.7	11	17.6	16.5-18.6	11	17.9	16.9-19.0
Body width	20.8	11	21.3	20.6-21.7	11	21.1	20.1-22.4
Distance from snout to pectoral fin	21.6	11	23.0	21.0-25.9	11	22.1	20.6-25.9
Distance from snout to dorsal fin	33.6	11	35.7	33.2-38.8	11	34.8	32.3-37.4
Distance from snout to pelvic fin	50.6	11	51.5	49.0-53.3	11	51.2	48.9-53.3
Distance from snout to adipose fin	75.2	11	76.3	74.7-79.4	11	76.3	74.7-78.2
Distance from snout to anal fin	68.8	11	66.4	63.7-68.8	11	65.3	62.3-68.3
Caudal-peduncle height	9.1	11	8.7	8.0-9.5	11	8.3	7.8-8.9
Pectoral-fin spine length	19.6	11	19.2	17.4-20.0	11	19.1	17.7-20.7
Dorsal-fin spine length	20.2	11	20.3	18.6-21.7	11	20.6	18.8-22.2
Pelvic-fin base length	4.3	11	3.9	3.1-4.7	11	4.0	3.7-4.4
Pelvic-fin height	13.2	11	13.1	10.1-13.9	11	15.3	12.3-17.6
Adipose-fin base length	8.1	11	7.9	6.5-9.7	11	7.5	6.0-8.8
Adipose-fin height	3.9	11	3.9	3.5-4.3	11	3.7	2.8-4.6
Anal-fin base length	17.4	11	18.9	16.7-20.0	11	19.5	18.1-20.0
Anal-fin height	13.0	11	13.3	10.5-15.7	11	14.6	13.5-15.8
Caudal-fin upper lobe length	32.3	11	32.8	30.1-41.4	9	32.7	30.3-35.1
Caudal-fin lower lobe length	29.9	10	30.6	26.9-35.1	8	32.5	29.4-39.9

fin origins, and greater distance from tip of snout to posterior margin of dorsomedian groove of neurocranium. Premaxilla broader in males than in females (Fig. 15). Accessory tooth plates longer and broader in females than in males (Fig. 15); plates covered by epithelial tissue, more distant from one another, and containing fewer and smaller molariform teeth in males. Posterior expansion of dentary longer and with more molariform teeth in females than in males (Fig. 15). Females with longer pelvic fin and higher anal fin than males.

Distribution. The species is common along most of the Caribbean portion of Central America, from Honduras to Panama (Fig. 11). *Cathorops higuchii* inhabits shallow coastal areas and low portions of coastal rivers

Etymology. This species is named on behalf of Dr. Horácio Higuchi, of Museu Paraense Emílio Goeldi, in recognition for his contribution to the taxonomy, systematics, and morphology of the South American Ariidae.

Vernacular names. Higuchi's Sea Catfish or bagre de Higuchi.

Remarks. The marine and brackish species of *Cathorops*, occurring from Costa Rica and Panama, have frequently been misidentified as *C. melanopus* (Steindachner, 1876; Meek & Hildebrand, 1923; Miller, 1966; Gilbert & Kelso, 1971) or *C. spixii* (Taylor & Menezes, 1978). Meek & Hildebrand (1923) identified specimens collected in Panama as *C. melanopus*, but noted that the specimens differed from those described by Günther (1864) and Regan (1907) concerning the number of gill rakers on first arch, length of anal fin, number of anal-fin rays, and rugosity on head. They considered the differences to be individual variations without specific value or probably errors in counting number of rays and gill rakers. Our examination of the same specimens revealed that they differ from *C. melanopus* and represent a new species, herein described as *C. higuchii*. The records of *C. melanopus* from coastal waters in Honduras, Nicaragua, Costa Rica and Panama are considered erroneous and should indeed be referred as *C. higuchii*.

***Cathorops (Cathorops) kailolae*, new species**
Figs. 16 and 17

Cathorops aguadulce (non Meek); Castro-Aguirre *et al.*, 1999 (in part): 148-149 [remarks and distribution, Mexico and Guatemala, from ?río Grijalva to río Polochic]; Miller *et al.*, 2005 (in part): 170 [description and distribution, Mexico and Guatemala, ?río Grijalva, río Usumacinta, and lago Izabal basins]; Betancur-R. & Willink, 2007 (in part) [key features and distribution, Mexico and Guatemala, río Usumacinta and lago Izabal basins]; Betancur-R. *et al.*, 2007:349 [only name].

Holotype. USNM 134330, 181.0 mm SL (male), Guatemala, lago Izabal, embayment about 3 mi. W of El Estor, 8-9 Apr 1946, R. R. Miller and A. D. Holloway.
Paratypes. USNM 385739, 10 (5, 145.0-214.0 mm SL), collected with holotype; AMNH 35074, 7 (3, 106.0-135.0 mm SL), Guatemala, Izabal, río Cienaga, 1 kilometer above mouth into río Dulce, 11 Apr 1974, R.M. Bailey *et al.*; AUM 19407, 6 (5, 112.0-159.0 mm SL), Guatemala, Izabal, lago Izabal, shore at beach off Finca Carolina; UF 35320, 12 (4, 51.0-119.0 mm SL), Guatemala, Izabal, lago Izabal, off Finca Carolina, 25 Jul 1979, C. L. Dyer and A. E. Limon.
Non-type specimens. AUM 32198, 3, 161-166 mm SL, Guatemala, Petén, mouths of río San Juan and río Pucté, río La Pasión, río Usumacinta basin; ANSP 142725, 1, 215.0 mm SL, Guatemala, Petén, near Sayaxche, río Usumacinta basin; UMMZ 188018, 3, 168.0-276.0 mm SL (1, 276.0 mm SL), Guatemala, Petén, Arroyo Tamarindo 0.5 km above mouth in Laguna Petexbatum, above jct with Arroyo Aquateca, 16º24'15''N, 90º11'20''W, río Usumacinta basin. ECO-SC 4270, 1, 198.0 mm SL, Mexico, Chiapas, Montes Azules, Selva Lacandona, Río Usumacinta basin; ECO-SC 4269, 1, 202.0 mm SL; ECO-SC 4268, 1, 217.0 mm SL, Mexico, Chiapas, Montes Azules, Selva Lacandona, Río Usumacinta basin.

Diagnosis. *Cathorops kailolae* is distinguished from all congeners, except *C. aguadulce*, through the fleshy papillae intercalated with gill rakers on first two gill arches (*vs.* papillae absent in the remaining species, except in *C. aguadulce*) (Fig. 3), 14-16 gill rakers on first arch (*vs*. 17-23 in *C. agassizii*, 17-22 in *C. arenatus*, 19-20 in *C. belizensis*, 18-21 in *C. higuchii*, 37-40 in *C. hypophthalmus*, 20-24 in *C. mapale*, 17-21 in *C. spixii*, and 19-22 in *C. tuyra*), and body width 17.7-19.7% SL (*vs*. 20.7-24.3% SL in *C. arenatus*, 20.5-23.5% SL in *C . belizensis*, 20.0-21.0% SL in *C.*

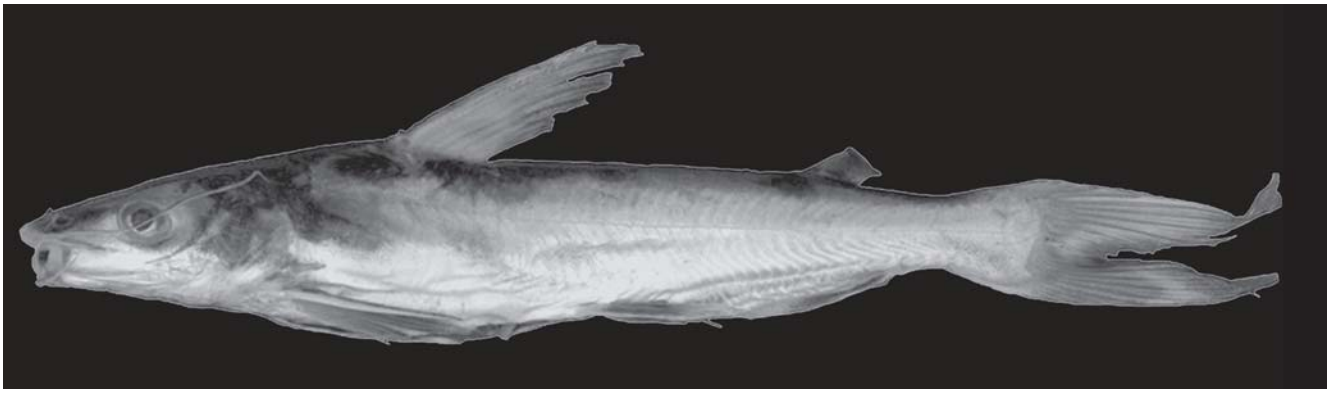

Fig. 16. *Cathorops kailolae*, holotype, USNM 134330, 181.0 mm SL (body in lateral view). Guatemala, lago Izabal, embayment about 3 mi. W of El Estor.

dasycephalus, 20.3-22.5% SL in *C. fuerthii*, 20.0-22.4% SL in *C. higuchii*, 19.8-20.1% SL in *C. hypophthalmus*, 20.1-21.8% SL in *C. mapale*, 20.7-21.9% SL in *C. manglarensis*, and 20.3-23.7% SL in *C. tuyra*).

Cathorops kailolae is distinguished from *C. aguadulce* by possessing a shorter snout (6.0-8.6 *vs*. 9.3-11.6% SL) (Fig. 4), and shorter distance from tip of snout to dorsal-fin origin (33.1-38.0 *vs.* 39.0-40.7% SL) (Fig. 5). *Cathorops kailolae* also differs from *C. belizensis* in having a shorter distance between anterior nostrils (3.2-4.5 *vs.* 5.1-6.1% SL), shorter distance between posterior nostrils (4.1-5.3 *vs.* 5.9-7.6% SL), larger orbital diameter (4.6-6.6 *vs.* 3.6-4.4% SL), shorter interorbital distance (8.9-12.3 *vs.* 12.9-15.1% SL), longer dorsal-fin spine (19.3-24.9 *vs.* 15.9-17.6% SL), narrower mouth (8.1-10.0 *vs.* 10.0-13.2% SL), narrower premaxilla (4.3-5.4 *vs.* 6.3-11.9% SL), and longer lower lobe of caudal-fin (29.2-34.3 *vs.* 25.5-28.2% SL). *Cathorops kailolae* is further distinguished from *C. higuchii* in possessing a narrower supraoccipital process at posterior portion (1.9-2.6 *vs.* 2.7-3.3% SL), shorter accessory tooth plates (1.3-2.5 *vs.* 2.6-4.7% SL), narrower premaxilla (4.3-5.4 *vs.* 5.7-7.7% SL), and larger orbital diameter (4.6-6.6 *vs.* 3.3-4.4% SL). *Cathorops kailolae* can be additionally distinguished from *C. mapale* species group in possessing a shorter interorbital distance (8.9-12.3 *vs.* 12.6-15.0% SL), narrower cephalic shield at supracleithrum area (15.3-17.3 *vs.* 17.3-19.8% SL), shorter accessory tooth plates (1.3-2.5 *vs.* 2.7-4.3% SL), and narrower premaxilla (4.3-5.4 *vs.* 5.7-7.7% SL). *Cathorops kailolae* is further distinguished from *C. melanopus* in possessing a longer snout (6.0-8.6 *vs.* 5.3-5.5% SL), longer distance from tip of snout to dorsal-fin origin (33.1-38.0 *vs.* 30.0-32.6% SL), longer distance from tip of snout to pelvic-fin origin (50.4-52.6 *vs.* 46.2-49.1% SL), longer dorsal-fin spine (19.3-24.9 *vs.* 17.2-18.1% SL), and lower caudal peduncle (6.6-8.0 *vs.* 8.7-9.0% SL).

Description. (Tables 1 and 5). Head long and depressed, profile slightly convex at level of frontals and supraoccipital. Body broader rather than deeper on pectoral girdle area. Cephalic shield rugose, relatively short and narrow on lateral ethmoid, frontal, supracleithrum, and epioccipital areas. Osseous bridge formed by lateral ethmoid and frontal long and slender, quite evident under skin. Dorsomedian groove of neurocranium formed by frontals and supraoccipital relatively deep and large, its margins well marked and progressively narrower posteriorly. Supraoccipital process relatively long and narrow on posterior portion, profile straight. Nuchal plate crescent-shaped, moderate in size. Snout relatively long, rounded on transverse section. Anterior and posterior nostrils relatively close to one another. Eye lateral and large. Interorbital distance short, distance between nostrils and orbit relatively large. Maxillary barbel surpassing base of pectoral-fin spine or reaching half of spine, external mental barbel surpassing margin of gill membrane, internal mental barbel reaching margin of gill membrane.

Mouth small, lower jaw arched. Lips thick, lower lip thicker than upper lip. Vomerine tooth plates absent. One pair of accessory tooth plates, elongated and narrow, quite small and distant from each other. Accessory tooth plates with small and not numerous molariform teeth. Premaxilla relatively short and quite narrow. Dentary with no so pronounced posterior projection, with many sharp teeth on anterior portion and few small molariform teeth on posterior portion.

Soft pectoral-fin rays 9-10 (10). Pectoral-fin spine long and thick; anterior margin with few granules on basal two thirds, distal third with short serrations; posterior margin with straight basal fourth, distal three quarters with long and conspicuous serrations. Soft dorsal-fin rays 7. Dorsal-fin spine longer than pectoral-fin spine; anterior margin with few granules on basal two thirds, distal third with short serrations; posterior margin serrated along almost its entire length. Pelvic fin high, with 6 rays. Anal fin high and relatively short at base, with 20-24 (22) rays. Upper and lower lobes of caudal fin long, upper lobe longer than lower lobe. Caudal peduncle relatively low.

Acicular gill rakers on first arch 14-16 (14), 4 or 5 (5) on upper limb, 9 to 11(9) on lower limb. Spike shaped gill rakers on second arch 13-16 (13), 4 or 5 (4) on upper limb, 9 to 11 (9) on lower limb. Mesial surfaces of all gill arches with developed gill rakers. Lateral and mesial surfaces of first and second gill arches with fleshy papillae intercalated with gill rakers, papillae more developed on second arch.

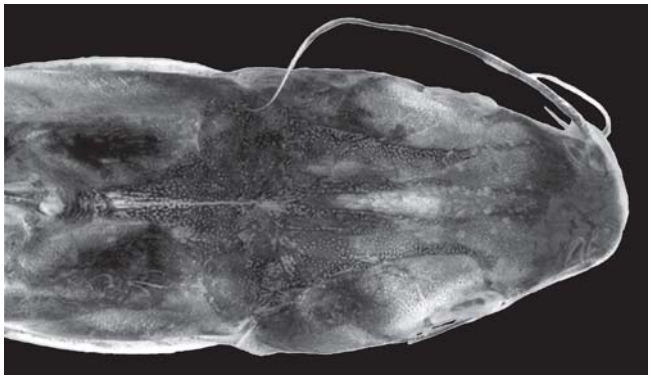

Fig. 17. *Cathorops kailolae*, holotype, USNM 134330, 181.0 mm SL (head in dorsal view). Guatemala, lago Izabal, embayment about 3 mi. W of El Estor.

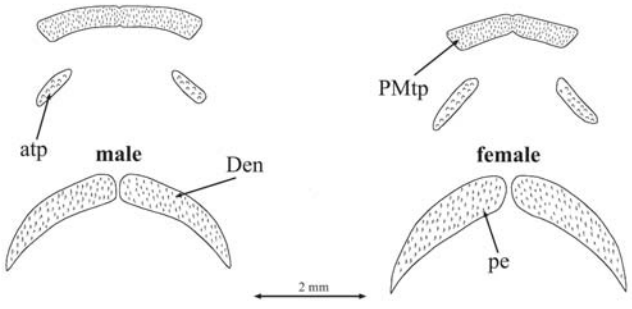

Fig. 18. Tooth plates of *Cathorops kailolae*. Abbreviations: atp - accessory tooth plates; Den - dentary; pe - posterior expansion; PMtp - premaxillary tooth plates.

Coloration in alcohol. Dorsal and lateral portions of head dark brown, ventrally light beige. Body with same dark brown color, progressively lighter towards lateral line and rather light beige under lateral line. Maxillary barbel dark, mental barbels light, fins dark especially towards edge.

Sexual dimorphism. Sexual dimorphism was observed in three females (145.0-214.0 mm SL) and three males (145.0-210.0 mm SL) with respect to the following morphological features (Table 5). Head and anterior portion of body longer in males than in females, as evidenced by greater distances from tip of snout to dorsal-, pelvic-, and adipose-fin origins. Females with longer and broader accessory tooth plates, males with accessory plates more distant from one another and covered by epithelial tissue (Fig. 18). Posterior expansion of dentary longer in females than in males (Fig. 18). Pectoral-fin and dorsal-fin spines, pelvic fin, and upper lobe of caudal fin longer in females than in males. Males with longer anal-fin base than females. Body deeper in females than in males.

Table 5. Morphometrics for *Cathorops kailolae*. Standard length is expressed in millimeters, other measurements are percents of standard length. Ranges include paratypes and non-type specimens.

	Holot	Males			Females			Uncertain	
		n	Mean	Range	n	Mean	Range	n	Range
Standard length (mm)	181.0	3		145.0-210.0	3		145.0-214.0	20	106.0-276.0
Head length	23.8	3	24.6	23.8-25.2	3	24.5	22.8-25.9	7	22.8-26.4
Snout length	7.2	3	7.0	6.8-7.2	3	7.0	6.1-7.9	7	6.0-8.6
Distance between anterior nostrils	3.8	3	3.8	3.2-4.5	3	4.0	3.8-4.4	7	3.2-3.9
Distance between posterior nostrils	4.6	3	4.8	4.4-5.3	3	4.7	4.6-4.8	7	4.1-5.0
Distance between anterior nostril to orbit	6.6	3	7.3	6.5-8.1	3	7.1	6.7-7.6	7	5.9-7.0
Distance between posterior nostril to orbit	4.7	3	5.3	4.7-5.9	3	5.3	4.8-5.8	7	4.4-5.1
Orbital diameter	4.9	3	5.2	4.6-6.1	3	4.9	4.6-5.1	18	4.6-6.6
Interorbital distance	10.7	3	11.4	10.7-12.2	3	11.4	10.8-12.2	12	8.9-12.3
Maxillary barbel length	27.4	3	25.8	24.3-27.4	3	26.4	25.2-28.6	17	27.3-34.1
External mental barbel length	16.7	3	16.4	16.0-16.7	3	17.3	15.9-18.6	18	17.0-24.9
Internal mental barbel length	10.6	3	10.3	10.0-10.6	3	10.6	9.5-11.5	12	11.4-14.7
Distance from snout to maxillary barbel	1.3	3	2.0	1.3-3.1	3	1.6	1.5-2.0	3	0.4-1.8
Distance from snout to external mental barbel	3.9	3	3.0	1.8-3.9	3	3.2	3.1-3.3	3	3.0-3.6
Distance from snout to internal mental barbel	2.9	3	2.9	2.8-2.9	3	2.2	2.0-2.5	3	2.3-2.7
Mouth width	9.4	3	8.7	8.2-9.4	3	8.8	8.2-9.5	12	8.1-10.0
Lower-jaw length	0.9	3	1.5	0.9-2.1	3	1.5	0.8-1.9	3	1.5-1.9
Premaxilla length	1.0	3	1.0	1.0-1.1	3	1.1	0.8-1.4	3	1.0-1.3
Premaxilla width	4.4	3	4.6	4.4-5.0	3	4.8	4.3-5.1	6	4.5-5.4
Distance between accessory tooth plates	4.1	3	4.1	3.8-4.4	3	3.9	3.2-4.6	3	3.3-5.4
Length of accessory tooth plates	1.3	3	1.5	1.3-1.9	3	1.9	1.5-2.1	3	1.6-2.5
Width of accessory tooth plates	0.8	3	0.7	0.3-0.8	3	0.9	0.7-1.3	3	0.7-0.8
Width of cephalic shield at lateral ethmoid area	10.9	3	11.4	10.9-11.9	3	11.3	10.4-12.0	10	10.9-12.4
Width of cephalic shield at frontals area	6.4	3	6.2	6.0-6.4	3	6.2	6.1-6.3	6	6.4-7.0
Width of cephalic shield at epioccipital area	11.2	3	11.5	11.2-11.8	3	11.9	11.8-12.1	3	11.4-12.3
Width of cephalic shield at supracleithrum area	15.5	3	16.0	15.5-16.7	3	16.4	15.3-16.9	6	16.2-17.3
Distance between lateral ethmoid and supracleithrum	18.6	3	20.0	18.6-21.4	3	20.2	18.7-21.1	6	18.9-21.9
Distance between snout and post. margin of dorsomedian groove of neurocranium	21.3	3	21.2	19.4-23.0	3	21.9	20.4-23.7	6	17.9-25.8
Supraoccipital process length	11.1	3	11.5	10.9-12.6	3	11.0	10.8-11.5	6	10.9-13.1
Supraoccipital process width	2.2	3	2.2	2.1-2.2	3	2.2	2.0-2.3	12	1.9-2.6
Nuchal-plate length	6.7	3	6.4	6.0-6.7	3	6.8	6.7-6.8	6	5.3-6.9
Nuchal-plate width	6.9	3	6.7	6.5-6.9	3	6.8	6.6-7.2	6	6.6-7.4
Body depth	16.1	3	16.3	15.9-16.9	3	17.5	16.6-18.1	7	15.8-19.0
Body width	18.0	3	18.6	18.0-19.4	3	18.8	17.7-19.6	7	17.7-19.7
Distance from snout to pectoral fin	20.7	3	22.0	20.7-24.0	3	22.5	21.8-23.0	6	22.1-25.3
Distance from snout to dorsal fin	33.4	3	34.6	33.4-35.9	3	33.8	33.5-34.1	6	33.1-38.0
Distance from snout to pelvic fin	50.9	3	51.6	50.9-52.3	3	51.0	50.4-51.7	8	50.6-52.6
Distance from snout to adipose fin	75.5	3	74.6	72.8-75.5	3	75.1	72.1-76.6	6	72.5-74.8
Distance from snout to anal fin	66.7	3	66.6	66.6-66.7	3	66.6	66.0-67.1	6	63.4-67.5
Caudal-peduncle height	6.7	3	7.1	6.7-7.4	3	7.7	7.6-8.0	8	6.6-7.7
Pectoral-fin spine length	19.2	2	18.6	17.9-19.2	3	18.7	17.9-19.4	15	15.6-18.5
Dorsal-fin spine length	21.8	3	20.4	19.4-21.8	3	22.3	20.3-24.9	13	19.3-23.1
Pelvic-fin base length	3.6	3	3.7	3.6-3.8	3	3.8	3.5-4.0	7	3.6-4.0
Pelvic-fin height	14.4	3	14.7	14.0-15.8	3	16.0	15.6-16.2	13	12.7-17.5
Adipose-fin base length	5.8	3	6.7	5.9-7.9	3	6.3	5.3-7.8	5	7.5-9.3
Adipose-fin height	3.7	3	3.2	2.7-3.7	3	3.3	3.2-3.4	6	2.9-4.4
Anal-fin base length	17.8	3	18.3	17.8-19.0	3	16.6	15.1-18.1	6	15.5-20.1
Anal-fin height	13.2	3	13.7	12.8-15.1	3	14.4	13.4-15.1	3	12.8-14.0
Caudal-fin upper lobe length	37.9	3	36.0	32.1-37.9	3	37.4	36.8-37.9	4	33.9-39.6
Caudal-fin lower lobe length	32.7	3	32.8	31.4-34.3	3	32.6	32.3-33.0	4	29.2-34.0

Distribution. Material examined of *Cathorops kailolae* comes from the lago Izabal basin in Guatemala (type locality) and the río Usumacinta basin in Mexico and Guatemala (Fig. 6). Because the main arm of the río Usumacinta flows into the río Grijalva near its mouth, the population reported by Miller *et al.* (2005, Map 6.144) from the río Grijalva is probably conspecific with *C. kailolae*, but this requires confirmation. This species inhabits chiefly freshwaters, but apparently also present in high salinities, as in laguna de Términos (Miller *et al.*, 2005).

Etymology. The species is name to honor Dr. Patricia J. Kailola, The University of the South Pacific, Suva, Fiji, for her enormous contribution to the systematics of the Ariidae.

Vernacular names. Kailola's Sea Catfish or bagre de Kailola.

Remarks. Despite the fact that the lago Izabal and the río Usumacinta basins are presently isolated, no important meristic or morphometric differences were observed between the populations from these two localities at this time. Type specimens were restricted to the lago Izabal basin because future studies (*e.g.* phylogeographic approaches) might reveal some differences between the two populations. *Cathorops kailolae* is closely related to *C. aguadulce* (see remarks of *C. aguadulce*).

Cathorops (Cathorops) melanopus (Günther, 1864)

Figs. 19 and 20

Arius melanopus Günther, 1864: 172. Type locality: río Motagua, Guatemala. Syntypes: BMNH 1865.4.29.51-53; Regan, 1907: 126 (in part) [description, Guatemala].

Tachisurus melanopus; Eigenmann & Eigenmann, 1888: 146 [only name]; Eigenmann & Eigenmann, 1890: 88 [synonymy].

Cathorops melanopus; Taylor & Menezes, 1978 [only name]; Marceniuk & Ferraris, 2003: 449 [distribution, Guatemala, río Motagua]; Acero P., 2003: 837 [only name]; Kailola, 2004: 132 [only name]; Marceniuk & Menezes, 2007: 45 [distribution, Guatemala, río Motagua]; Betancur-R. *et al.*, 2007:349 [only name]; Betancur-R. & Willink, 2007 [key features and distribution, Guatemala, río Motagua].

Material examined. BMNH 1865.4.29. 51-53, 3 (1, 172.0 mm SL), Guatemala, río Motagua, syntype of *Arius melanopus*; AMNH 35241, 2, 115.0-143.0 mm SL, Guatemala, Izabal, río Motagua at Finca Hopi; UMMZ 197336, 3, 126.0-188.0 mm SL, Guatemala, Izabal, río Motagua at Finca Hopi.

Diagnosis. *Cathorops melanopus* differs from all congeners by having 16-18 gill rakers on first arch (*vs.* 19-20 in *C. belizensis*, 14-15 in *C. fuerthii*, 37-40 in *C. hypophthalmus*, 20-24 in *C. mapale*, and 19-22 in *C. tuyra*), 19-20 rays on anal fin (*vs.* 21-23 in *C. agassizii*, 21 in *C. aguadulce*, 21-24 in *C. arenatus*, 22-25 in *C. fuerthii*, 22-23 in *C. hypophthalmus*, 24-27 in *C. manglarensis*, 21-24 in *C. mapale*, 25-27 *in C. multiradiatus*, 22-25 in *C. spixii*, and 22-23 in *C. steindachneri*), snout length 5.3-5.5% SL (*vs*. 6.9-8.9% SL in *C. belizensis*, 6.3-7.9% SL in *C. fuerthii*, 6.1-8.0% SL in *C. higuchii*, 8.6-9.6% SL in *C. hypophthalmus*, 6.0-8.6% SL in *C. kailolae*, 6.2-8.0% SL in *C. manglarensis*, 7.3-7.6% SL in *C. steindachneri*, 7.4-8.3% SL in *C. taylori*), and posterior margin of pectoral-fin spine with prominent serrations (*vs.* short and inconspicuous serrations in all other species, except in *C. aguadulce*, *C. kailolae*, *C. multiradiatus*, and *C. tuyra*) (Fig. 20).

Cathorops melanopus is further distinguished from *C. aguadulce* by possessing a shorter snout (5.3-5.5 *vs.* 9.3-11.6% SL), shorter distance from tip of snout to dorsal-fin origin (30.0-32.6 *vs.* 39.0-40.7% SL), shorter distance from tip of snout to posterior margin of dorsomedian groove of neurocranium (17.9-19.1 *vs.* 22.9-26.4% SL), and by lacking fleshy papillae intercalated with gill rakers on first two arches (*vs*. papillae present). *Cathorops melanopus* is additionally distinguished from *C. belizensis* in having a shorter head (22.3-23.0 *vs.* 25.8-31.9% SL), shorter distance between lateral cornu of lateral ethmoid and external limb of supracleithrum (19.3-19.6 *vs.* 22.2-26.4% SL), smaller distance between the anterior nostrils (3.6-4.4 *vs.* 5.1-6.1% SL), shorter distance between posterior nostrils (4.4-5.1 *vs.* 5.9-7.6% SL), larger orbital diameter (4.5-5.0 *vs.* 3.6-4.4% SL),

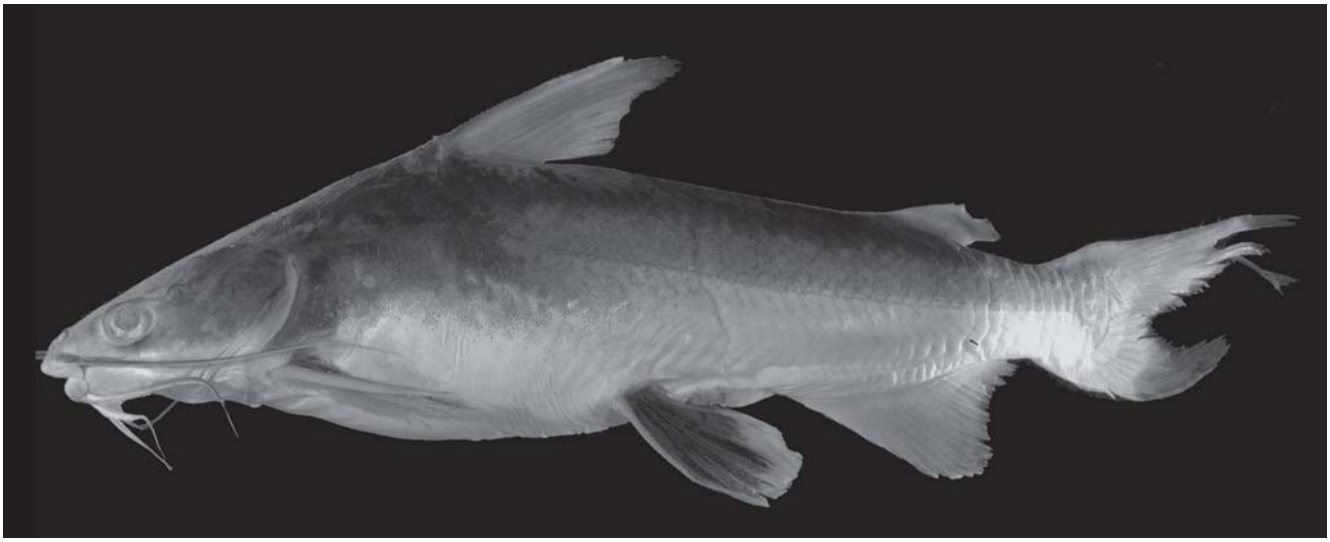

Fig. 19. *Cathorops melanopus*, UMMZ 197336, 188.0 mm SL (body in lateral view). Guatemala, Izabal, río Motagua at Finca Hopi.

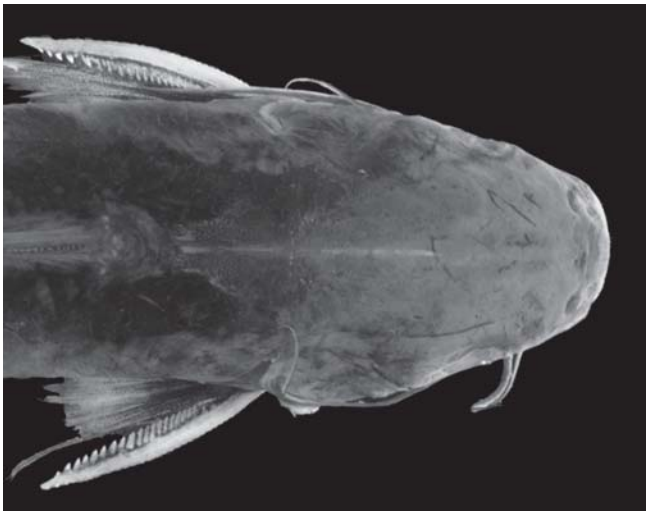

Fig. 20. *Cathorops melanopus*, UMMZ 197336, 188.0 mm SL (head in dorsal view). Guatemala, Izabal, río Motagua at Finca Hopi.

smaller interorbital distance (11.1-12.1 *vs.* 12.9-15.1% SL), narrower mouth (8.9-9.7 *vs.* 10.0-13.2% SL), narrower premaxilla (5.1-5.8 *vs.* 6.3-11.9% SL), and intense black pigmentation on pelvic fin (*vs*. pale pigmentation on pelvic fin) (Fig. 19). *Cathorops melanopus* is further distinguished from *C. higuchii* in possessing a shorter distance from tip of snout to posterior margin of dorsomedian groove of neurocranium (17.9-19.1 *vs.* 20.9-26.3% SL), larger orbital diameter (4.5-5.0 *vs.* 3.3-4.4% SL), shorter distance between lateral cornu of lateral ethmoid and external limb of supracleithrum (19.3-19.6 *vs.* 20.4-25.9% SL), and intense black pigmentation on pelvic fin (*vs*. pale pigmentation on pelvic fin) (Fig. 19). *Cathorops melanopus* also differs from *C. kailolae* in possessing a shorter distance from tip of snout to dorsal-fin origin (30.0-32.6 *vs.* 33.1-38.0% SL), shorter distance from tip of snout to pelvic-fin origin (46.2-49.1 *vs.* 50.4-52.6% SL), shorter dorsal-fin spine (17.2-18.1 *vs.* 19.3-24.9% SL), higher caudal peduncle (8.7-9.0 *vs.* 6.6-8.0% SL), and by lacking fleshy papillae intercalated with gill rakers on first two arches (*vs*. papillae present). *Cathorops melanopus* is additionally distinguished from *C. mapale* species group in possessing a narrower cephalic shield at supracleithrum area (16.7-16.9 *vs.* 17.3-19.8% SL), shorter head (22.3-23.0 *vs.* 24.4-28.9% SL), narrower body (19.6-20.1 *vs.* 20.5-22.3% SL), shorter distance from tip of snout to dorsal-fin origin (30.0-32.6 *vs.* 33.4-38.7% SL), shorter dorsal-fin spine (17.2-18.1 *vs.* 18.5-24.2% SL), and intense black pigmentation on pelvic fin (*vs*. pale pigmentation on pelvic fin) (Fig. 19).

Description. (Tables 1 and 6). Head short and depressed, profile slightly convex at level of frontals and supraoccipital. Body broader rather than deeper on pectoral girdle area. Cephalic shield rugose, relatively short and narrow on lateral ethmoid, frontal, supracleithrum, and epioccipital areas. Osseous bridge formed by lateral ethmoid and frontal long and slender, evident under skin. Dorsomedian groove of neurocranium relatively deep and large, its margins well marked, progressively narrower posteriorly. Supraoccipital process long and wide on posterior portion, profile straight. Nuchal plate crescent-shaped and moderate in size. Snout quite short, rounded on transverse section. Anterior and posterior nostrils close to one another. Eye lateral and relatively large. Interorbital distance and distance between nostrils and orbit short. Maxillary barbel surpassing base of pectoral-fin spine, external mental barbel surpassing margin of gill membrane, internal mental barbel reaching margin of gill membrane.

Mouth relatively small, lower jaw arched. Lips relatively thick. Vomerine tooth plates absent. One pair of small, narrow and elongated accessory tooth plates, quite distant from one another. Accessory tooth plates with small molariform teeth. Premaxilla quite narrow and long. Dentary with not so pronounced posterior projection, with many sharp teeth on anterior portion and few small molariform teeth on posterior portion.

Soft pectoral-fin rays 10. Pectoral-fin spine short; anterior margin with few granules on basal two thirds, distal third with

Table 6. Morphometrics for *Cathorops melanopus*. Standard length is expressed in millimeters, other measurements are percents of standard length.

	n	Mean	Range
Standard length (mm)	7	-	113.0-188.0
Head length	2	22.7	22.3-23.0
Snout length	2	5.4	5.3-5.5
Distance between anterior nostrils	2	4.1	3.6-4.4
Distance between posterior nostrils	2	4.8	4.4-5.1
Distance between anterior nostril to orbit	2	6.2	6.2-6.2
Distance between posterior nostril to orbit	2	4.5	4.5-4.5
Orbital diameter	7	4.8	4.5-5.0
Interorbital distance	7	11.7	11.1-12.1
Maxillary barbel length	7	30.5	27.8-32.8
External mental barbel length	7	20.4	19.2-23.4
Internal mental barbel length	7	12.9	11.8-13.7
Distance from snout to maxillary barbel	2	1.2	1.1-1.3
Distance from snout to external mental barbel	2	4.2	4.2-4.3
Distance from snout to internal mental barbel	2	3.6	3.6-3.6
Mouth width	7	9.1	8.9-9.7
Lower-jaw length	2	1.5	1.1-1.8
Premaxilla length	2	1.5	1.3-1.7
Premaxilla width	2	5.5	5.1-5.8
Distance between accessory tooth plates	2	4.4	4.3-4.4
Length of accessory tooth plates	2	2.5	2.3-2.9
Width of accessory tooth plates	2	0.8	0.7-0.9
Width of cephalic shield at lateral ethmoid area	2	11.4	11.4-11.4
Width of cephalic shield at frontals area	2	6.4	6.4-6.5
Width of cephalic shield at epioccipital area	2	11.2	11.2-11.2
Width of cephalic shield at supracleithrum area	2	16.8	16.7-16.9
Distance between lateral ethmoid and supracleithrum	2	19.5	19.3-19.6
Distance between snout and post. margin of dorsomedian groove of neurocranium	2	18.5	17.9-19.1
Supraoccipital process length	2	10.3	10.3-10.4
Supraoccipital process width	6	2.9	2.6-3.4
Nuchal-plate length	2	6.6	6.6-6.6
Nuchal-plate width	2	7.0	7.0-7.1
Body depth	2	17.1	16.7-17.5
Body width	2	19.8	19.6-20.1
Distance from snout to pectoral fin	2	19.7	19.1-20.4
Distance from snout to dorsal fin	2	31.3	30.0-32.6
Distance from snout to pelvic fin	2	47.6	46.2-49.1
Distance from snout to adipose fin	2	72.0	71.9-72.1
Distance from snout to anal fin	2	62.9	61.6-64.3
Caudal-peduncle height	2	8.8	8.7-9.0
Pectoral-fin spine length	2	17.2	16.7-17.6
Dorsal-fin spine length	2	17.6	17.2-18.1
Pelvic-fin base length	2	4.3	4.3-4.4
Pelvic-fin height	6	15.3	13.7-17.8
Adipose-fin base length	2	9.7	9.2-10.1
Adipose-fin height	2	3.2	3.0-3.5
Anal-fin base length	2	20.5	19.9-21.1
Anal-fin height	2	14.0	13.6-14.3
Caudal-fin upper lobe length	2	31.5	31.1-32.0
Caudal-fin lower lobe length	2	29.8	29.7-29.9

short serrations; posterior margin straight on basal fourth, distal three quarters with long serrations. Soft dorsal-fin rays 7. Dorsal-fin spine short, as long as pectoral-fin spine; anterior margin with granules on basal two thirds, distal third with short serrations; posterior margin serrated for almost its entire length. Pelvic fin high, with 6 rays. Anal fin high and long at base, with 19-20 (19) rays. Upper and lower lobes of caudal fin of moderate length, upper lobe longer than lower lobe. Caudal peduncle high.

Acicular gill rakers on first arch 16-18 (17), 5 or 6 (5) on upper limb, 11 or 12 (11) on lower limb. Spike shaped gill rakers on second arch 16-18, 4 to 6 on upper limb, 12 or 13 on lower limb. Mesial surfaces of all gill arches with developed gill rakers. Lateral and mesial surfaces of first and second gill arches without fleshy papillae intercalated with gill rakers.

Coloration in alcohol. Dorsal and lateral portions of head dark, ventrally light beige. Body with same dark color, progressively lighter towards lateral line and rather light beige under lateral line. Maxillary barbel dark, mental barbels light, fins dark especially towards edge.

Sexual dimorphism. Sex of specimens was not examined (see Material and Methods).

Distribution. Material examined is from the río Motagua in Guatemala, type locality of the species (Fig. 6). Probably present in the Honduran portion of the río Motagua, near its mouth. The species is restricted to freshwaters.

Vernacular names. Dark Sea Catfish, bagre prieto.

Remarks. Because *C. melanopus* is restricted to the freshwaters of río Motagua (in Guatemala and probably Honduras), the recognition of specimens from Mexico, Nicaragua, Costa Rica and Panama as *C. melanopus* by previous authors (*e.g.* Steindachner, 1876; Meek & Hildebrand, 1923; Miller, 1966; Gilbert & Kelso, 1971; Castro-Aguirre *et al*., 1999) is erroneous.

Discussion

The genus *Cathorops* can be diagnosed from other New World ariid genera by having accessory tooth plates small and oval (*vs*. large, round to subtriangular in *Amphiarius* and some *Notarius* and *Sciades*, longitudinally elongated in *Aspistor*, *Occidentarius*, some *Notarius* and *Sciades* or absent in *Potamarius*), dentary with posterior expansion in females (*vs*. dentary without posterior expansion in other ariid genera with exception of *Potamarius*), extrascapular subtriangular, contacting the supraoccipital through a suture parallel to the longitudinal axis (*vs*. extrascapular subrectangular or subquadrangular with oblique suture in other genera), base of adipose fin quite short, less than one-half the length of anal-fin base (*vs*. about half as long as anal-fin base in *Genidens*, *Notarius*, *Potamarius* and *Sciades* or as long as anal-fin base in *Amphiarius*, *Aspistor*, and *Galeichthys*), and lateral line not bifurcated at caudal region, reaching base of caudal-fin upper lobe (*vs*. bifurcated at caudal region, reaching base of caudal-fin upper and lower lobes in *Bagre*). The subgenus *Cathorops*, within which the species described here are included, can be diagnosed from the subgenus *Precathorops* and from other ariid genera by possessing a lateral ethmoid and frontal limiting a wide conspicuous fenestra, visible under the skin (*vs*. moderately developed in *Precathorops*, *Amphiarius*, *Aspistor*, *Bagre*, *Galeichthys*, *Notarius*, and *Potamarius* or reduced or absent in *Genidens*, *Sciades*, and *Occidentarius*), mesethmoid, lateral ethmoid and frontal lacking bony spinulations (*vs*. bony spinulations present in *Precathorops*), posterior cranial fontanel very reduced (*vs*. moderately developed, long and narrow in *Precathorops*, *Notarius*, and *Potamarius*, large and long in *Amphiarius* and *Aspistor*, or absent in *Sciades*), vomerine tooth plates absent (*vs*. present in *Precathorops*, *Aspistor*, *Bagre*, *Galeichthys*, *Notarius*, *Occidentarius*, and *Sciades*), accessory tooth plates bearing molariform teeth (*vs*. conical in *Precathorops*, and in other ariid genera except *Aspistor*), posterior cleithral process short (*vs*. moderate length in *Precathorops* and other ariid genera), and

Key to the species of *Cathorops* from the Mesoamerica and Caribbean Sea

1. Lateral and mesial surfaces of first and second gill arches with fleshy papillae intercalated with the gill rakers, papillae more developed on second arch (Fig. 3b); 14-16 gill rakers on first arch; 13-16 gill rakers on second arch 2
1'. Lateral and mesial surfaces of first and second gill arches without fleshy papillae intercalated with the gill rakers (Fig. 3a); 16 to 23 gill rakers on first arch; 16 to 22 gill rakers on second arch 3
2. Snout length 9.3-11.6% SL (Fig. 4); distance from tip of snout to dorsal-fin origin 39.0-40.7% SL (Fig. 5) .... *Cathorops aguadulce*
2'. Snout length 6.0-8.6% SL (Fig. 4); distance from tip of snout to dorsal-fin origin 33.1-38.0% SL (Fig. 5)....*Cathorops kailolae*
3. Head length 22.3-23.0% SL; distance from tip of snout to posterior margin of dorsomedian groove of neurocranium 17.9-19.1% SL; pelvic and pectoral fins with intense black pigmentation; posterior margin of pectoral-fin spine with conspicuous and long serrations (Fig. 20).....*Cathorops melanopus*
3'. Head length 23.3-31.9% SL; distance from tip of snout to posterior margin of dorsomedian groove of neurocranium 20.2-27.3% SL; pelvic and pectoral fins with pale pigmentation; posterior margin of pectoral-fin spine with inconspicuous and short serrations (Figs. 8 and 13)..... 4
4. Dorsal-fin spine 15.9-17.6% SL (Fig. 9); dorsal-fin spine length 29.4-33.3% of distance from tip of snout to pelvic-fin origin; dorsal-fin spine as long as pectoral-fin spine..... *Cathorops belizensis*
4'. Dorsal-fin spine 18.6-24.2% SL (Fig. 9); dorsal-fin spine length 35.1-48.3% of distance from tip of snout to pelvic-fin origin; dorsal-fin spine longer than pectoral-fin spine..... 5
5. Cephalic shield with very few granules (Fig. 13); supraoccipital process length 22.3-32.6% of maxillary barbel length (Fig. 14); supraoccipital process length 32.8-48.3% of external mental barbel length..... *Cathorops higuchii*
5'. Cephalic shield densely granulated; supraoccipital process length 35.5-51.4% of maxillary barbel length (Fig. 14); supraoccipital process length 51.5-81.2% of external mental barbel length..... *Cathorops mapale* species group

mesial gill rakers on first two arches developed (*vs*. absent or reduced in *Precathorops*, *Amphiarius*, *Aspistor*, *Bagre*, *Notarius*, *Occidentarius*, and *Sciades*).

Betancur-R. & Acero (2005) and Betancur-R. *et al.* (2007) hypothesized the relationships of 13 species of *Cathorops* based on mitochondrial sequences (ATP synthase 8/6, cytochrome *b*, 12S, and 16S, total 2842 bp). The marine and brackish entities occurring from Belize to Brazil were formerly treated as *C. spixii* (*e.g.* Taylor & Menezes, 1978), described from equatorial Brazil. Betancur-R. & Acero (2005) demonstrated that *C. mapale*, described from the southern and central coasts of the Colombian Caribbean, is more closely related to the *C. fuerthii* group from the Eastern Pacific than to the *C. spixii* clade (including *C. spixii*, *C. agassizii*, and probably *C. arenatus*), which is restricted from Brazil and the Guyanas. The entity distributed between northern Colombian and Venezuela has been recently hypothesized to be the sister species of *C. mapale* based on mitochondrial grounds (Betancur-R. & Acero P., 2006). Both species are unambiguously distinguished from one another by mitochondrial characters, but the best morphological discriminators (e.g. anterior internarial distance in maxillary barbel length, gill raker counts on first and second arches) have some degree of overlapping. Both entities are thus referred as the *C. mapale* species complex (Colombian Caribbean and Venezuela; Betancur-R. & Acero P., 2006). Based on the morphology, distribution, and habitat preferences of the new Caribbean species described here (*C. higuchii* and *C. belizensis*), it would be expected that they are included within the *C. mapale/C. fuerthii* clade, but this requires confirmation. The molecular phylogenies also recovered the freshwater *C. aguadulce* complex sister to a clade including four Eastern Pacific species (*C. taylori*, *C. steindachneri*, *C. hypophthalmus*, and *C. tuyra*). The pyhlogenetic position of *C. melanopus* is still uncertain and needs further investigation.

Ariids are known for their peculiar reproductive habits (*i.e.* male mouthbrooding) (Rimmer & Merrick, 1982; Acero P. *et al*., 2005; Wang, *et al*., 2005) associated with striking morphological differences between males and females. Females have pelvic fins that are longer and wider at base than males and distally rounded (Gudger, 1916; Lee, 1931, 1937; Merriman, 1940; Whitley, 1941), and during the spawning season the inner pelvic-fin rays become hook-like (Mane, 1929; Lee, 1931). Likewise, during the incubation period, males enlarge the branchial chamber, reduce the number of teeth, and modify the epithelium that covers the oral cavity (Gudger, 1916; Dimitrenko, 1970). All these differences are observed in the species of *Cathorops*, which have additional modifications not found in other ariid species, such as head larger and wider in males than in females (Marceniuk, 1997; 2007a; 2007b). These differences may be associated with the smaller body sizes, on average, attained by the species of *Cathorops*. Considered r-strategists, ariid species reach gonadal maturity at relatively old ages and large sizes, but in *Cathorops* the values for these traits are lower (Etchevers, 1978; Mishima & Tangi, 1983; Mello & Teixeira, 1992). Consequently, additional dimorphic features associated to head size in males of *Cathorops*, could represent an adaptation to compensate for the smaller body lengths, allowing a relative increase of the branchial chamber. The conspicuous dimorphism of *Cathorops* has caused misidentifications and synonym descriptions in the literature. For instance, Valenciennes (1840) based the description of *Arius arenatus* and *A. fissus* on generalized features within the Ariidae, considering that *A. arenatus* (= *Cathorops arenatus*) could be distinguished from *A. fissus* by having a shorter head, larger teeth and larger accessory tooth plates. The characters used to diagnose *A. arenatus* are typical of females, whereas the condition found in *A. fissus* is characteristic of males (Marceniuk, 2007b). The latter species is currently considered junior a synonym of the former.

Comparative material examined. ***Cathorops agassizii*.** MZUSP 25169, 1, 186.0 mm SL, Brazil, Pará, Vigia; MZUSP 49346, 4, 154.0-157.0 mm SL, Brazil, Pará, Cajueiro, Mosqueiro island, Marajó bay; MZUSP 49347, 2, 201.0-219.0 mm SL, Brazil, Pará, fish market of Vigia; MZUSP 37228, 1, 148.0 mm SL, Brazil, Maranhão, Coqueiro straight, São Luís island; MZUSP 49344, 1, 147.0 mm SL, Brazil, Maranhão, rio Curica, São Luís island; MZUSP 37230, 4, Brazil, Alagoas, Maceió; MZUSP 37231, 8, Brazil, Alagoas, Maceió, Mundaú lagoon; MZUSP 37232, 17, Brazil, Alagoas, Maceió, Mundaú lagoon; MZUSP 37234, 5, Brazil, Alagoas, Maceió, Mundaú lagoon; MZUSP 37235, 2, Brazil, Alagoas, Maceió, Mundaú lagoon; MZUSP 49341, 6, Brazil, Alagoas, Maceió, Mundaú lagoon; MZUSP 49342, 1, Brazil, Alagoas, Maceió, Mundaú lagoon; MZUSP 49343, 2, Brazil, Alagoas, Maceió,Mundaú lagoon; MZUSP 51709, 11, Brazil, Alagoas, Maceió, Mundaú lagoon; MZUSP 49355, 4, Brazil, Sergipe, rio Jarapatuba, near Pirambú; MZUSP 49356, 4, Brazil, Sergipe, rio Jarapatuba, near Pirambú; MZUSP 37237, 3, Brazil, Sergipe, rio Sergipe; MZUSP 49358, 4, Brazil, Sergipe, rio Sergipe; MZUSP 49359, 6, Brazil, Sergipe, rio Sergipe; MZUSP 49354, 1, Brazil, Sergipe, mouth of rio Pomongá, near Aracaju. ***Cathorops arenatus***. USNM 233482, +40 (6, 110.0-133.0 mm SL), Venezuela, mouth of río Orinoco up stream from sea buoy; USNM 66101, 1, 141.0 mm SL, Guyana, Georgetown market; USNM 286395, 17, Surinam, 06°04'N 54°51'W; USNM 225446, 6, Surinam, Nickerie district, Corantijn river off Clara creek; USNM 226106, 1, Surinam, Nickerie district, Corantijn river off Clara creek; MZUSP 37241, 1, 136.0 mm SL, French Guiana, Pointe des Roches; USNM 286461, 2, French Guiana, 04°59'N 51°58'W; USNM 286465, 5, French Guiana, 04°43'N 51°29'W; USNM 286750, 11, Brazil, Amapá, 01°04'N 48°06'W; USNM 286458, 1, Brazil, Amapá, 02°55'N 49°44'W; USNM 286459, 2, Brazil, Amapá, 03°16'N 50°03'W; USNM 286460, 5, Brazil, Amapá, 03°33'N 50°17'W; USNM 286463, 2, Brazil, Amapá, 03°27'N 50°25'W; USNM 286471, 5, Brazil, Amapá, 01°26'N 48°14'W; USNM 286472, 10, Brazil, Amapá, 00°24'N 47°32'W; USNM 286390, 14, Brazil, Amapá, 03°16'N 50°12'W; USNM 286394, 7, Brazil, Amapá, 03°17'N 50°12'W; USNM 286509, 2, Brazil, Amapá, 02°16'N 48°47'W; MZUSP 49345, 5 (1, 155.0 mm SL), Brazil, Pará, Marajó bay; MZUSP 49364, 1, 172.0 mm SL, Brazil, Pará, fish market of Vigia; MZUSP 48523, 1, 89.0 mm SL, Brazil, Pará, Marajó bay, Jubim. ***Cathorops dasycephalus***. FMNH 19143, 5, 216.0-242.0 mm TL, Panama, Balboa, Panama bay; USNM 286481, 7, 162.0-233.0 mm TL, Colombia, off Cape Manglares, south of Tumaco. ***Cathorops fuerthii***. USNM 79398, 12 (5, 185.0-242.0 mm SL), Panama, Panama bay, Balboa, channel zone; STRI 5720, 2, 321.0-332.0 mm SL, Panama, Punta Patino. ***Cathorops hypophthalmus***. USNM 293275, 2, 168.0-185.0 mm SL, Panama, Darien province, río Pirre ½ km above El Real, río Tuyra drainage. ***Cathorops liropus***. USNM 47584, 2, 140.0-197.0 mm SL syntype, Mexico, lago San Juan, río Sonora; UMMZ 172001, 13 (4, 83.0-85.0 mm SL), Mexico, Nayarit, puente de Chacalilla on estero de San Blas. ***Cathorops manglarensis***. USNM 286392, 1, 164.0 mm SL holotype, Colombia, off Cape Manglares, south Tumaco; USNM 388316, 8 (3, 164.0-195 mm SL paratypes), Colombia, off Cape Manglares, south Tumaco; USNM 286388, 3 (2, 195.0-195.0 mm SL paratypes), Colombia, off Boca San Juan, San Juan del Sur; USNM 286389, 2, 89.0-107.0 mm SL paratypes, Colombia, off Boca

San Juan, north of Tumaco. ***Cathorops mapale***. USNM 286396, 5 (2, 178.0-180.0 mm SL), Colombia, Ciénaga Grande de Santa Marta; USNM 286398, 5 (4, 175.0-186.0 mm SL), Colombia, Cga. de la Virgen; additional material is listed in Betancur-R. and Acero P. (2005). ***Cathorops multiradiatus***. USNM 79408, 1, 192.0 mm SL neotype, Panama, Panama bay, Balboa, channel zone; USNM 388315, 1, 209.0 mm SL, Panama, Panama bay, Balboa, channel zone; USNM 286400, 3 (2, 120.0-125.0 mm SL), Colombia, south of Tumaco, off Cape Manglares; USNM 292703, 1, 174.0 mm SL, Colombia, Sandy beach immediately south of Punta Canchaco in Juan Chaco bay. ***Cathorops spixii***. USNM 286461, 2 (1, 126.0 mm SL), French Guiana, 04º59'N - 51º58'W; MZUSP 37214, 3 (1, 64.0 mm SL), Brazil, Pará, Vigia; MZUSP 49345, 6, Brazil, Pará, Marajó bay; MZUSP 49411, 2, Brazil, Pará, Coroinha, Marajó bay; MZUSP 49348, 1, Brazil, Pará, Ponta Fina Maguari, Marajó bay; MZUSP 37215, 2, 88.0-91.0 mm SL, Brazil, Maranhão, Pajé, Coqueiro straight, São Luís island; MZUSP 49350, 1, Brazil, Paraíba, Lucena; MZUSP 49351, 1, Brazil, Paraíba, Lucena; MZUSP 49349, 1, Brazil, Paraíba, Lucena; MZUSP 37236, 4, Brazil, Sergipe, rio Sergipe; MZUSP 49363, 16, Brazil, Sergipe, rio Sergipe; MZUSP 49357, 2, Brazil, Sergipe, rio Japaratuba, near Pirambú; MZUSP 24374, 2, 106.0-106.0 mm SL, Brazil, Bahia, mouth of rio Paraguassú, near Maragogipe; MZUSP 2300, 2, Brazil, Espírito Santos, rio Paraíba, São João da Barra; MZUSP 49353, 31 (7, 101.0-133.0), Brazil, Rio de Janeiro, Pontal de Atafona; MZUSP 24487, 10 (4, 95.0-120.0 mm SL), Brazil, Rio de Janeiro, Macaé, Portinha; MZUSP 22783, 1, 121.0 mm SL, Brazil, Rio de Janeiro, Maricá lagoon; MZUSP 48526, 2, 166.0-181.0 mm SL, Brazil, Rio de Janeiro, Sepetiba Bay; MZUSP 23127, +300 (17, 96.0-160.0 mm SL), Brazil, Rio de Janeiro, Ilha Grande; MZUSP 49352, 1, 144.0 mm SL, Brazil, Rio de Janeiro, Angra dos Reis; MZUSP 22571, 1, 108.0 mm SL, Brazil, São Paulo, Caraguatatuba, Caraguatatuba bay; MZUSP 24624, 8 (2, 107.0-111.0 mm SL), Brazil, São Paulo, Ubatuba, Ubatuba bay; MZUSP 10090-91, 2, Brazil, São Paulo, Santos; MZUSP 2299, 4, Brazil, São Paulo, Santos; MZUSP 49360, 3, Brazil, São Paulo, Santos bay; MZUSP 49362, 38, Brazil, São Paulo, Santos; MZUSP 22572, 5 (2, 96.0-106.0 mm SL), Brazil, São Paulo, Moela island; MZUSP 22216, 1, 163.0 mm SL, Brazil, São Paulo, Praia Grande; MZUSP 22609, 1, 117.0 mm SL, Brazil, São Paulo, Itanhaém; MZUSP 22491, 1, Brazil, São Paulo, Cananéia; MZUSP 37239, 6, Brazil, São Paulo, Cananéia, Valo Grande; MZUSP 37240, 6, Brazil, São Paulo, Cananéia; MZUSP 49361, 19, Brazil, São Paulo, Cananéia. ***Cathorops steindachneri***. STRI 5773, 1, 265.0 mm SL, Panama, Punta Chame; STRI 5724, 1, 200.0 mm SL, Panama, Isla Majagual. ***Cathorops taylori***. USNM 87224, 1, 283.0 mm SL holotype, El Salvador, San Maroco, río Lempa; STRI 5727, 2, 145.0-147.0 mm SL, El Salvador, bahia La Union; STRI 5768, 2, 155.0-157.0 mm SL, El Salvador, bahia La Union; STRI 5743, 1, 139.0 mm SL, El Salvador, bahia La Union; STRI 5767, 1, 175.0 mm SL, El Salvador, bahia La Union. ***Cathorops tuyra***. USNM 286397, 1, 123.0 mm SL, Panama, río Pirre, 3-5 miles above El Real; USNM 286466, 9 (6, 138.0-225.0 mm SL), Panama, río Pirre, 3-5 miles above El Real; USNM 286462, 1, Panama, río Uruseca, 2 miles above El Real; USNM 292824, 5 (3, 146.0-165.0 mm SL), Panama, río Uruseca, 5 miles above El Real.

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