

## AMBLYCEPS CARINATUM, A NEW SPECIES OF HILLSTREAM CATFISH FROM MYANMAR (TELEOSTEI: AMBLYCIPITIDAE)

Heok Hee Ng

Fish Division, Museum of Zoology, University of Michigan, 1109 Geddes Avenue,  
Ann Arbor, Michigan 48109-1079, USA.

**ABSTRACT.** – *Amblyceps carinatum*, a new species of hillstream catfish from the middle Irrawaddy River drainage in Myanmar is described here. It can be distinguished from congeners in having a unique combination of the following characters: the adipose fin in the form of a long, low ridge (length of adipose-fin base 37.5–44.6% SL), a smooth posterior edge of the pectoral spine, poorly developed pinnate processes along the median caudal-fin rays, a deeply forked caudal fin, body depth at anus 13.1–15.0% SL, head depth 10.6–13.6% SL, eye diameter 9.4–11.8% HL vs. 8.3), 39–40 vertebrae, and a uniform body coloration. The valid species of *Amblyceps* are listed. The status of *A. apangi* and *A. arunachalensis* are discussed; the former species is considered valid and the latter a junior synonym of *A. mangois*. *Amblyceps mucronatum* is also recorded from the Irrawaddy River drainage for the first time.

**KEY WORDS.** – Siluriformes, Sisoroidea, Irrawaddy River.

### INTRODUCTION

*Amblyceps* Blyth, 1858, is a group of catfishes typically inhabiting fast flowing hillstreams or faster-flowing stretches of larger rivers, and is distributed throughout South and Southeast Asia. Its members are diagnosed by an epiphyseal commissure of the supraorbital sensory canals not passing through the epiphyseal bar, fifth ceratobranchial expanded posteromedially, the presence of pinnate processes along the median caudal-fin rays, and the presence of triangular fenestrae immediately medial to both inner and outer mandibular barbels (Chen & Lundberg, 1995). Externally, *Amblyceps* species are easily distinguished by the presence of the pinnate processes along the median caudal-fin rays (although these processes may be poorly developed in some species), a prominent cup-like skin flap above the base of the pectoral spine, adipose fin largely separate from caudal fin and, with three exceptions, the presence of a deeply forked caudal fin. Following Ng & Kottelat (2000) and Ng (2001), eleven valid species of *Amblyceps* are recognized, viz. *A. mangois* (Hamilton, 1822), *A. laticeps* (M' Clelland, 1842), *A. caecutiens* Blyth, 1858, *A. murraystuarti* Chaudhuri, 1919, *A. foratum* Ng & Kottelat, 2000, *A. mucronatum* Ng & Kottelat, 2000, *A. platycephalus* Ng & Kottelat, 2000, *A. serratum* Ng & Kottelat, 2000, *A. tenuispinis* Blyth, 1860, *A. variegatum* Ng & Kottelat, 2000 and *A. macropterus* Ng, 2001. A twelfth species, *A. apangi* Nath & Dey, 1989, is recognized as valid in this study.

Among the thirteen species, two are known to occur in Myanmar or in river drainages that flow through Myanmar (Ng & Kottelat, 2000), viz. *A. murraystuarti* and *A. mucronatum*. Recent collections have uncovered a third species, which is described in this study as *Amblyceps carinatum*, new species.

### MATERIAL AND METHODS

Measurements were made point to point with dial calipers and data recorded to tenths of a millimeter. Counts and measurements were made on the left side of specimens whenever possible. Subunits of the head are presented as percentage proportions of head length (% HL). Head length and measurements of body parts are given as percentage proportions of standard length (% SL). Measurements follow Ng & Kottelat (2000), and institutional abbreviations follow Eschmeyer (1998).

### TAXONOMY

*Amblyceps carinatum*, new species  
(Fig. 1)

**Material examined.** – Holotype - UMMZ 245588, 34.7 mm SL, Myanmar: Kachin, Irrawaddy drainage, hillstreams at Tonpan village, on road from Myitkyina to Tanai, coll. Hain Zin & Hlaing Hlaing Oo, 20 Feb.2005.

Paratypes – UMMZ 245490, 3 ex., 25.8–36.0 mm SL, data as for holotype.

**Diagnosis.** – *Amblyceps carinatum* can be distinguished from congeners in having the adipose fin in the form of a long, low ridge (vs. blade-like, length of adipose-fin base 37.5–44.6% SL vs. 13.6–33.5; Fig. 2). It further differs from congeners on the Indian subcontinent with a deeply forked caudal fin (*A. mangois*, *A. tenuispinis*, and *A. macropterus*) in having poorly developed (vs. well developed) pinnate processes along the median caudal-fin rays (Fig. 1 in Ng & Kottelat, 2001). *Amblyceps carinatum* can be further distinguished from *A. apangi*, *A. laticeps* and *A. murraystuarti* in having a deeply forked (vs. truncate or emarginate) caudal fin, and from *A. caecutiens* in having a deeper body (13.1–15.0 vs. 9.8–10.7) and larger eyes (9.4–11.8% HL vs. 2.0–3.4). It further differs from *A. foratum* in having larger eyes (9.4–11.8% HL vs. 5.5–8.5), from *A. platycephalus* in having a deeper head (10.6–13.6% SL vs. 8.3), and body (13.1–15.0% SL vs. 11.5), from *A. serratum* in having a smooth (vs. serrated) posterior edge of the pectoral spine and more vertebrae (39–40 vs. 34–36), and from *A. variegatum* in having larger eyes (9.4–11.8% HL vs. 5.3–6.9) and a uniform (vs. mottled) body coloration.

**Description.** – Biometric data in Table 1. Head depressed, body cylindrical. Anus and urogenital openings located at vertical through middle of adpressed pelvic fin. Skin tuberculate. Lateral line midlateral, apparently extending to base of caudal fin; visible externally anterior to, but not posterior to, middle of dorsal-fin base. Only individual laterosensory pores visible externally posterior to middle of dorsal-fin base. Vertebrae 19+20=39 (1), 20+19=39 (1), or 20+20=40\* (2).

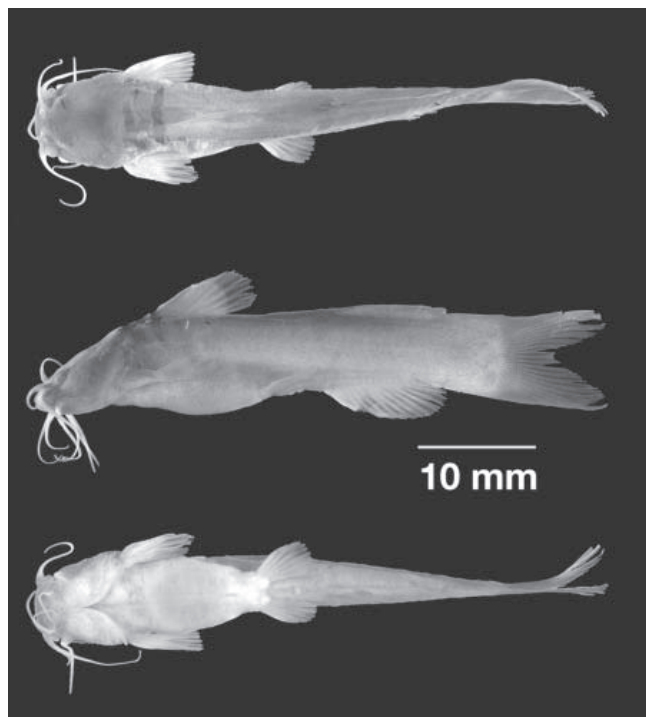


Fig. 1. *Amblyceps carinatum*, holotype, UMMZ 245588, 34.7 mm SL, Myanmar: hillstreams at Tonpan village.

Head depressed, with expanded cheek muscles imparting slightly swollen appearance in front of opercular region. Anterior and posterior nares separated only by base of nasal barbel. Gill openings broad, extending from immediately ventral to post-temporal to isthmus. Dorsal surface of head covered with thick, tuberculate skin. Eye ovoid, horizontal axis longest; located entirely in dorsal half of head and subcutaneous.

Barbels in four pairs. Maxillary barbel long and slender, extending to middle of pectoral-fin rays. Nasal barbel slender, extending to opercle. Inner mandibular-barbel origin close to midline, extending to middle of pectoral-fin base. Outer mandibular barbel originating posterolateral of inner mandibular barbel, extending to middle of pectoral-fin rays.

Mouth terminal, with lower jaw very slightly longer than upper; anterior edge barely visible dorsally. Lips fleshy and slightly fimbriated, with very well developed rictal fold present below anterior border of eye. Oral teeth small and villiform, in irregular rows on all tooth-bearing surfaces. Premaxillary teeth in single broad semilunate band. Dentary teeth in two narrow crescentic bands separated at midline.

Dorsal fin located above anterior one-third of body, with I,6 (4) rays; fin margin convex; spine very short and straight, encased in thick skin and with fluid-filled cavity imparting

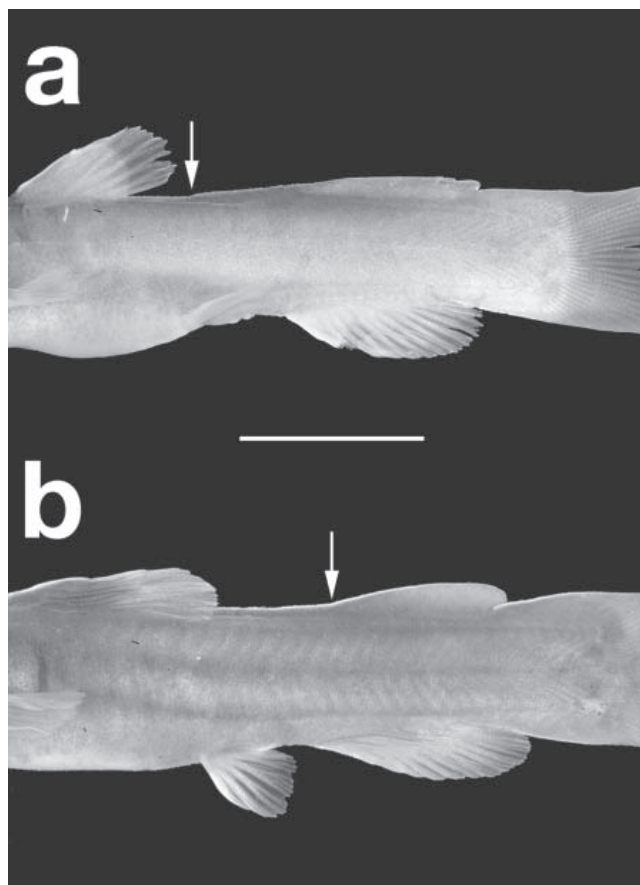


Fig. 2. Adipose fins of: a. *Amblyceps carinatum*, holotype, UMMZ 245588, 34.7 mm SL; b. other *Amblyceps* species (*A. mucronatum*, UMMZ 245497, 41.2 mm SL illustrated). Arrows indicate origin of adipose fin and scale bar represents 10 mm.

Table 1. Biometric data for *Amblyceps carinatum* (n=4)

	Holotype	Range	Mean±SD
Standard length	34.7	25.8–36.0	
<b>%SL</b>			
Predorsal length	32.3	30.4–32.3	31.5±0.79
Preanal length	63.4	63.4–66.1	64.3±1.24
Prepelvic length	49.9	47.7–52.5	50.6±2.27
Prepectoral length	21.3	18.7–22.1	20.7±1.45
Length of dorsal-fin base	14.4	13.4–15.5	14.6±0.90
Length of anal-fin base	21.6	19.8–23.3	21.3±1.56
Pelvic-fin length	11.5	11.1–13.4	11.8±1.08
Pectoral-fin length	19.3	17.7–19.3	18.3±0.73
Caudal-fin length	28.5	25.0–28.5	26.5±1.80
Length of adipose-fin base	39.8	37.5–44.6	40.8±2.98
Dorsal to adipose distance	10.7	7.8–10.7	9.1±1.48
Length of caudal peduncle	15.6	14.5–16.7	15.6±0.90
Depth of caudal peduncle	14.4	12.7–14.4	13.4±0.79
Body depth at anus	15.0	13.1–15.0	13.7±0.90
Head length	24.5	24.5–26.4	25.2±0.86
Head width	17.9	16.3–17.9	17.1±0.68
Head depth	12.7	10.6–13.6	12.2±1.27
<b>%HL</b>			
Snout length	32.9	29.4–36.2	33.2±2.88
Interorbital distance	31.8	31.8–40.6	34.2±4.35
Eye diameter	11.8	9.4–11.8	10.5±1.01
Nasal barbel length	70.6	70.6–78.1	74.6±3.12
Maxillary barbel length	111.8	111.8–129.4	118.2±7.71
Inner mandibular barbel length	76.5	46.9–85.9	68.3±16.88
Outer mandibular barbel length	94.1	84.1–111.8	96.0±11.54

somewhat bulbous appearance along entire length. Adipose fin long and low, anterior origin at vertical through pelvic-fin origin. Caudal fin strongly forked, with upper lobe longer than lower (but less than 1.5 times length of lower lobe) and i,8,7,i (4) principal rays. Procurrent rays symmetrical and extending considerably anterior to fin base. Anal-fin base ventral to adipose-fin origin at distance about half length of anal-fin base. Anal fin with straight anterior margin and straight or slightly concave posterior margin, spanning posterior half of adipose-fin base and with v,9 (1), v,10\* (2) or vi,10 (1) rays. Pelvic-fin origin midway between verticals through posterior end of dorsal-fin base and anal-fin origin. Pelvic fin with convex margin and i,5 (4) rays; tip of adpressed fin not reaching anal-fin origin. Pectoral fin narrow, with I,6\* (3) or I,6,i (1) rays; posterior fin margin strongly convex. Pectoral spine short and straight, with smooth anterior and posterior margins. Spine encased in thick skin, with fluid-filled cavity imparting somewhat bulbous appearance along proximal half.

**Coloration.** - In 70% ethanol: Dorsal and lateral surfaces of head, and body brown, fading to off white on ventral surfaces.

Dorsal and anal fins brown for proximal half, distal half hyaline. Pectoral and pelvic fins hyaline. Adipose fin brown, with hyaline distal margin. Caudal fin with brown fin rays and hyaline interradial membrane. Nasal and maxillary barbels brown at base, off white for almost entire length, mandibular barbels off white.

**Distribution.** - Known only from the middle part of the Irrawaddy River drainage in Myanmar (Fig. 3).

**Etymology.** - From the Latin *carina* (keel), in reference to the long, low adipose fin of this species.

## DISCUSSION

The shape of the adipose fin diagnoses *A. carinatum* from all other congeners. It is the only character that reliably distinguishes it from the sympatric *A. mucronatum*. Although *A. carinatum* seemingly has a longer head (24.5–26.4% SL vs. 20.3–22.6%) and shorter caudal peduncle (14.5–16.7% SL vs. 18.3–21.8%) than *A. mucronatum*, the differences are

obscured by the size disparity of the material between the two species examined (no specimen above 40 mm SL for *A. carinatum* and no specimen under 40 mm SL for *A. mucronatum*). Therefore, it is difficult to discount ontogeny as accounting for the biometric differences observed. Biplots of caudal peduncle length and head length against SL (Fig. 4) graphically illustrate this point. Until a larger series of material can be studied to exclude the effects of ontogeny in explaining the biometric differences, the lengths of the head and caudal peduncle are not used in diagnosing the two species here.

The same argument (i.e. ontogeny) can be applied to discount using the size and shape of the adipose fin as a diagnostic character, but there is enough circumstantial evidence to suggest its utility as a diagnostic character. In species where a large series (spanning the interval between the sizes of both the series of *A. carinatum* and *A. mucronatum*) is available (*A. mangois*, *A. laticeps*, *A. murraystuarti*, and *A. foratum*), the size and, in particular, the general shape and relative length of the adipose fin does not change much during ontogeny (as shown in Fig. 5 using *A. mangois* as an example), thus making this character useful in diagnosing species of *Amblyceps*.

The gonads of two paratypes of *A. carinatum* were examined. The largest paratype (UMMZ 245490, 36.0 mm SL) is a female in which the ovaries contained immature oocytes corresponding to the stage defined as initial maturation by dos Santos et al. (2004). The gonads of the other paratype (UMMZ 245490, 28.3 mm SL) were too small for its sex to

be determined. Therefore, it cannot be demonstrated conclusively that the available material of *A. carinatum* are adults and that size is a useful character in distinguishing *A. carinatum* from *A. mucronatum*.

Recent studies of *Amblyceps* taxonomy (Ng & Kottelat, 2000; Ng, 2001) have not mentioned two nominal species described by Nath & Dey (1989): *A. apangi* Nath & Dey, 1989 (type locality: Dikrong River; the Dikrong is a tributary of the Brahmaputra River) and *A. arunachalensis* Nath & Dey, 1989 (type locality: Dikrong River). Specimens of an *Amblyceps* species with a truncate caudal fin from the Brahmaputra River drainage closely matches the description of *A. apangi*, and is hereby referred to this species (a photograph of *A. apangi* is provided in Fig. 6). *Amblyceps apangi* is most similar to *A. murraystuarti*, which is known from the upper Irrawaddy River drainage. Both species differ from all other congeners in having truncate (vs. deeply forked or emarginate) caudal fins and more vertebrae (45–48 vs. 34–41). *Amblyceps apangi* differs from *A. murraystuarti* in having a longer head (20.2–24.6% SL vs. 18.3–20.5) and more vertebrae (47–48 vs. 45–46). In specimens above ca. 50 mm SL, *A. apangi* has a wider head (13.8–15.2% SL vs. 10.6–12.7; Fig. 7), although this difference is not clearly evident between individuals of both species below this size. Furthermore, the live colors of

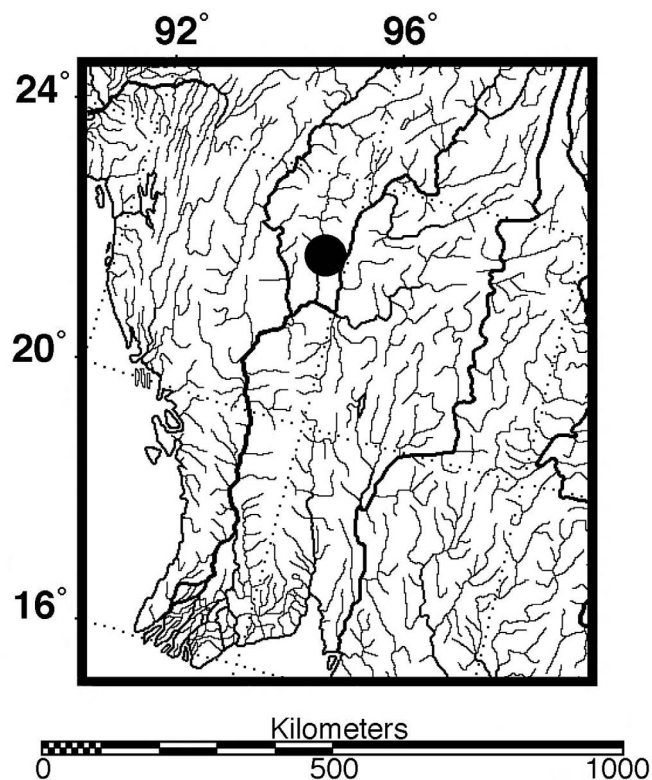


Fig. 3. Collecting locality for the type series of *Amblyceps carinatum*.

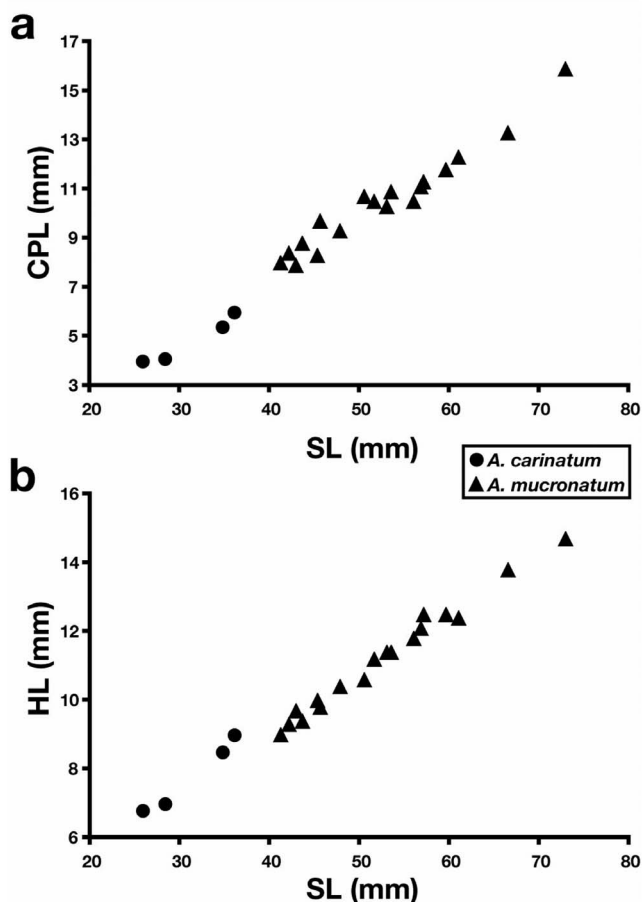


Fig. 4. Scatterplots of: a. length of caudal peduncle (CPL) and b. head length (HL) plotted against standard length for *Amblyceps carinatum* and *A. mucronatum*.

the two species are different, with *A. apangi* being bronze yellow and *A. murraystuarti* gray.

I was unable to examine material clearly referable to *A. arunachalensis*, but I was unable to find any distinct differences between material identified as *A. mangois* from the Brahmaputra River drainage and both the original description of *A. arunachalensis*, and the photograph of this species provided in Nath & Dey (2000). Both *A. arunachalensis* and *A. mangois* share a caudal fin with greatly unequal lobes, with the upper lobe much longer than the lower (upper lobe about 1.5 times length of lower). This character is otherwise only seen in *A. tenuispinis*, another Indian species, but both *A. arunachalensis* and *A. mangois* have deeper bodies than *A. tenuispinis* (11.9–13.5% SL for *A. mangois* vs. 9.7–11.6 for *A. tenuispinis*). The body depth of *A. arunachalensis* is 15.6–16.0% SL as calculated from data in the original description (which is unusually high for *Amblyceps* species, as all other congeners have body depths under 15% SL), but is only 13.6% SL as calculated from the illustration in the original description and 12.4% SL as calculated from the illustration in Nath & Dey (2000). Given the probable inaccuracy of the data in the original description and the overall similarity in physiognomy of the two nominal species (comparing *A. mangois* with the photographs of *A. arunachalensis* in Nath & Dey, 2000), *A. arunachalensis* is here considered a junior synonym of *A. mangois*.

*Amblyceps mucronatum* has been previously reported from the Mekong and the Salween River drainages (Ng & Kottelat, 2000), and the occurrence of this species in the Irrawaddy River drainage is reported for the first time in this study. Given that the freshwater fish fauna of the Irrawaddy River drainage is much more similar to that of the Ganges-Brahmaputra system than it is to the Mekong River drainage

(in which the type locality of *A. mucronatum* is located) (Rainboth, 1991; 1996), this pattern of distribution is unusual. It is possible that the populations of *A. mucronatum* in the Mekong, Salween and Irrawaddy River drainages represent more than one species, but I was unable to find distinct characters to separate the populations. A thorough study with more material is necessary to completely resolve this question and until such a study is possible, I consider the Mekong, Salween and Irrawaddy populations of *A. mucronatum* conspecific for the time being.

**Comparative material.** – *Amblyceps mangois*: UMMZ 2445888, 1 ex., 29.4 mm SL, India: West Bengal, Dolong River in the vicinity of Shildanga, 26°23'13.0"N 89°14'31.0"E; UMMZ 244680, 3 ex., 17.2–30.0 mm SL, India: West Bengal, Schutunga River at Ansole, 26°22'24.0"N 89°11'17.0"E; UMMZ 244752, 8 ex., 28.8–47.1 mm SL, West Bengal, Raidak I River at Shipra, just outside Buxa Tiger Reserve, 26°31'12.0"N 88°42'32.0"E; UMMZ 244760, 10 ex., 26.6–51.3 mm SL, India: West Bengal, Jorai and Raidak I Rivers, 26°31'N 89°47'E; UMMZ 244866, 15 ex., 29.0–43.0 mm SL, India: West Bengal, Tista River at Tista Barrage, 26°45'10.0"N 88°34'11.0"E.

*Amblyceps laticeps*: UMMZ 208806, 15 ex., 17.5–42.1 mm SL, Bangladesh: Chittagong, Sylhet district, Piyain Gang River at Songram Punji, 400 m downstream of Indian border, 25°11'N 92°1'E; UMMZ 244765, 1 ex., 41.5 mm SL, India: West Bengal, market at Barobisha, 26°40'N 89°40'E; UMMZ 244865, 1 ex., 37.6 mm SL, India: West Bengal, Tista River at Tista Barrage, 26°45'10.0"N 88°34'11.0"E.

*Amblyceps caecutiens*: ZRC 43717, 4 ex., 39.2–56.3 mm SL, Myanmar: Bago.

*Amblyceps tenuispinis*: ZRC 1563, 6 ex., 46.5–62.1 mm SL, India: Uttar Pradesh, Naini Tal district, Gola River at Kathgodam.

*Amblyceps murraystuarti*: ZSI F9736/1, holotype, 72.4 mm SL, Myanmar: Putao plains; NRM 40944, 5 ex., 90.8–128.3 mm SL, Myanmar: Kachin, Ma Kyaw Wa Chaung and its tributary Nan Hto Chaung in Putao, 27°19'44.0"N 97°22'36.0"E; UMMZ 245489, 6 ex., 34.4–81.9 mm SL, Myanmar: Kachin, Myitkyina district, hillstreams at Tonpan village, on road from Myitkyina to Tanai.

*Amblyceps apangi*: BMNH 1932.4.22.2–5, 3 ex., 28.1–30.8 mm SL; RMNH 16093, 2 ex., 38.6–51.6 mm SL, India: West Bengal, Sevoke stream, Tista Valley; CAS-SU 69784, 1 ex., 42.8 mm SL, India: West Bengal, Kalimpong Duars and Siliguri Terai; UMMZ 244754, 7 ex., 27.8–81.0 mm SL,

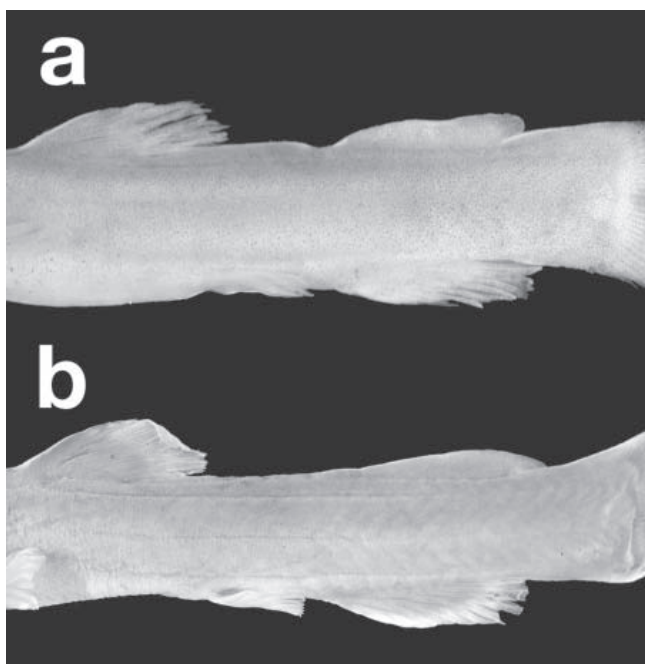


Fig. 5. Adipose fins of *Amblyceps mangois*: a. UMMZ 244680, 17.2 mm SL and b. UMMZ 244760, 50.8 mm SL, showing little change in relative length and general shape.



Fig. 6. *Amblyceps apangi*, UMMZ 244754, 44.6 mm SL, India: West Bengal, Raidak I River at Shipra.

India: West Bengal, Raidak I River at Shipra, just outside Buxa Tiger Reserve, 26°31'12.0"N 88°42'32.0"E.

*Amblyceps foratum*: ZRC 43718, holotype, 63.9 mm SL; ZRC 38733, 14 paratypes, 19.8–54.1 mm SL, Malaysia: Terengganu, Sungai Brang just outside Sekayu waterfall park, 4°57'51.0"N 102°57'46.0"E.

*Amblyceps mucronatum*: ZRC 41323, holotype, 42.9 mm SL, Thailand: Loei, Huang River tributary at 17°16'0.9"N 101°8'29.2"E; CMK 5027, 4 paratypes, 45.3–56.0 mm SL, Thailand: Loei, Nam Man, 2 km upstream of Amphoe Dan Sai, 17°16'N 101°9'E; CMK 5539, 1 paratype, 72.9 mm SL, Thailand: Tak, Huay Khokhe, approximately 6 km S of 60 km mark on Tak–Mae Sot highway; CMK 14667, 1 paratype, 61.0 mm SL, Thailand: Tak, Mae Nam Charao at and upstream of Ban Makhom Porn, 16°58'33.0"N 98°39'4.0"E; UMMZ 245497, 11 ex., 41.2–66.5 mm SL; Myanmar: Yangon, lower Kanazou Njaun Chaung, tributary of Ngamoyeik Chaung, at Gyongon village, 27 km from Hlegu on Yangon–Bago road.

*Amblyceps platycephalus*: ZRC 42745, holotype, 60.2 mm SL, Thailand: Mae Hong Son, Nam Mae Sa-Nga at Ban Yang Top Sole, immediately downstream of Nam Tok Pa Sua, 19°29'0.0"N 97°57'50.0"E.

*Amblyceps serratum*: UMMZ 234708, holotype, 35.5 mm SL, Cambodia: Stung Treng, shallow channel across S end of Kaoh Han, 14 km NE of Stung Treng, 13°37'N 106°3'E; UMMZ 235399, 1 ex., 43.4 mm SL, Laos: Champasak, Mekong River at Ban Hang Khone, just downstream of Khone Falls; UMMZ 238843, 1 ex., 36.0 mm SL, Laos: Attapeu, Xe Kamen at crossing on road to Pleiku, 14°54'N 107°9'E; UMMZ 240006, 1 ex., 38.7 mm SL, Laos: Vientiane, Nam

Po mouth at confluence Nam Xone, 18°58'N 102°28'E.

*Amblyceps variegatum*: ZRC 43719, holotype, 62.9 mm SL; CMK 14560, 8 paratypes, 43.5–60.9 mm SL, Thailand: Kanchanaburi, Nam Kung, upstream of Ban Huai Pak Khung, 14°37'20.0"N 98°31'24.0"E.

*Amblyceps macropterus*: UMMZ 187411, holotype, 47.4 mm SL, Pakistan: Baluchistan, Las Bela district, Hab River at Hinidan.

#### ACKNOWLEDGMENTS

I am grateful to Tin Win for help in obtaining material and the following for permission to examine material under their care: Darrell Siebert (BMNH), David Catania (CAS), Maurice Kottelat (CMK), Sven Kullander (NRM), Martien van Oijen (RMNH), Douglas Nelson (UMMZ), Kelvin Lim (ZRC) and A. K. Karmakar (ZSI). Funding from the Carl L. and Laura C. Hubbs Research Fellowship from the Museum of Zoology, University of Michigan and the All Catfish Species Inventory (NSF DEB-0315963) are gratefully acknowledged.

#### LITERATURE CITED

- Blyth, E., 1858. Report of Curator, Zoological Department, for May, 1858. *Journal of the Asiatic Society of Bengal*, **27**: 267–290.
- Blyth, E., 1860. Report on some fishes received chiefly from the Sitang River and its tributary streams, Tenasserim Provinces. *Journal of the Asiatic Society of Bengal*, **27**: 138–174.
- Chaudhuri, B. L., 1919. Report on a small collection of fish from Putao (Hkamti Long) on the northern frontier of Burma. *Records of the Indian Museum*, **16**: 271–287, Pl. 22.

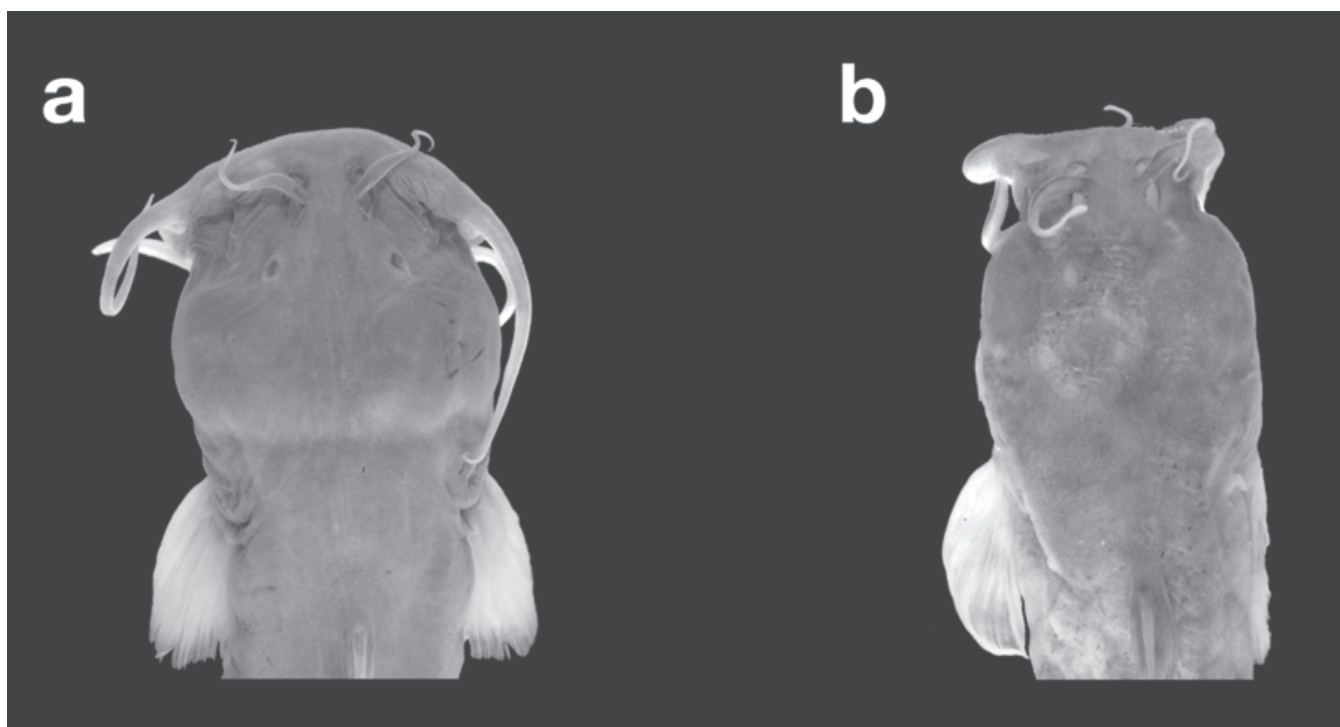


Fig. 7. Dorsal views of heads of: a. *Amblyceps apangi*, UMMZ 244754, 81.0 mm SL; b. *A. murraystuarti*, UMMZ 245489, 81.1 mm SL.

- Chen, X.-P. & J. G. Lundberg, 1995. *Xiurenbagrus*, a new genus of amblycipitid catfishes (Teleostei: Siluriformes), and phylogenetic relationships among the genera of Amblycipitidae. *Copeia*, **1995**(4): 780–800.
- dos Santos, J. E., N. Bazzoli, E. Rizzo & G. B. Santos, 2004. Reproduction of the catfish *Iheringichthys labrosus* (Lütken) (Pisces, Siluriformes) in Furnas reservoir, Minas Gerais, Brazil. *Revista Brasileira de Zoologia*, **21**: 193–200.
- Eschmeyer, W. N., 1998. *Catalog of Fishes*. California Academy of Sciences, San Francisco. 2905 pp.
- Hamilton, F., 1822. *An account of the fishes found in the river Ganges and its branches*. Archibald Constable, Edinburgh and Hurst, Robinson, London. 405 pp.
- M'Clelland, J., 1842. On the fresh-water fishes collected by William Griffith, Esq., F. L. S. Madras Medical Service, during his travels under the orders of the Supreme Government of India, from 1835 to 1842. *Calcutta Journal of Natural History*, **2**: 560–589, Pls. 15, 18, 20, 21.
- Nath, P. & S. C. Dey, 1989. Two new fish species of the genus *Amblyceps* Blyth from Arunachal Pradesh, India. *Journal of the Assam Science Society*, **32**: 1–6.
- Nath, P. & S. C. Dey, 2000. *Fish and Fisheries of North Eastern India (Arunachal Pradesh)*. Narendra Publishing House, Delhi. 217 pp.
- Ng, H. H., 2001. *Amblyceps macropterus*, a new species of amblycipitid catfish (Osteichthyes: Amblycipitidae) from Pakistan. *Ichthyological Exploration of Freshwaters*, **12**: 201–204.
- Ng, H. H. & M. Kottelat, 2000. A review of the genus *Amblyceps* (Osteichthyes: Amblycipitidae) in Indochina, with descriptions of five new species. *Ichthyological Exploration of Freshwaters*, **11**: 335–348.
- Rainboth, W. J., 1991. Cyprinid fishes of Southeast Asia. In: Winfield, I. & J. S. Nelson (eds.) *Cyprinid fishes: systematics, biology and exploitation*. Chapman & Hall, London. Pp. 156–210.
- Rainboth, W. J., 1996. The taxonomy, systematics, and zoogeography of *Hypsibarbus*, a new genus of large barbs (Pisces, Cyprinidae) from the rivers of southeastern Asia. *University of California Publications in Zoology*, **129**: 1–199.