SILUROID FISHES OF INDIA, BURMA AND CEYLON.

1. Loach-like Fishes of the genus *Amblyceps* Blyth.

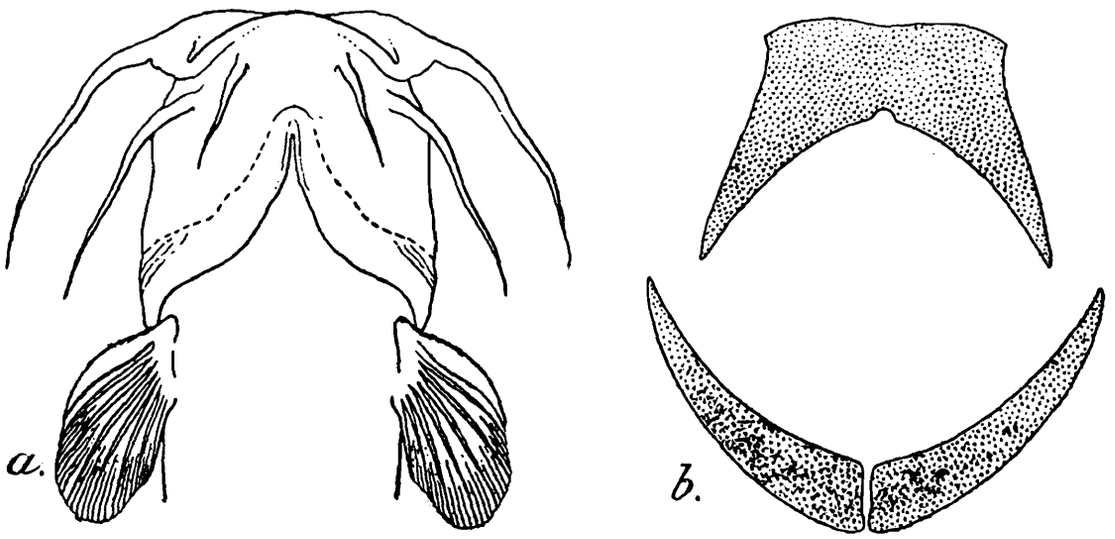
By Sunder Lal Hora, *D. Sc., F.A.S.B., F.R.S.E., Assistant Superintendent, Zoological Survey of India, Calcutta.*

Contents.

Definition.

The genus *Amblyceps* comprises small "Cobitis-like Siluroid" fishes in which the body is long, slender and compressed except in the region in front of the ventrals where the lower surface is flattened. The head is broad and depressed with the anterior end somewhat rounded or truncate. The head is greatly swollen in the region of the opercular chambers. The eyes are small, superior and subcutaneous. The nostrils are situated close together; the anterior nostril is rounded and its edges are raised to form a short tube; the posterior nostril is oval and is surrounded by a cutaneous flap which is produced into a prominent nasal barbel anteriorly. The two nostrils appear to be separated superficially by the nasal barbel. The mouth is wide and transverse. The jaws are subequal, either the upper or the lower being slightly longer than the other. The lips are continuous and surround the gape of the mouth; both the lips are slightly fimbriated and are thrown into a fold at each corner of the mouth (fig. 1*a*). The maxillary barbels are slightly shorter than the head and are provided with broad bases. There are 2 mandibular and 2 mental barbels. In the upper jaw there is a broad band of small, villiform teeth (fig. 1*b*) produced at the sides. In the lower jaw there is a similar, but narrow band which is interrupted in the middle. There are no teeth on the palate. The gill-openings are very wide extending forwards for a considerable distance on the ventral surface; in young specimens the notch extends as far forwards as the chin (fig. 1*a*). The gill-membranes are very extensive and are united to each other across the isthmus; they are supported by a well-developed hyoid arch and 12 long and strong branchiostegal rays (fig. 2*b*, *b. o.*). Above and anterior to the base of the pectoral fin and immediately behind the gill-opening is a prominent fold of skin on which the gill-membrane rests when the opening is closed. The ventral surface in the thoracic region is devoid of any adhesive apparatus. The anterior

dorsal fin is situated very far forwards, almost above the pectoral fin; it is enveloped in a thick skin and is provided with one soft spine and 5-6 rays. The adipose dorsal is low, and its length is variable. The



TEXT.-FIG. 1.—*Amblyceps mangois* (Ham. Buch.).
a. Ventral surface of head and anterior part of body × 3; *b*. Tooth-bands × 4½.

paired fins are small, horizontally placed and enveloped in skin. The pectoral fin contains about 8 rays; the outermost ray is soft and broad, and is produced along its anterior border into a number of soft, long cartilaginous processes which run along the length of the ray. This ray is thus composed of several longitudinal strands. The ventral fin possesses one spine and five rays; it is separated from the anal fin by a considerable distance. The anal fin is also enveloped in skin and contains 9 to 12 rays of which 2 to 3 may be soft spines. The caudal fin is either sub-rounded, truncate, slightly emarginate or deeply furcate (fig. 5). The anal opening is situated in a pit between the ventral fins. The lateral line is entirely absent. The air-bladder is greatly reduced and is divided into two lateral chambers (fig. 2*a*) which are partially enclosed in bone.

Type-species.—*Amblyceps mangois* (Ham. Buch.)

HISTORY.

The genus *Amblyceps* was erected by Blyth [1] to accommodate the species—*A. caecutiens* [2] Blyth—from Maulmein in 1858. He pointed out its close affinity to *Olyra* McClelland,[3] but distinguished it by "the head much broader and flatter, with minute eyes, placed near the hind aperature of the nostril; two pairs of cirri above and below, the inner

[1] Blyth, *Proc. As. Soc. Bengal*, XXVII, p. 281 (1858).

[2] In the old register (Catalogue of Fish) containing a list of specimens transferred from the Asiatic Society of Bengal to the Indian Museum, there is an entry under number 587 which shows that two specimens of *Amblyceps caecutiens* Blyth were received in the collection. The locality given is "Andamans," and the name of the donor is not mentioned. Though this entry was transferred to the New Registers under numbers F. $\frac{9814\text{-}15}{1}$, unfortunately the specimens cannot be traced now in the collection. The species is not found in the Andamans, and there is no doubt that the mistake is due to the wrong labelling of the specimens. On the other hand, it seems probable that these were the type-specimens which were obtained at Maulmein.

[3] McClelland, *Calcutta Journ. Nat. Hist.*, II, p. 588 (1842).

above situate between the fore and hind apertures of the nostrils; pectoral and dorsal spines short and concealed, but comparatively robust; the second or adipose dorsal short and low; and the ventrals and anal also short; tail large and moderately furcate; a band of card-like teeth above and below, but no palatal band discernible in the specimens; body subcylindrical, compressed, becoming more so to the tail." Two years later Blyth [1] assigned *Pimelodus mangois* Ham. Buch.[2] to *Amblyceps* and remarked that " the form is rather less elongated, the tail more sharply formed, the eyes (to judge from the drawing) more distinct and the adipose dorsal better defined and less distinct from the first dorsal than in *A. caecutiens*." At the same time he described another species—*A. tenuispinis*—from Ghazipur which he distinguished " by the slenderness of its short dorsal and pectoral spines, and also by the fineness of its eight cirri." He also amplified the definition of the genus by pointing out that " the lateral line wanting in all the species." Günther[3], when writing his *Catalogue*, had no specimen of the genus, and, therefore, his characterization was based on Blyth's definition. Later in 1892, Günther [4] described a species of *Amblyceps* from the Min River, Province Sze-Chwan, China, with a subtruncate caudal fin; but this has been referred by Regan [5] to *Liobagrus*. After an examination of abundant material Day [6] was led to conclude that there was only one species of the genus *Amblyceps* in India and Burma. He was, however, aware of the great variations exhibited by this fish. All the same he characterized the genus as having a " forked caudal." Chaudhuri [7] in describing *A. murray-stuarti* emended the definition of the genus to include species with a truncate caudal fin and an adhesive thoracic surface. The adhesive folds of skin referred to by Chaudhuri in *A. murray-stuarti* are an artifact. The folds represent shrunken muscles and loose skin in the thoracic region. In *Amblyceps* there is no adhesive apparatus. Prashad and Mukerji [8] further emended the definition of the genus *Ambylceps* to accommodate *A. horae*, which on examination has been found to be a species of *Olyra* McClelland. Wu [9] has recently described *A. marginatoides* from Sze-Chwan which, like its close ally *A. marginatus* Günther, may be a species of *Liobagrus*. Smith [10] has extended the range of *A. mangois* to Siam where it has been taken in widely separated places and will no doubt be found in suitable waters all over the country. I have collected a large number of specimens of *Amblyceps* in Sevoke River at the base of the Darjeeling Himalayas. These specimens exhibit considerable variation in the form of the caudal fin, the extent of the adipose dorsal, the form of the body, etc., etc. In spite of these differences, I am of opinion, and in this I agree with

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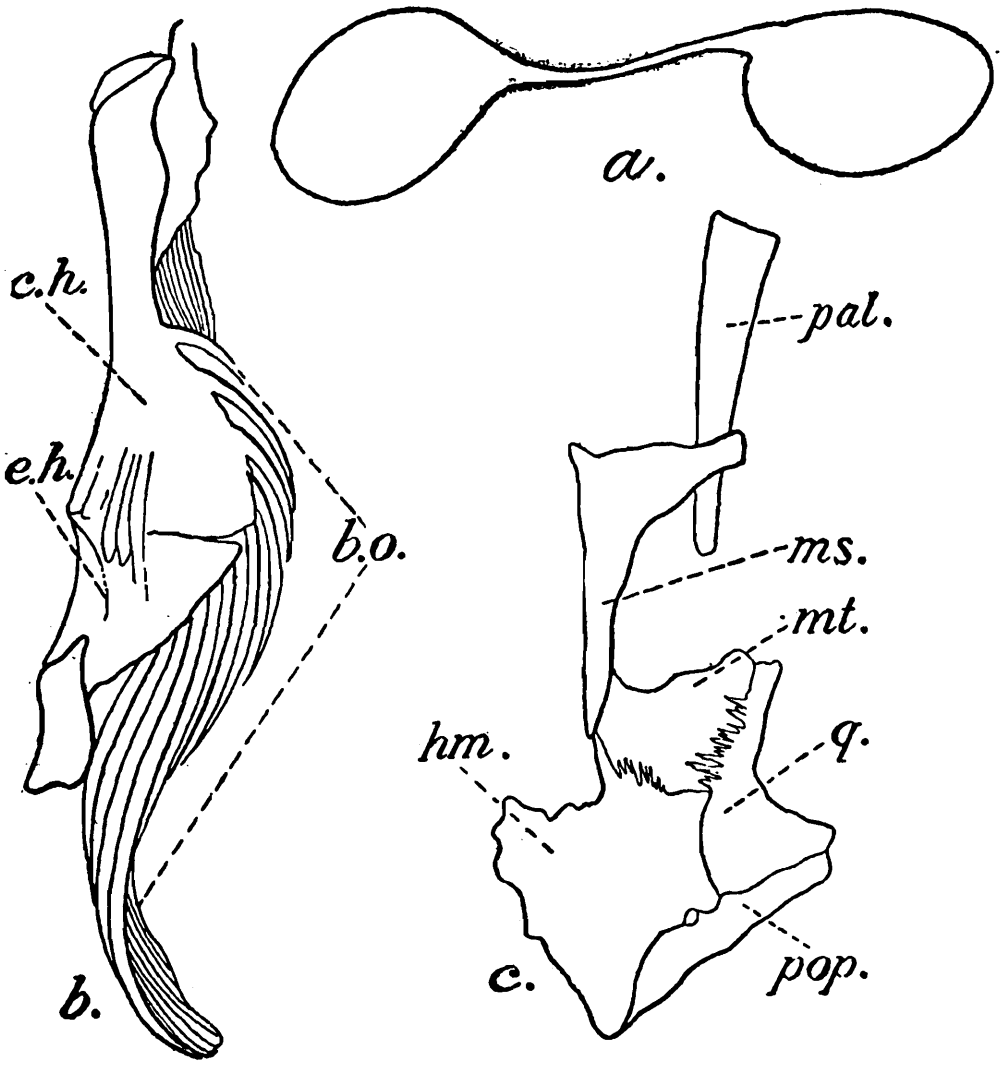
[1] Blyth, *Journ. & Proc. As. Soc., Bengal*, XXIX, p. 153 (1860).
[2] Hamilton-Buchanan's drawing of *Pimelodus mangois* was reproduced by me in *Mem. Ind. Mus.*, pl. xxii, fig. 4 (1929).
[3] Günther, *Cat. Fish. Brit. Mus.*, V, p. 190 (1864).
[4] Günther, in Pratt's *Snows of Tibet*, p. 245 (1892).
[5] Regan, *Ann. Mag. Nat. Hist.*, (7) XIII, p. 193 (1904).
[6] Day, *Proc. Zool. Soc. London*, p. 524 (1869); *Fish India*, p. 490 (1878).
[7] Chaudhuri, *Rec. Ind. Mus.*, XVI, p. 273 (1919).
[8] Prashad & Mukerji, *Rec. Ind., Mus.*, XXXI, pp. 172, 173 (1929).
[9] Wu, *Bull. Mus. Paris* (2) II, p. 256 (1930).
[10] Smith, *Journ. Siam Soc., Nat. Hist. Suppl.*, VIII, p. 180 (1931).

Day, that there is only one species of the genus and that the divergent forms probably represent the habitat varieties of the species *A. mangois* (Ham. Buch.).

Griffith [1] remarked that a loach-like *Silurus* is not uncommon about Julraiz in Afghanistan. I[2] have indicated that in this record reference is made to *Glyptosternum reticulatum*; but Day [3] doubtfully considered this loach-like *Silururs* to be an *Amblyceps*. So far as I am aware *Amblyceps* has never been definitely recorded from any place west of the Kangra Valley.

RELATIONSHIPS.

According to Regan [4] *Amblyceps* belongs to the family Amblycepidae which, in its external characters as well as in its osteology, bears a general resemblance to the Bagridae. It possesses certain features of specialisation (fig. 2*c*). "The pterygoid is absent, the metapterygoid is reduced,



TEXT-FIG. 2.—*Amblyceps mangois* (Ham. Buch.).

a. Greatly reduced air-bladder × 15; *b*. Bony support of the extensive gills-membrane × 7; *c*. Hyopalatine arch × 7.

b. *o.*=branchiostegals; *c*. *h.*=ceratohyal; *e*. *h.*=epihyal; *hm*=hyomandibular; *ms*=mesopterygoid; *mt* = metapterygoid; *pal*=palatine; *pop*= praeoperculum; *q*=quadrate.

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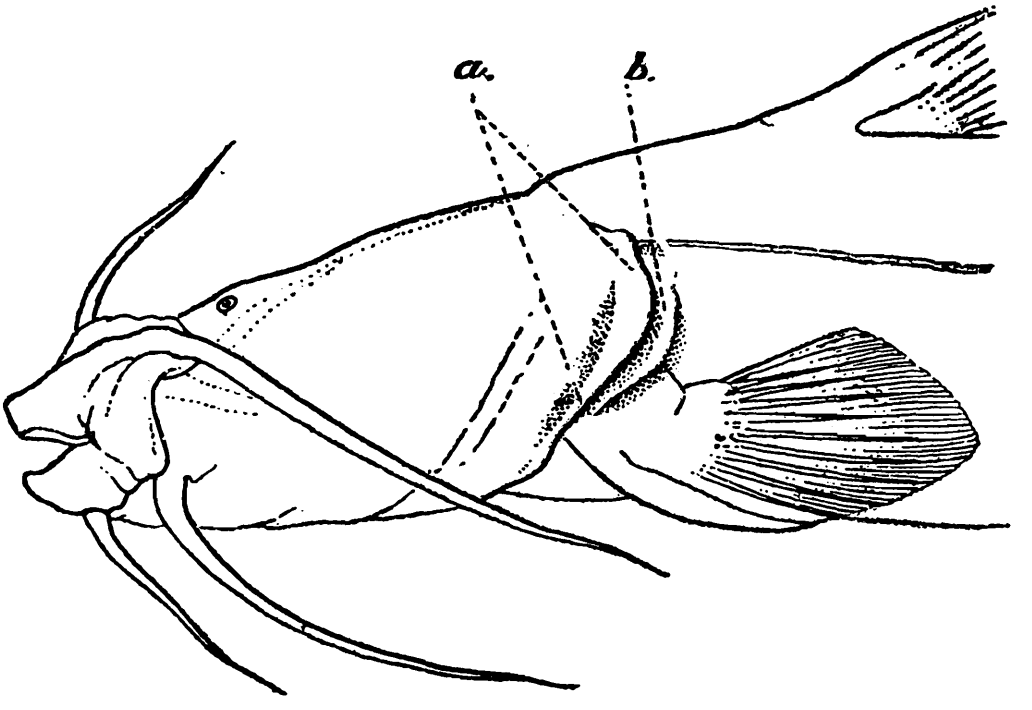
[1] Griffith, *Calcutta Journ. Nat. Hist.*, II, p. 564 (1842).
[2] Hora, *Ann. Mag. Nat. Hist.* (10)X, p. 177 (1932).
[3] Day, Ichthyology, *Sci. Res. 2nd Yarkand Miss.*, p. 19, foot-note (1878).
[4] Regan, *Ann. Mag. Nat. Hist.* (8) VIII, p. 562 (1911).

and the elongate mesopterygoid extends from the palatine to the hyomandibular. There is no post-temporal and the proximal end of the upper limb of the supra-cleithrum is wedged in between pterotic and epiotic. The parapophyses of the fourth vertebra form on each side a semicylinder incomplete below, or an inverted cup, partly enclosing the reduced air-bladder, which is divided into two lateral sacs." Besides *Amblyceps* this family includes *Liobagrus*, *Akysis* (*Sosia*) and *Acrochordonichthys*. All these fishes are of small size and inhabit the fresh waters of Asia. Chaudhuri (*op. cit.*) included a heterogenous assemblage of genera, including *Amblyceps*, in the family Sisoridae without giving any reason except perhaps that his Sisoridae " consists of small cat-fishes found in swift mountain streams in Northern India, Burma, Tibet and China." Different forms living under similar conditions become modified in a similar way, but this superficial likeness, though confusing at times, does not indicate genetic affinities of the various units. Jordan [1] included *Amblyceps* in his family Amblycipitidae with three other genera, *Acrochordonichthys*, *Akysis* and *Sosia*. *Liobagrus*, which is very closely related to *Amblyceps*, has been placed by Jordan in Bagridae. According to Regan [2] " *Amblyceps* is distinguished from *Liobagrus* by the nostrils, which are close together instead of well separated, and by the forked caudal." Having observed very extensive variations in the form



TEXT-FIG. 3.—Lateral view of head and anterior part of body of *Amblyceps mangois* (Ham. Buch.).

a=opercular flap ; *b*=flap of skin behind gill-opening and in front of base of pectoral.

of the caudal fin of *Amblyceps mangois*, I requested Mr. J. R. Norman to send me a specimen of *Liobagrus* for study. He sent a specimen of *L. nigricauda* Regan and taking this species as a typical member of the genus I find that as compared with *Amblyceps*, fishes of the genus *Liobagrus* are more stoutly built and possess much broader and rounded head.

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[1] Jordan, *Classification of Fishes*, p. 148 (1923).
[2] Regan, *Ann. Mag. Nat. Hist.* (7), XIII, p. 193 (1904).

In *Liobagrus* the nostrils are situated distinctly apart and the ventrals are not very far removed from the anal. The most remarkable feature, however, is the absence in *Liobagrus* of the skin-flaps (fig. 3, *b*) which are found behind the gill-opening in *Amblyceps* (for function see p. 615).

A few specimens of *Amblyceps* were also sent to Mr. J. R. Norman for comparison with the material of *Liobagrus* in the collection of the British Museum. He did not have sufficient time to go into the matter thoroughly, and, therefore, he was unable to give a definite opinion. He has, however, given a tentative opinion, and as this agrees with that expressed above, I take the liberty to reproduce here a passage from his letter. He says: "I have examined the following species of *Liobagrus*:—*nigricauda*, Regan; *reini*, Hilgendorf; *sugubii*, Regan; *andersonii*, Regan; and *formosanus*, Regan; as well as *Liobagrus* or *Amblyceps marginatus*, Günther. I agree that on the whole the species of *Liobagrus* are more stoutly built and possess a broader and more rounded head than *Amblyceps*. The nostrils vary among the different species of *Liobagrus*, but are certainly never quite so close together as in *Amblyceps*. The position of the vent and pelvic fins with regard to the anal fin appears to be variable, and I should be disinclined to place much reliance on this character Finally, I am unable to find any trace of the skin-flaps in any species of *Liobagrus*, but this is also wanting in the type of *Amblyceps marginatus*, which ought, therefore, to be a *Liobagrus*. It certainly looks rather like one. I am a bit doubtful about the distinction of two genera, but the skin-flaps seem to be a reliable character."

From what has been stated above it is clear that Regan has expressed the relationships of the genus *Amblyceps* more correctly than any other ichthyologist who has referred to these fishes.

HABITAT AND BIONOMICS.

I have indicated above that there is only one species of the genus *Amblyceps*. It was described by Francis Hamilton (once Buchanan) [1] as *Pimelodus mangois* from "the tanks of Northern Behar." In the 'Original Notes' concerning "Gangetic Fishes" the description of the species is dated "Nathpur 26th April 1809," and the habitat given is "Habitat in stagnis methile borealis." In 1809, Nathpur was a large trading village which lay some miles to the west of the river Kosi, and was situated in the extreme north-east of the present district of Bhagalpur close to the boundary of Purnea. In 1875, the town of Nathpur was completely swept away by the violence and destructive power of the Kosi River during heavy floods. It is thus clear that Nathpur was situated in the sub-Himalayan tract where it was subject to heavy floods. In these circumstances it seems likely that the ponds and tanks in the neighbourhood of the town received elements of mountainous fish-fauna during floods. It is also probable that towards the end of April, when the weather is usually hot and dry, certain small channels in the course of the River Kosi were cut up into a series of pools, and that Buchanan may have collected his specimens of *Pimelodus mangois* in

[1] Hamilton, *Fish. Ganges*, p. 200 (1822).

such situations. Day [1] had specimens of *Amblyceps mangois* from Kangra in the Western Himalayas and Darjeeling in the Eastern Himalayas. Smith has collected a large number of specimens in Siam from mountain streams (see addendum). These, as well as other records, from India and Burma show that the fish is restricted throughout its extensive range to the bases of the hills, and has nowhere been found either in the plains or at very high altitudes. I have studied this fish in its natural haunts in the Sevoke Stream at the base of the Darjeeling Himalayas whence a large series of specimens was collected. The Sevoke Stream near Sevoke in the Teesta Valley is a shallow brook with a pebbly bed and clear, rapid-flowing water. Besides the main stream, the brook consists of a series of small channels which are liable to dry up during the hot and dry months. *Amblyceps*, a small, elongated and slimy fish, was found living at the bottom of the stream among stones and pebbles. When a portion of a small channel was artificially drained dry by making a dam across it, several specimens of *Amblyceps* were observed to crawl with great agility over wet stones and to seek shelter in holes and crevices among pebbles and stones. Like loaches of the genus *Nemachilus*, which frequent a similar habitat, they are rather difficult to get at. Moreover, their dark-reddish colour harmonises with stones, and until they wriggle about it is difficult to locate them. *Amblyceps*, no doubt, uses its small paired fins and flat belly for clinging purposes, but during progression it wriggles like an eel, and its muscular body and well-developed tail seem to be well adapted for this purpose. I have not observed this fish crawling on the exposed surfaces of rocks in swift currents, and, in the absence of any special adhesive devices, it is probable that it is incapable of doing so.

It is seen from the above that the hill-streams, in which *Amblyceps* is found, are subject to great rise and fall in the quantity of water they carry. These are liable either to break up into a series of pools and puddles that may dry up altogether or to become rapid torrents after a single heavy shower. The torrential condition of the streams does not affect *Amblyceps* to any appreciable extent, as the fish lives at the bottom among pebbles where the swiftness of the current is a negligible factor.[2] But when the waters begin to dry up a really critical condition arises for the fish, for it must protect itself against partial or complete desiccation for shorter or longer periods. At such times its habit of wriggling about and seeking narrow crevices is certainly very useful, as the fish in these places finds not only shelter but much needed moisture. It is also possible, though no direct observations exist on this point, that at night when the temperature is comparatively lower and the rocks are wet with dew drops this species wanders about and seeks pools and puddles in the course of the drying-up stream. Such peregrinations are made possible by the fact that *Amblyceps mangois*, as observed by

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[1] Day, *Fish. India*, p. 491 (1878). Through the kindness of Mr. Hamid Khan of the Department of Fisheries, Punjab, I have examined three small and partially desiccated specimens of *Amblyceps mangois* from Madhopur in the Kangra Valley.

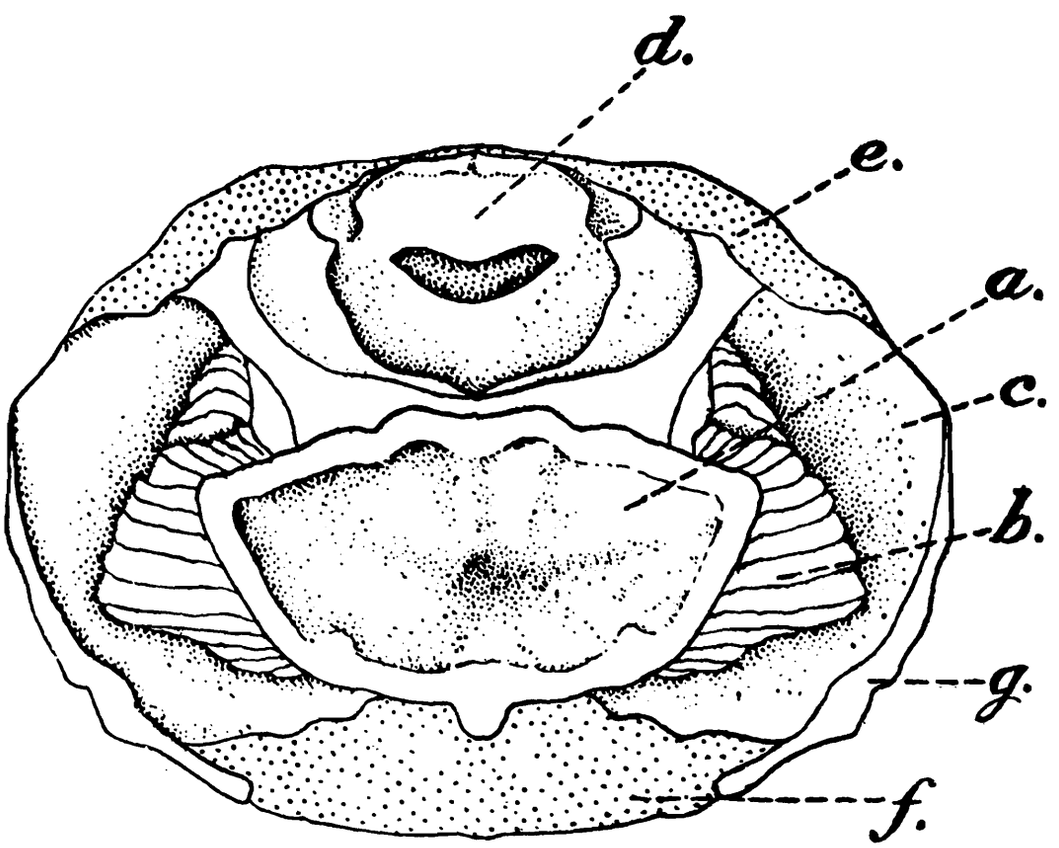
[2] Hora, *Phil. Trans. Roy. Soc., London* (B), CCXVIII, p. 175 (1930).

Day [1], is capable of living "for some time after its removal from the water."

In order to test the tenacity of life in *Amblyceps*, four young specimens were kept in a small dish at 10 A.M. It was found that for 2 hours they were quite active, but about 1 P.M. they responded only to violent stimulation. I believe, these specimens died of desiccation, and had they been kept moist they would have undoubtedly lived for a much longer time. It appears to me probable that, in such circumstances, oxygenations of the blood goes on through the skin, which is very thin and is of a reddish colour in living specimens.

A few specimens were placed in water, from which air had been expelled by boiling. They lay quietly at the bottom and made no effort to come to the surface. Their activity was retarded, but they continued to respire. It is quite probable that the water received certain amount of oxygen from the blood of the fish through osmosis but I regret that I was unable to determine this point in the field.

The opercular chambers are large and distended outwards; they contain empty spaces in which water or air could be stored for respiration. The walls of these chambers are highly vascular, but the observations made so far do not indicate as to how they assist in respiration—



TEXT-FIG. 4.—A vertical transverse section through the middle of the opercular-chamber of *Amblyceps mangois* (Ham. Buch.) × 16.

a=alimentary canal; *b*=gills; *c*=pouch of the gill-cover; *d*=brain; *e*=dorsal muscle; *f*=ventral muscle; *g*=operculum.

perhaps when the fish suspends respiration for a short time, water is retained in the opercular chambers and slow respiration goes on.

Aquatic Respiration.—During a visit to Sevoke in March 1932, Mr. D. D. Mukerji made observations on the mechanism of respiration

[1] Day, *Fish. India.*, p. 492 (1878).

in *Amblyceps*. He noticed that during respiration the fish keeps its mouth wide open and the maxillary barbels directed forwards. The floor of the mouth moves up and down in quick succession ; the portion of the gill-membrane dorsal to the pectoral fin flaps vigorously against the fold of skin developed above and anterior to the base of the pectoral fin. After this short period of breathing, the fish closes its mouth, the movements of the gill-membranes as well as of the floor of the buccal cavity cease and the upper and lower membranous flaps by resting against one another close the gill-openings. The fish now lies quietly for some time—1 to 4 minutes—after which respiratory movements are again started. It was further observed by Mr. Mukerji that during respiration the throat as well as the neighbouring region of the branchiostegal membranes assume a distinctly red colour, and a large number of small blood-vessels can be seen through the transparent skin. This shows that so long as respiration lasts. this region of the body is gorged with blood.

Mr. Mukerji's observations show that the mechanism of respiration in *Amblyceps* is similar to that described by me [1] in the case of other hill-stream fishes such as *Garra*, *Glyptothorax*, *Pseudecheneis*, *Balitora* and *Loricaria*. The essential features of this machanism are (i) the mouth is kept open throughout the actual period of respiratory movements, (ii) only a portion of the gill-opening is used for the exit of the expiratory current and (iii) the respiratory current is initiated and carried on by a small, specially developed portion of the gill-membrane which beats vigorously. Such a mechanism of respiration is totally different from the normal mode of breathing in a fish.[2] Another point of interest in the case of most of the hill-stream fishes is that they suspend their respiratory movements for a shorter or a longer period. During this period of rest probably a quantity of the highly oxygenated water is retained in the gill-chamber, and I believe a slow absorption of oxygen is carried on all the time through the gill-filaments and walls of the opercular cavities. As an adaptation for the retention of water in the gill-chambers, the gill-openings are greatly reduced as is the case in several Homalopterid and Sisorid fishes.[3] In certain hill-stream fishes, where the gill-opening is large, as in *Glyptothorax*, only a part of the opening is used for respiratory purposes, whereas the remaining portion is kept tightly closed. In *Amblyceps* the gill-openings are wide and the gill-membranes,which are notched as far as the chin, are broad and united with each other. Such a structure does not appear to be in any way specially adapted for the retention of water inside the opercular chambers. To obviate this difficulty a fold of skin is developed behind the gill-opening which is broad and well marked above the base of the pectoral fin. So far as I am aware, this structure is found only in the genus *Amblyceps*. The fold of skin below and the gill-membrane above form the two lips of the gill-opening, and there seems no doubt that they regulate or prevent the flow of water from inside, especially

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[1] Hora, *Rec. Ind. Mus.*, XXV, pp. 591-596 (1923); *Proc. Zool. Soc., London*, pp. 205-207 (1932).

[2] Hora, *Current Science* I, p. 34 (1932).

[3] Hora, *Journ. Bombay Nat. Hist. Soc.*, XXXVI, p. 540 (1933).

as the upper portion of the gill-membrane is responsible for the respiratory current.

In April 1933, I had an opportunity of making further observations on *Amblyceps* in the Teesta Valley. When placed in water in a glass dish, the fish was noticed to be very active and restless, and made frantic efforts to seek shelter from light. The respiratory movements were very fast, and the fish always took a deep " breath " at irregular intervals. During a deep breath, the head shook and the entire gill-opening was opened for expiration. Usually only the upper part of the gill-opening functions during respiration. This can be ascertained by watching the movements of the ventral surface of the fish in a mirror [1]. The part of the gill-openings on the ventral surface opens only at the time of deep breathing. The respiratory rate varies considerably as the fish is capable of suspending respiration altogether for long periods. The following two observations on the rate of breathing were taken with the help of a stop-watch. The mark of addition (+) separating figure denotes a deep breath.

16 seconds

(i) 10 + 7 + 13 +

In 16 seconds, there were 33 respiratory movements (rate about 124 per minute), of which 3 respresented deep breaths.

28 seconds

(ii) + 7 + 14 + 10 + 11 + 7 +

In 28 seconds, there were 53 respiratory movements (rate about 113 per minute), of which 4 represented deep breaths.

PROBABLE EVOLUTION.

The above study of the structure, habitat and bionomics of *Amblyceps* indicates that this fish is very highly specialised, and in the present state of our knowledge, it is difficult to say anything regarding its ancestry. It is probable, however, that it may have developed from such Bagrid forms as *Aoria*, *Macronoides* and *Liocassis*. The fishes of the two last genera are found in the same or similar streams as are inhabited by *Amblyceps*, and it may be presumed that they are evolved from generalized and diverse members of the genus *Aoria*. The genus *Amblyceps* may also have evolved from this stock and developed independently. The most remarkable structure of *Amblyceps* is the development of the fold of skin in front of the pectoral fin referred to above. This is no doubt a special acquisition for respiration in fast currents characteristic of its natural haunts.

DESCRIPTION OF *Amblyceps mangois* (H. B.).

As has been indicated above, *Amblyceps mangois* is a very variable species and has been described under several names. In view of the abundant material now available in the collection of the Zoological

[1] For the use of the mirror see Hora, *Proc. Zool. Soc. London*, Part I, p. 205 (1932).

Survey of India, I give below a detailed description of the species indicating the great range of variation in reference to the various diagnostic characters on which species of this genus had hitherto been based.

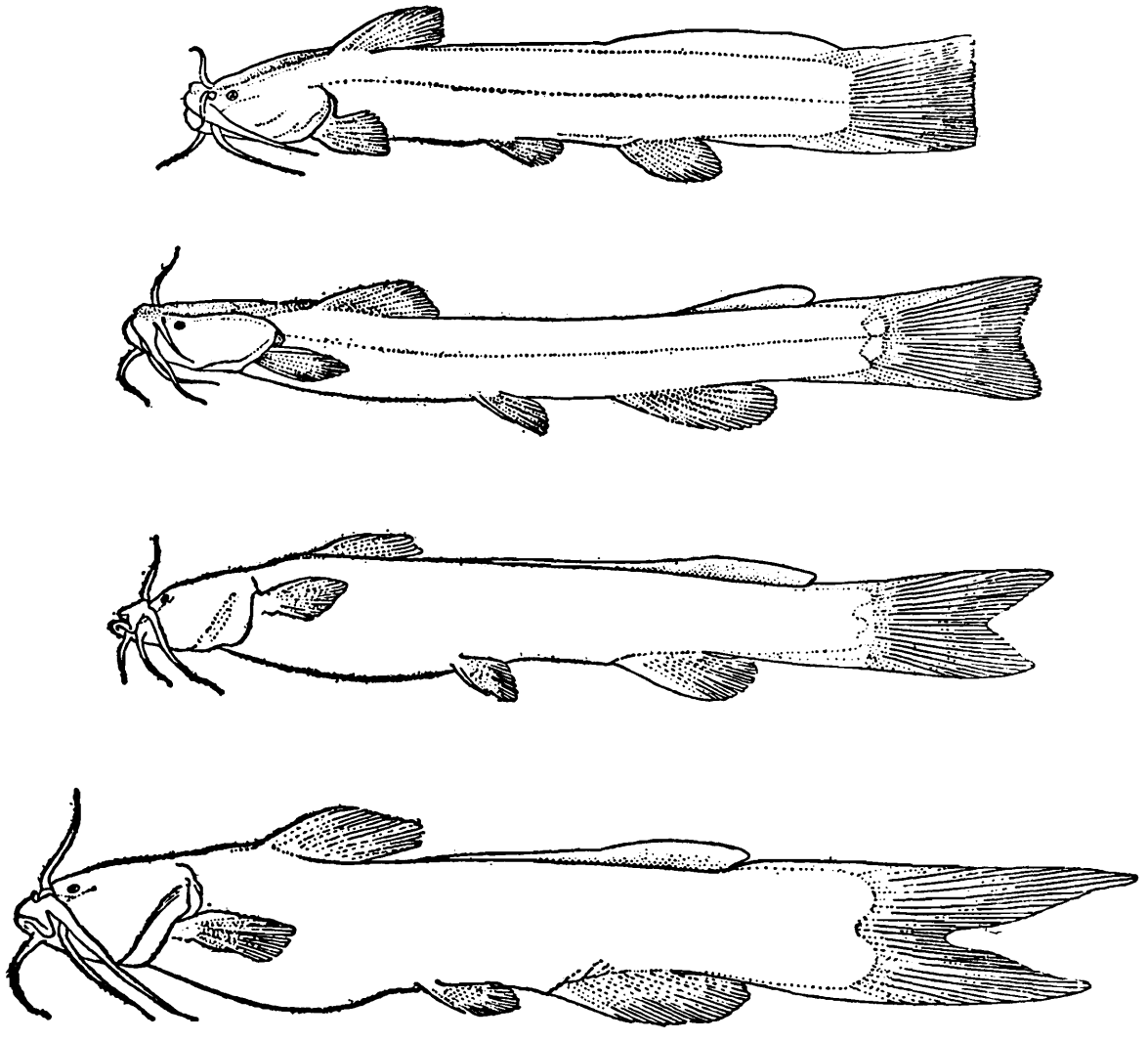
Amblyceps mangois (Ham. Buch.).

D. 1/5-6; A. 2-3/6-8; P. 1/7; V 1/5; C. 19 (excluding the smaller outer rays).

1822. *Pimelodus mangois*, Hamilton (Buchanan), *Gangetic Fishes*, pp. 199, 379.
1853. *Pimelodus mangois*, Bleeker, *Verth. Batavia Gen.*, XXV, p. 58.
1858. *Amblyceps caecutiens*, Blyth, *Proc. As. Soc., Bengal*, XXVII, p. 282.
1860. *Amblyceps mangois*, Blyth, *ibid*, XXIX, p. 153.
1860. *Amblyceps tenuispinis*, Blyth, *ibid.*, p. 153.
1864. *Amblyceps caecutiens*, Günther, *cat., Fish. Brit. Mus.*, V, p. 190.
1864. *Amblyceps tenuispinis*, Günther, *ibid.*, p. 190.
1864. *Amblyceps mangois*, Günther, *ibid.*, p. 190.
1869. *Amblycetis mangois*, Day, *Proc. Zool. Soc., London*, p. 524.
1869. *Amblycetis caecutiens*, Day, *ibid.*, p. 524.
1869. *Amblycetis tenuispinnis*, Day, *ibid.*, p. 524.
1871. *Akysis Kurzii*, Day, *ibid.*, p. 703.
1873. *Amblyceps mangois*, Day, *Rep. Fresh Water Fish & Fisheries of India & Burma*, p. cclxxv.
1873. *Amblyceps caecutiens*, Day, *ibid.*, p. cclxxv.
1877. The Mangoi, Hamilton Buchanan, in Hunter's *Stat. Account Bengal*, XX, p. 60.
1877. *Amblyceps mangois*, Day, *Fish. Ind.*, p. 490, pl. cii, fig. 6 and pl. cxv, fig. 1.
1889. *Amblyceps mangois*, Day, *Faun. Brit. Ind., Fish.*, I, p. 123, fig. 52.
1890. *Amblyceps mangois*, Vinciguerra, *Ann. Mus. Civ. Stor. Nat. Genova* (2), IX, p. 196.
1893. *Amblyceps mangois*, Boulenger, *Ann. Mag. Nat. Hist.* (6), XII, p. 200.
1893. *Amblyceps* sp. ?, Bridge and Haddon, *Phil. Trans. Roy. Soc., London* (B), CLXXXIV, p. 156.
1913. *Amblyceps mangois*, Chaudhuri, *Rec. Ind. Mus.*, VIII, p. 252.
1919. *Amblyceps murray-stuarti*, Chaudhuri, *ibid.*, p. 272, pl. xxii, figs. 1, 1a, 1b.
1919. *Amblyceps mangois*, Chaudhuri, *ibid.*, XVI, p. 275.
1929. *Pimelodus mangois*, Hora, *Mem. Ind., Mus.*, IX, p. 188, pl. xxii, fig. 4 (Hamilton Buchanan's MS. drawing of the species published).
1931. *Amblyceps mangois*, Smith, *Journ. Siam Soc., Nat. Hist. Suppl.*, VIII, p. 180 (see addendum).
1933. *Amblyceps mangois*, Hora, *Proc. 20th Ind. Sci. Cong.*, p. 273.
1933. *Amblyceps mangois*, Hora, *Journ. Bombay Nat. Hist. Soc.*, XXXVI, pp. 550, 551.
1933. *Amblyceps mangois*, Mukerji, *ibid.* (in press).

Amblyceps mangois is a small, slimy, loach-like fish in which the body is elongated and compressed except in the region in front of the ventral fins. The head is broad and depressed; it bulges outwards in the form of two bladders in the region of the opercular chambers. The length of the head is contained 4·7 to 5·3 times in the total length without the caudal; its greatest width, which is in the opercular region, is contained 1·1 to 1·5 times in the length. As the width of the head depends on the distended nature of the cheeks, there is considerable variation in this dimension of the fish. The height of the head is contained 1·7 to 2·2 times in its length. The snout is broad and subtruncate. The eyes are small, superior and subcutaneous; they are situated in the anterior

half of the head, though their position is subject to considerable variation. The length of the snout is contained 2·7 to 4·2 times in the length of the head. The mouth is transverse and anterior; its gape extends from side to side. The lips are fleshy, slightly fimbriated and continuous; at each corner of the mouth they form a prominent fold. The upper or the lower jaw is slightly longer than the other, but very rarely the two jaws are equal in length. In ten specimens, whose measurements are given below, the lower jaw was found to be longer in five, the upper jaw longer in four and only in one specimen both the jaws were of equal length. The depth of the body is very variable; it is contained from 5·2 to 8·2 times in the total length without the caudal. The nature of the barbels, teeth, gill-openings and fins is the same as given in the diagnosis of the genus.



Text-fig. 5.—Slightly dorso-lateral (upper two figures) and lateral view of four specimens of *Amblyceps mangois* (Ham. Buch.), showing variation in the form and extent of adipose dorsal, the form of the caudal fin and of the body.

The length of the caudal fin depends upon its form; it is shorter where the fin is truncate and longer where the fin is furcate; the length varies considerably and is contained from 4·3 to 8·5 times in the total length of the fish. In a series of ten specimens the caudal fin was found to be truncate in three, concave or slightly emarginate in three and deeply furcate in the remaining four. It seems obvious, therefore, that this character cannot be relied upon for specific distinctions. The adipose dorsal fin is also variable; in some individuals it is continuous with the

caudal and in these forms the fin is long and narrow. In the majority of specimens, however, the adipose fin is distinct from the caudal and is short and high.

The anal opening is followed by a fleshy papilla; it is situated between the ventral fins considerably in front of the anal fin but its actual position is subject to considerable variation. It may be situated almost in the middle of the length of the ventrals, or it may be nearer to their bases or to their tips.

The living specimens are of a darkish flesh colour, deeper above and lighter on the ventral surface. In specimens preserved in spirit the colour is dark gray which becomes considerably lighter on the ventral surface. Hamilton-Buchanan [1] remarked that the colour "is everywhere of an uniform lurid brown *colour*, inclining to olive."

Distribution.—Amblyceps mangois is found in rapid-running streams at the bases of hills. It has been recorded from the base of the Himalayas in India and from Northern Burma and Siam. In the collection of the Indian Museum the species is represented by 161 specimens from the following localities from west to east:—

Punjab: Kangra; *United Provinces:* Gazipore; *Bengal:* Siliguri, Sevoke, Darjeeling (?) and rivers of Terai and Duars; *Assam*: Abor Hills and Manipur Valley; *Burma:* Tributaries of Mali Hka river and streams in Putao Plain.

The majority of the specimens in the collection are from the base of the Darjeeling-Himalayas.

Measurements in millimetres.

	N. E. Bengal.					Manipur, Assam.		Northern Burma.		
Total length without caudal	33·0	34·0	39·0	47·0	82·0	34·0	65·0	40·0	80·0	120·0
Length of caudal	6·5	7·0	11·5	8·0	12·0	6·5	12·0	8·0	12·0	16·0
Depth of body	4·5	5·0	7·5	6·5	10·0	5·0	9·5	5·0	12·0	19·0
Length of head	7·0	6·5	8·0	9·0	16·5	7·0	12·0	8·5	15·0	23·0
Width of head in opercular region.	4·5	4·5	7·0	7·0	12·0	6·0	11·0	7·0	11·5	16·0
Height of head at occiput	3·5	3·0	4·7	4·0	8·0	4·0	7·0	4·0	7·0	11·5
Length of snout.	2·0	2·0	2·5	3·0	6·0	1·8	4·0	2·0	4·5	7·5
Interorbital width	2.0	1·5	2·7	2·0	3·7	2·0	4·0	2·0	2·5	4·0
Internasal distance	0·7	1·0	1·0	1·0	2·0	1·0	2·0	1·5	1·5	2·5
Distance of dorsal from tip of snout.	8·7	9·0	11·0	11·0	18·0	10·0	17·0	11·5	8·0	26·0
Longest ray of dorsal	3·0	3·5	5·5	5·5	8·0	6·0	11·0	6·0	9·0	12·5
Longest ray of anal	3·0	3·0	6·0	6·0	8·5	6·0	10·5	4·5	6·0	13·0
Length of pectoral	4·5	4·5	6·5	6·0	9·7	5·0	9·5	6·0	8·5	13·0
Length of ventral	3·0	3·5	4·0	4·0	6·0	4·5	7·0	4·0	6·0	10·0
Length of caudal peduncle	7·5	8·0	7·0	11·0	18·0	7·0	13·0	7·5	17·0	25·0

ADDENDUM.

A Short Description of the Siamese Form.

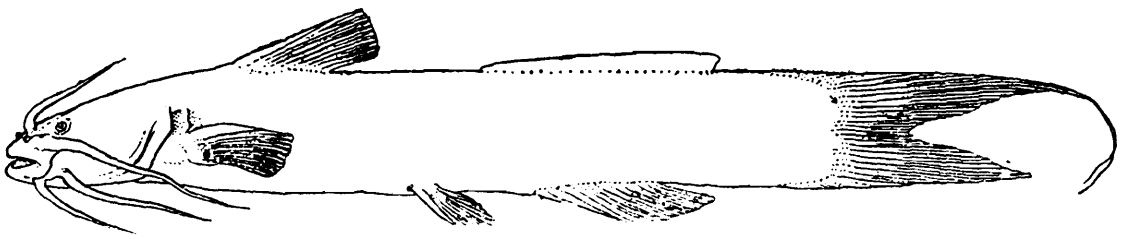
Since the above went to the press, three specimens of *Amblyceps mangois* (H. B.) were received from Siam through the kindness of Dr. H. M. Smith with the remark that "These are from Pak Jong, a mountain district in east-central Siam, March 12, 1927. Other localities represented in our collection are Nakon Sritamarat, Peninsular Siam, and

[1] Hamilton-Buchanan, *Fish. Ganges*, p. 200 (1822).

Chantabun Estuary, south-east Siam. The last locality is peculiar in that the water is brackish, but the single specimen could easily have come down from hill streams in the Chantabun basin, where, however, the species has not yet been collected.

"The species, as found at Pak Jong and Nakon Sritamarat, is mostly in clear running streams at bases of hills or in plains very near the hills."

When Smith[1] recorded the species from Siam for the first time in 1931, he referred only to the local distribution of the fish and no attempt seems to have been made so far to compare the Siamese specimens with examples from India and Burma. The examination of the three specimens referred to above has shown that they differ in several respects from the Indo-Burmese form, but without a comparative study of a large collection from Burma and Siam, it is difficult to separate the Siamese form as a distinct species, variety or even as a local race. Caution is, further, warranted by the fact that the species, as indicated above, is extremely variable even with regard to some of its most characteristic features. It seems advisable, however, to include here a short description of the distinctive features of the Siamese specimens to complete the account of the genus and the only species, and to facilitate further reference to the Siamese form.



TEXT-FIG. 6.—Lateral view of a Siamese specimen of *Amblyceps mangois* (Ham. Buch.) ×1½.

Caudal Fin.—The caudal fin is deeply bifurcate in all the three specimens and the lobes are sharp and pointed; the upper lobe is considerably longer than the lower and is produced into a long, thread-like process. Such a long and filamentous extension of the upper lobe of the caudal fin is not to be found in any of the Indo-Burmese specimens.

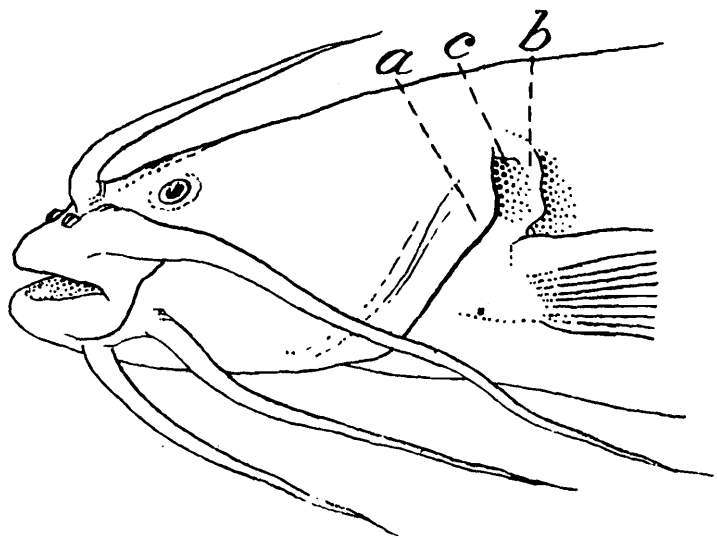
Adipose Dorsal.—The adipose dorsal is short and low. Reference has already been made to the variability exhibited by this structure (p. 618), but in none of the Indian specimens the adipose fin is so low.

Anal Fin.—In the Siamese examples the anal fin is somewhat more extensive and has eight to nine branched rays besides three spines. In the Indian specimens, there are usually two to three spines and six to eight branched rays.

Gill-opening and associated structures.—The portion of the gill-opening above the base of the pectoral fin is modified still further for respiratory function. It is situated in a shallow, cup-like depression, the posterior margin of which is formed by a fold of skin homologous to the structure mentioned above, which is situated above and anterior to the base of the pectoral fin and immediately behind the gill-opening.

[1] Smith, *Journ. Siam Soc., Nat. Hist. Suppl.*, VIII, pp. 180, 181 (1931).

In the Indo-Burmese examples, the membranous flaps of the gill-covers lie above the skin-flaps, whereas in the Siamese specimens the latter are situated at a considerable distance away from the former. It seems probable that in the Siamese form of *Amblyceps* the functional region of the gill-opening has become still further localised.



TEXT-FIG. 7.—Lateral view of head and anterior part of body of a Siamese specimen of *Amblyceps mangois* (Ham. Buch). ×4.
a=opercular flap; *b*=skin-flap; *c*=shallow cup-like depression.

Barbels.—In the Siamese specimens, the barbels are relatively thin and long; the nasal barbels reach the base of the pectoral fin; the maxillary barbels extend beyond the middle of the length of the pectorals; the outer mandibulars are slightly shorter than the maxillaries, while the inner mandibulars are still shorter.

General Remarks.—In all the three specimens from Pak Jong, the lower jaw is slightly longer than the upper, and the anal opening is situated almost in the middle of the distance between the bases of the ventral fins and their tips. The colouration in spirit is the same as that of the Indo-Burmese examples.

For the relative proportions of the various parts, I give below a detailed table of measurements.—

Measurements in millimetres.

Total length without caudal	58·0	54·0	47·0
Length of caudal excluding thread-like process . .	18·0	18·0	15·0
Approximate depth of body	9·0	8·5	6·5
Length of head . .	12·0	11·5	9·0
Width of head in opercular region	9·0	9·0	7·0
Height of head at occiput	5·0	5·0	5·0
Length of snout	3·0	3·0	3·0
Interorbital width	3·0	3·0	3·0
Internasal distance .	1·7	1·7	1·7
Distance of dorsal from tip of snout	18·5	17·0	14·0
Longest ray of dorsal	6·5	6·5	6·5
Longest ray of anal	8·0	8·0	7·0
Length of pectoral	9·0	8·5	7·5
Length of ventral . .	6·5	6·5	5·2
Length of caudal peduncle .	11·0	10·0	9·0
Least height of caudal peduncle	7·5	7·0	6·0

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