

Article II.—THE FISHES OF HAINAN¹BY JOHN T. NICHOLS AND CLIFFORD H. POPE²

PLATE XXVI, TEXT FIGURES 1 TO 51

INTRODUCTION

Prior to the work of The American Museum of Natural History's Asiatic Expeditions, the fresh-water fishes of Hainan Island off the coast of south China were very little known. Boulenger has reported on a collection of five species obtained in the interior of the island by Mr. John Whitehead, who died in Hainan in 1899 after a short stay there. (Proc. Zool. Soc. London, 1899, pt. 2, pp. 959-961, Pl. LXVIII and LXIX). Three of the five he lists as new, referring the other two respectively to a Burmese and Japanese species. Our Hainan collection contains the last-mentioned form, a *Zacco* which we have no hesitation in separating from Japanese species, though they are close; and we have some doubt in following Boulenger in the identification of his Hainan *Garra* with one from Burma.

The extensive collection on which the present paper is based was made in the vicinity of Nodda in the late winter of 1922-1923 and spring of 1923 by C. H. Pope. Nodda is situated in a foothill region where both swift-water (mountain) and sluggish-water (plains) fishes were to be met with, and, although from but a single locality, the forty-nine species probably give a very fair idea of the fishes of the island. Bearing this in mind, as also the size and isolation of Hainan and its large percentage of endemic fresh-water fishes, we have drawn up this paper in the form of an account of the fishes of Hainan, rather than merely a report on our collection as would have been appropriate for material of similar extent from some point on the mainland of China, for instance on the Yang-tze. Of the small number of forms in Hainan from the mainland of China, most are common or widely distributed—for instance, the carp, goldfish, Japanese eel “monopterus,” snakeheads (*Ophicephalus maculatus* and *gachua*), *Channa* paradise fish, and *Barbus semifasciatus*, the two latter species commonly kept in aquaria. Perhaps some of the supposedly endemic species will prove to be identical with species in Indo-China and Malay, with the fishes of which region the authors are much less familiar than with those of China proper. The *Parasilurus* is identified with *P. cochinchinensis*, an *Acanthorhodeus* with *A. tonkinensis* (close

¹Publications of the Asiatic Expeditions of The American Museum of Natural History. Contribution No. 72.

²The colored plate is by Mr. Wong of Peking; the line drawings are by Miss Olive Otis.

to *A. guichinoti*), both southern representatives of species abundant in central China. We find no endemic fresh-water genera in Hainan.

Since the completion of this paper Oshima (1926) has reported on a collection of fresh and brackish water fishes from Hainan, describing several new species and listing a number not previously recorded from the island. As it is not our purpose to include brackish water forms with marine affinities, or marine forms the occurrence of which in fresh water is fortuitous, the following (mostly from Haiho) have not been included.

Elops saurus, *Harengula fimbriata*, *Anodontosoma chacunda*, *Dorosoma nasus*, *Clupanodon haihoensis* Oshima (1926), *Mugil carinatus*, *M. nepalensis*, *Caranx forsteri* (Haiho, and also Kachek River), *Sparus datnia*, *Gerres punctatus*, *G. poeti*, *G. limbatus*, *Bostrichthys sinensis*, *Apo-cryptes maculatus* Oshima (1926), *Rhinogobius punctatus* Oshima (1926, Haiho), *Boleophthalmus chinensis*.

Of two new genera which Oshima proposes, the one, *Spinibarbichthys*, our view would not admit to generic rank, the other, *Carassioides*, we suspect of being the hybrid between carp and goldfish for which generic and specific names were already available.

It is a (necessary) pleasure to use Oshima's names for 3 new forms which we also had to hand from the vicinity of Nodoa, one of his we think we have identified with *Acanthorhodeus tonkinensis* from the mainland, and 1 or 2 of ours which he seemingly had but failed to differentiate from known species, we are not yet prepared to relinquish.

The ichthyological work of the Third Asiatic Expedition in Hainan extended over a period of eight months, beginning December 1922 and ending July 1923. Most of the fish were taken in the early spring, for at that time the streams were low and the fish forced to gather in isolated or barely connected pools.

Nodoa was the center of activity, as all of our specimens were secured within fifteen miles of this town, the vast majority having been taken from water in its immediate vicinity. Nodoa's location is an especially good one for it lies in the hilly, rolling country of the area intermediate between Hainan's northern plain and central highland. This market town is slightly nearer the island's center than its north-western coast and about forty miles from the famous Five Finger Mountains. A distance of ten miles directly north brings one out on the low plain, while the wildest section of the highland is only twenty miles to the southwest.

The fishes recorded herein as having been caught in the "immediate vicinity" of Nodoa were taken from one of the following sources:

ricefield irrigation ditches and reservoirs; or sluggish streams rising in the lower foothills; or a small river which, though rising in the foothills, flows for some miles down a series of cascades.

All specimens were secured first-hand or directly from fishermen. For more than three months natives were paid to fish the waters about Nodoa using their own nets. Such methods, while more or less primitive, in the long run yield excellent results. Many rare forms may be secured in this way. More drastic methods were employed when the headwaters of the Golden River were investigated for river and mountain forms. This, the island's largest river, flows within five miles of Nam Fong, which is itself only ten miles south of Nodoa.

It should be noted that our collecting was entirely confined to fresh waters and that most of our fishing was done in streams, pools, and ditches. Hainan is only a small island and its fresh waters are not extensive.

The authors fully realize that this work could never have been carried on had it not been for the hospitality, generosity, and continued help rendered by the members of the Nodoa Station of the American Presbyterian Mission, Hainan. This opportunity is taken to express deepest gratitude for assistance so graciously rendered.

A small stream rises just northeast of Nodoa in low, rolling country. For about two miles it is little more than a series of shallow, barely connected, grass-grown pools crowded by ricefields. In its third mile it picks up and begins to flow through the dense vegetation that crowds its bed of solid rock. Now and then it forms an open pool comparatively free of vegetation. We selected one of these in the third mile and one of the lagoon-like, grassy pools of the second mile and made an investigation of the fish life of each; the results of which are set down below.

The open, basin-like pool in the third mile of the stream's course was partly shaded, circular, 150 feet in diameter, 4 to 8 deep, and has a gravel bottom. The borders and bottom are practically free of vegetation. There are no overhanging banks. Our fairly clean sweep of the fishes of this pool was made late in February before they had been scattered by the spring rains. Twelve hundred and fifty-nine specimens were counted as follows:

<i>Ischikauia hainanensis</i>	665	examples
<i>Osteochilus salsburyi</i> ,.....	222	"
<i>Acanthorhodeus tonkinensis</i>	160	"
<i>Pseudoperilampus hainanensis</i>	76	"
<i>Carassius auratus</i>	47	"

<i>Barbus semifasciolatus</i>	37 examples
<i>Hemibarbus and Pseudogobio</i>	25 "
<i>Hemiculter hainanensis</i>	19 "
<i>Barbus nigrodorsalis</i>	2 "
<i>Cobitis tænia dolichorhynchus</i>	1 "
One species uncertain.....	5 "

The grass-grown, partly-shaded, lagoon-like pool in the second mile of the stream's course was murky and wedged in between ricefields. It had a sand and mud bottom, was three to five feet deep, a hundred yards long by ten wide, and one of its banks was densely overgrown and overhanging. Probably we missed many catfish and examples of *C. t. dolichorhynchus* (later on with a net we got many examples of the latter in this same pool). Twelve hundred and seventy specimens were counted as follows:

<i>Barbus semifasciolatus</i>	520 examples
<i>Acanthorhodeus tonkinensis</i>	394 "
<i>Ischikauia hainanensis</i>	160 "
<i>Pseudoperilampus hainanensis</i>	86 "
<i>Osteochilus salsburyi</i>	34 "
<i>Carassius auratus</i>	30 "
Four species uncertain.....	46 "

The following species were constantly taken in the immediate environs of Nodoa.

Fluta alba xanthognatha
Clarias fuscus
Parasilurus cochinchinensis
Pseudobagrus virgatus
Cobitis tænia dolichorhynchus
Misgurnus mizolepis hainan
Nemacheilus pulcher
Cyprinus carpio
Carassius auratus
Barbus nigrodorsalis
Barbus semifasciolatus
Osteochilus salsburyi
Hemibarbus labeo
Pseudogobio labeoides
Zacco asperus
Opsariichthys hainanensis
Ischikauia hainanensis
Magalobrama melrosei
Hemiculter hainanensis
Rasbora hainanensis
Aphyocypris normalis
Acanthorhodeus tonkinensis

Pseudoperilampus hainanensis
Aplocheilichthys curvinotus
Ophicephalus maculatus
Channa ocellata
Macropodus viridiauratus
Philypnus chalmersi
Gobius hadropterus

Four species, as follows, were not taken in the mountains and were only very rarely found near Nodoo:

Anguilla japonica
Garra schismatorhyncha
Sarcocheilichthys hainanensis
Hemiculter serracanthus

The following three fishes were apparently confined to the higher mountain streams some miles south of Nodoo.

Glyptosternon hainanensis
Gastromyzon leveretti
Cyclocheilichthys iridescens

Several species were taken in the Golden River at its point of emergence from the mountains five miles southeast of Namfong. As the lower reaches of the river were not fished, we do not know how generally they are distributed down stream. Such are:

Barbus denticulatus
Barbus barbodon
Varicorhinus discognathoides
Onychostoma leptura
Labeo collaris
Erythroculter pseudobrevicauda

ELOPIDÆ. The Tarpons

Herring-like fishes with large mouth, projecting lower jaw, lateral line, and no ventral keel.

MEGALOPS Lacépède

LACÉPÈDE, 1803, 'Hist. Nat. Poiss.,' V, p. 289. Type *Megalops filamentosus* Lacépède = *Clupea cyprinoides* Broussonet.

Large compressed fishes with large silvery scales, running into fresh water from the sea. The dorsal fin with its last ray produced.

Megalops cyprinoides (Broussonet)

Clupea cyprinoides BROUSSONET, 1782, Ichthyologia, I, Pl. ix.

Depth, in length to base of caudal, about 3.5; head, about 3.5. Eye in head 3.2 to 3.5; snout, and interorbital, about 6.5. Dorsal rays 19 to 21; anal 24 to 27. Scales in lateral line 37 to 42.

Recorded by Oshima (1926) from Haiho, Hainan.

ANGUILLIDÆ. The True Eels**ANGUILLA Shaw**

SHAW, 1803, 'General Zoology or Systematic Natural History,' IV, p. 15. Type: *Anguilla vulgaris*.

This genus is distinguished from its relatives by the presence of small, embedded, linear scales placed in groups, those of one group at right angles to those of adjoining groups. Its species are indifferently coastal or fresh-water and retire to the deeps of ocean basins under the warm water of the open sea to spawn. The young pass through a flat, translucent, pelagic, larval stage. The common fresh-water eel of Japan (and of China) is very like that of Europe and that of the Atlantic slope in America.

***Anguilla japonica* Temminck and Schlegel**

Anguilla japonica TEMMINCK AND SCHLEGEL, 1847, p. 258, Pl. CXIII, fig. 2.

But a single specimen of *Anguilla*, which is common in the Yang-tze, was obtained at Hainan. It was this species.

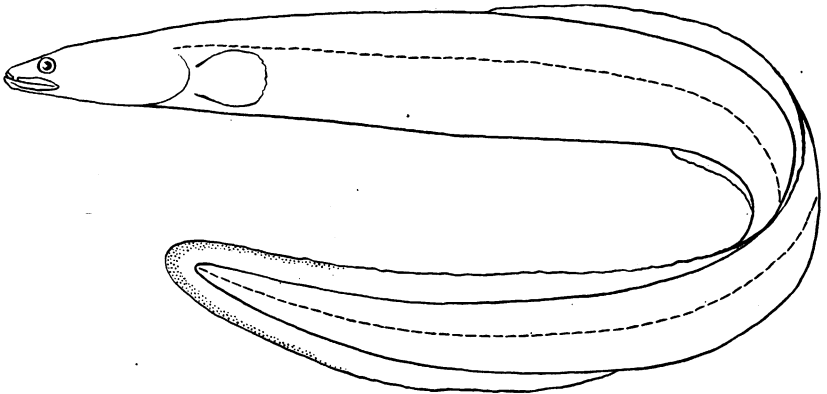


Fig. 1. *Anguilla japonica* Temminck and Schlegel. 440 mm. without caudal.

Length to base of caudal 440 mm. Head in length 7.9, tail 1.7. Depth in head 2; snout 5.3; maxillary 3.4; pectoral 3. Eye in snout 3. Anal origin behind dorsal origin a distance contained 1.2 in head.

Body little compressed, snout depressed, tail compressed. Dorsal beginning far behind head. Lower jaw projecting, lips fleshy; maxillary extending to beyond eye

Olivaceous, belly abruptly pale, caudal and posterior dorsal and anal dusky edged.

For comparison, a specimen 345 mm. in length to base of caudal, Tung-ting Lake, Hunan, December 9, 1921, is as follows. Head in length 8.4; tail 1.6. Depth in

head 2.5; snout 5; maxillary 3.1; pectoral 3. Eye in snout 3. Cylindrical, snout depressed; tail somewhat compressed. Anal origin behind that of dorsal a distance contained 2.5 in head, considerable divergence here likely individual or age variation.

We unhesitatingly refer the Hainan specimen to *Anguilla japonica*, to which Oshima (1919, *Annals. Carn. Mus.*) refers the common Formosan form, and doubt the distinctness of *Anguilla sinensis* McClelland (1844, *Calc. Jour.*, IV, p. 406, China) to which the Tungting specimen should belong.

My Hainan fishermen caught only one specimen of *Anguilla*, and insisted that it was not only the rarest but most delicious "fish" found about Nodoo.

***Anguilla mauritiana* Bennett**

Anguilla mauritiana BENNETT, 1831, *Proc. Comm. Zool. Soc.*, p. 128. Mauritius.

East Indian oceans and archipelagoes in general, recorded by Oshima (1926) from the Kachek River, Hainan. Irregularly spotted with blackish; the dorsal origin more anterior than in *A. japonica*, nearer to the pectoral than to the anal origin.

SYMBRANCHIDÆ. Symbranch Eels

Slender, scaleless, more or less finless fresh-water eels of southern Asia and the Indies and tropical America. The gill openings are joined on the under surface of the head to form a single cleft. A few, sometimes very wide-ranging species.

***Fluta* Bloch and Schneider**

BLOCH AND SCHNEIDER, 1801, 'Systema Ichthyologiae,' p. 525. Type: *Monopterus javanensis* Lacépède = *Fluta alba* (Zuiew).

***Fluta alba* (Zuiew)**

Muraena alba ZUIEW, 1793, *Nova Acta, Acad. Sc. Petropol.*, VII, p. 299.

The *Fluta* from Hainan may be differentiated from that found in the Yang-tze basin (*Fluta alba cinerea*) by shorter tail, smaller eye, and higher, more gibbous nape. None of our fourteen Hainan specimens (172 to 455 mm. in total length) show the rather bold, blackish spotting frequently found in *cinerea*. They have head in length to vent 8.1 to 10.3 (average 9.5); tail from vent 2.5 to 3.3 (average 2.9); eye in snout 1.7 to 3 (average 2.3), with tendency to decrease of size of eye, slight decrease of length of tail and increase of length of head with increase of size. The eye is about one-half the snout at 200 mm. total length, about one-third at 400 mm.

***Fluta alba xanognatha* (Richardson)**

Monopterus xanthognathus RICHARDSON, 1844, 'Voyage of the Sulphur,' p. 118, Pl. LII, Canton.

Description of a specimen taken March 30, 1923 at Nodoa:

Total length 174 mm. Head (to posterior angle gill-opening) 12.4 in length; tail from vent 4.1. Depth in head 2.2; gape (snout to angle mouth) 2.4; snout 4.4; maxillary 2.3; distance between posterior corners of gill slit 3.4. Eye in snout 2.1;

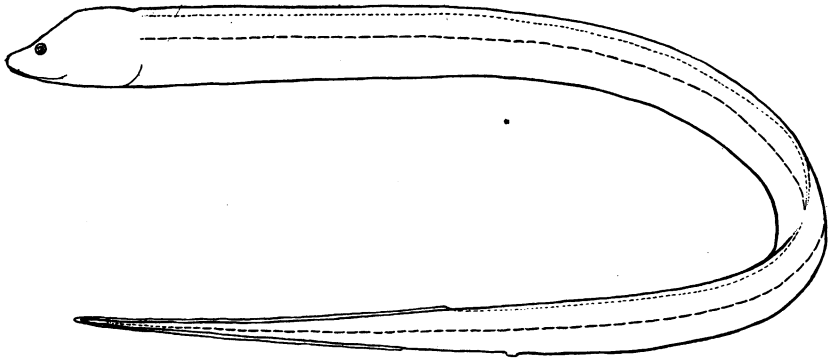


Fig. 2. *Fluta alba xanognatha* (Zuiew). 395 mm. total.

width lower lip 2; interorbital 1.7. Snout bluntly pointed; lower jaw slightly included; eye small, beneath skin, over middle of mouth; gill opening ventral, V-shaped, angle of the V somewhat less than a right angle. Body cylindrical, slightly deepest at shoulder, without fins or ridges; tail compressed, tapering, a low keel along three quarters of its upper and two thirds of its lower edge; profile of head low, slightly concave over the eye and convex at nape. Color uniform ash-gray. A color sketch from life is dusky olive above, finely freckled with blackish; bright orange band below; dusky mark downward and backward of the eye.

SILURIDÆ. Catfishes

Scaleless fishes, ordinarily with a transverse, more or less terminal mouth surrounded by several pairs of conspicuous barbels. Dorsal and pectoral fins each with a spine, frequently serrate, more or less developed or absent. When the dorsal is short there is usually an adipose fin situated more posteriorly on the back. Catfishes are scarce in Europe and northern Asia, plentiful in southern Asia and eastern temperate America, abundant and varied in Africa, and perhaps reach their greatest development in tropical America, where there is a large, specialized, armored, offshoot family, the Loricariidæ. Catfishes are mostly inhabitants of fresh water; there are a few tropical or subtropical, marine coastwise genera.

CLARIAS Scopoli

SCOPOLI, 1777, following Gronow, 1763, 'Zoophylaceum,' p. 100.

Type: *Clarias orontis* Günther.

Elongate catfishes; the dorsal, without spines, extending the length of the back, longer than the anal, which is also long. Top and sides of the head bony. Four pairs of barbels. Caudal truncate or rounded.

Clarias fuscus (Lacépède)

Macropteronotus fuscus LACÉPÈDE, 1803, V, p. 88, Pl. II, fig. 2.

Clarias fuscus GÜNTHER, 1864, 'Cat.,' V, p. 18.

Description of a specimen taken February 21, 1923, at Nodoa:

Length to base of caudal 96 mm. Depth in length 5.4; head (to end of bony covering on side) 3.8. Eye in head 9; snout 3; interorbital 2; width of mouth 2.4; width of head 1.4; length of anterior foramen 4; posterior foramen 5; maxillary barbel 0.8; depth of peduncle 4; pectoral spine 2.5; ventral 2.6; caudal 1.8.

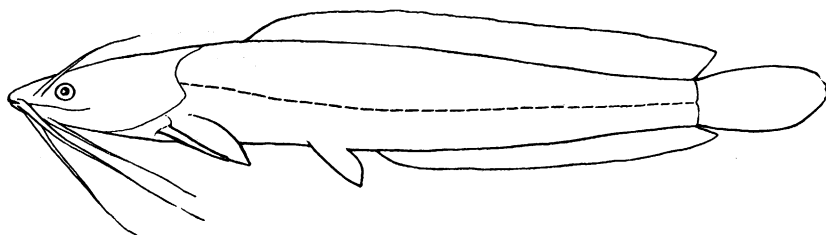


Fig. 3. *Clarias fuscus* (Lacépède). 76 mm. without caudal.

Dorsal about 60; anal about 50.

Head depressed; body compressed; belly flat. Whole top of head and nape smooth and bony beneath the skin, this carapace ending in a vertical limb on the sides, a wide-angled point in the center of nape (separated by an interval slightly less than snout from dorsal origin), and in a horizontal ridge or angle below eye; two well-marked foramina in the central line. Mouth wide, transverse, the upper jaw slightly the longer; lips, chin and flattened base of maxillary barbel papillose; a long barbel at posterior nostril, on maxillary, and two at the side of lower jaw; gill-membranes united at base, free from isthmus, the gill slit ending above at the bony carapace over pectoral base. Pectoral spine short and stout, roughened in front, smooth behind; ventrals passing anal origin; dorsal and anal rays obscure in the fleshy membrane of the fins; vertical fins adnate to caudal at base; anal origin equidistant from base of caudal and center of eye; caudal rather narrow, with straight sides, somewhat rounded behind.

Body and fins uniform dark slaty, paler on the belly. A color sketch from life is uniformly dusky body and fins; that of a smaller specimen dark purplish; the head and fins brownish; blackish horizontal streak below the eye and vertical streak at the base of the caudal.

PARASILURUS Bleeker

BLEEKER, 1862, Versl. Akad. Amsterdam, XIV, p. 394. Type: *Silurus japonicus* Temminck and Schlegel = *Silurus asotus* Linnæus.

Elongate catfishes with a very small spineless dorsal and no adipose; the anal very long more or less adnate to the subtruncate caudal; only two pairs of barbels.

Parasilurus cochinchinensis (Cuvier and Valenciennes)

Silurus cochinchinensis CUVIER AND VALENCIENNES, 1839, XIV, p. 352, Cochinchina. GÜNTHER, 'Cat.,' V, p. 342.

Description of a specimen (Number 8359, American Museum of Natural History) from Nodoa, Hainan:

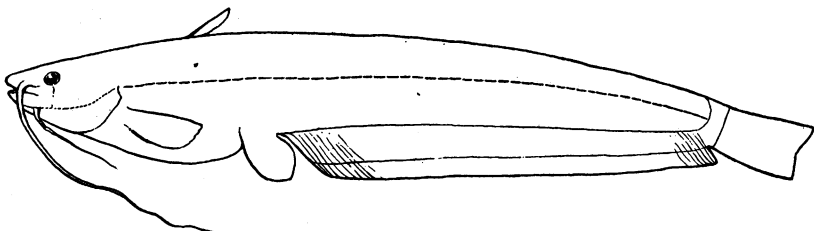


Fig. 4. *Parasilurus cochinchinensis* (Cuvier and Valenciennes). 145 mm. without caudal.

Length to base of caudal 125 mm. Depth in length 4.7; head 5.6. Eye in head 7.5; snout 2.7; interorbital 2.2; maxillary 2; width of mouth 2; maxillary barbel 0.4; width of head 1.4; depth of peduncle 3; pectoral 1.3; ventral 2; longest anal ray 1.7; dorsal 2; caudal 1.1.

Dorsal 5; anal 66.

Head a little depressed; body compressed, breast gibbous, rounded; ventral and anal bases close together. Mouth almost terminal, slightly inferior, wide, curved, transverse, with somewhat pimply lips; maxillary reaching to nearly under center of small eye; which has no trace of a free rim; interorbital broad, slightly convex; gill membranes joined at the base, free from isthmus; dorsal small, without a spine, over the end of pectoral; a little before ventral origin; pectoral spine short pungent concealed, about one-half the length of the fin; pectoral not quite to ventral, ventral reaching past front of anal; last anal ray joined to caudal base for about one-half its length; caudal obliquely subtruncate; very slightly emarginate; no adipose. A long maxillary and single mental barbel, the former reaching to front of anal, the latter to base of pectoral.

Marbled with blackish and paler; caudal and anal dark proximally of two lines which intersect at the tip of the notch between them. A number of specimens of which this is one of the smaller.

The slightly included lower jaw separates this species at once from the widely distributed *Parasilurus asotus* of North and Central China.

We find nothing in the Hainan fish to separate it from *cochinchinensis*, but have no material from Cochin-China, wherewith to compare it.

PSEUDOBAGRUS Bleeker

BLEEKER, 1860, Act. Soc. Sci. Indo-Neerl, VIII, p. 87. Type: *Bagrus aurantiacus* Schlegel.

Moderate or short-bodied catfishes, with four pairs of barbels; the dorsal short; anal of moderate length; caudal well forked; adipose moderate, much smaller than the anal; a strong spine in dorsal and pectoral; eye large or moderate, with a free or partially free rim.

***Pseudobagrus intermedius*, new species**

Close to the widely distributed *Pseudobagrus fulvidraco*; intermediate between that species and one or more related ones on the mainland with short, slender barbels.

DESCRIPTION OF TYPE.—Number 8360, American Museum of Natural History. Locality: Nodda, Hainan. Length to base of caudal 106 mm. Depth in length 4.4; head 3.4; Eye in head 5.4; snout 3; interorbital 3; maxillary 3.3; width of mouth

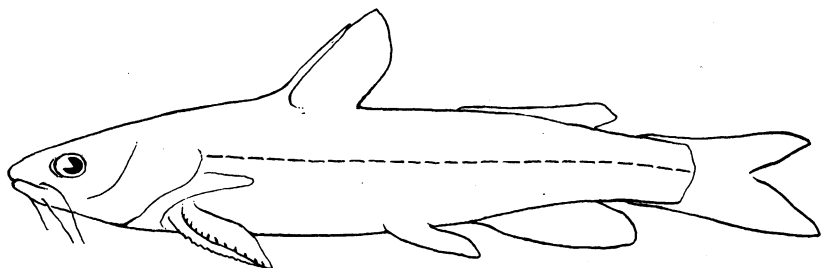


Fig. 5. *Pseudobagrus intermedius*, type. 106 mm., without caudal.

2.5; maxillary barbel 2; width of head 1.5; depth of peduncle 2.6; its length 2.5; dorsal spine 1.8; pectoral spine 1.4; ventral 2; longest anal ray 2.2; lower caudal lobe 1.4; length of adipose 1.9; dorsal interspace 1.2.

Dorsal I, 7; anal 20.

Snout depressed; body behind dorsal compressed; vent about half-way between ventral axil and anal origin. Interorbital flattish; a long depression in the center of the head; bones of the top of head rough striate, not or but thinly covered with skin; backward and forward processes narrowly meeting at nape to form a continuous bony bridge; mouth inferior, curved, with moderately thick slightly striate lips; maxillary reaching not quite to front of eye; barbels normally placed, weak and slender; orbital rim imperfectly free above and below, adnate before and behind; gill-membranes narrowly joined free from isthmus at base. Dorsal origin equidistant from snout and front part of anal or front of adipose; dorsal spine smooth before and behind;

pectoral spine barbed behind, finely serrate in front; both spines striate; a conspicuous rough naked scapular point above pectoral; pectoral not reaching ventral, ventral passing anal origin; caudal well forked, the lower lobe slightly the longer and much the broader.

A darker triangular area on side below dorsal, in front of which a pale band extends downward and forward, and behind which a pale band downward and backward; another slightly dark cross area covering the anterior three quarters of anal; nasal and maxillary barbels dark.

***Pseudobagrus virgatus* (Oshima)**

Aoria virgatus OSHIMA, 1926, Annot. Zool. Japon., XI, p. 4, Kachek River, Hainan.

A small handsome species with round snout, large eye, and unusually sharply marked color pattern, apparently related to but distinct from *Pseudogabrus brachysoma* Günther from Cochin-China.

Description of a specimen (Number 8361, American Museum of Natural History). Locality: Nodoa, Hainan.

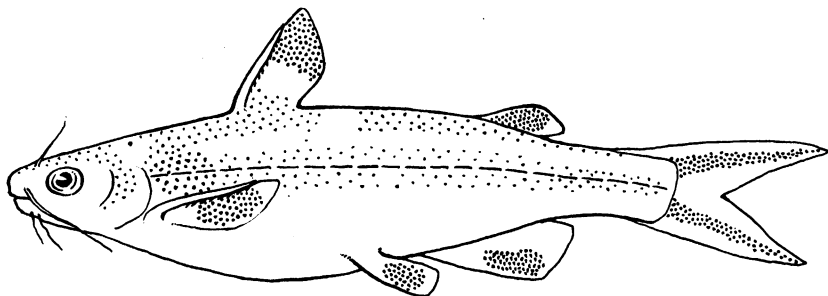


Fig. 6. *Pseudobagrus virgatus* (Oshima). 95 mm., without caudal.

Length to base of caudal 95 mm. Depth in length 3.3; head 3.9. Eye in head 3.8; snout 3; interorbital 2.8; width of mouth 3.4; depth of peduncle 2.2; its length 1.6; maxillary barbel 2; dorsal spine 1.5; pectoral spine 1.3; pectoral fin 1.1; ventral 1.7; longest dorsal ray 1.3; longest anal ray 1.8; caudal lobe 1.1; total length of adipose 1.6; same in dorsal interspace 1.7.

Dorsal I, 7; anal 16.

Well compressed, profile low and slanting, belly rounded; snout blunt and soft; top of head covered with skin; occipital prolongation narrow and long meeting predorsal shield. Mouth inferior, transverse; maxillary not reaching eye; lips rather thick, striate; nostrils far apart; interorbital slightly convex; 4 barbels on each side, one at the front of the posterior nostril, one on maxillary, and two close together on either side of chin; barbels of moderate length and very slender; orbital rim imperfectly free above and in front where there is a deep fold, otherwise adnate; gill-membranes narrowly joined, free from isthmus at base. Dorsal and pectoral spines slender and strong with low barbs behind, smooth in front except one obscure barb

near top of dorsal spine; shoulder spine above basal half of pectoral spine narrow, pointed, exposed, striate, the hollow below it sheathing the pectoral spine. Dorsal origin equidistant from tip of snout and anal origin; ventral origin well behind dorsal base; adipose axil slightly in advance of that of anal; ventrals short and broad, reaching front of anal; caudal well forked with pointed spreading lobes, and rudimentary basal rays keeled. Lateral line bowed slightly up before dorsal, otherwise straight, complete.

Top of dorsal, a large blotch on end of pectoral, another occupying most of the ventral with exception of its base; the adipose excepting its origin and margin, a blotch on the anterior anal rays, and center of caudal lobes black. Vague faint dark shading along the back, broken behind dorsal; and in a band on side from shoulder to base of caudal; otherwise dull pinkish, the fins somewhat yellowish.

GLYPTOSTERNON McClelland

McClelland, 1842, Journ. Nat. Hist. Calcutta, II, p. 584. Type: *Glyptosternon reticulatus* McClelland.

This genus differs conspicuously from *Pseudobagrus* in that the eye is small, more superolateral, without a free rim; the anal is shorter, its base scarcely longer than that of the adipose; the basal portion of the maxillary barbel is furnished with a conspicuous membranous flap adnate to the side of the snout.

***Glyptosternon hainanensis*, new species**

A small *Glyptosternon* with dark spot across each of several fins.

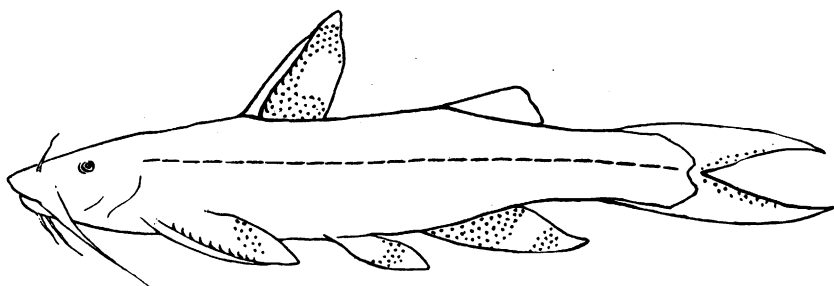


Fig. 7. *Glyptosternon hainanensis*, type. 55 mm. without caudal.

DESCRIPTION OF TYPE.—Number 8362, American Museum of Natural History. Locality: Nodoa, Hainan. Length to base of caudal 55 mm. Depth in length 4.6; head 3.7. Snout in head 2.2; interorbital 3; width of mouth 2.2; maxillary barbel 1.3; depth of peduncle 2.5; its length (from anal axil) 1.5; pectoral spine 1.2; dorsal spine 1.5; ventral 1.4; longest anal ray 1.4; total length adipose 1.4; dorsal interspace 1.3; caudal lobe 0.8. Eye in snout 4.

Dorsal I, 6; anal 10.

Snout depressed; body at nape triangular; head and breast flat below; body compressed behind the dorsal. Nape rugose striate; with a narrow backward prolongation not quite to the forward point of dorsal shield; eye superolateral; top of head and snout gently and evenly rounding; nasal barbel between the two nostrils which are close together well forward; maxillary barbel adnate at base by a broad membrane; 2 barbels at each side of lower jaw, the outer the larger; mouth inferior, transverse, the lips rather broad; the upper lip and chin slightly papillose; eye without free rim; gill-membranes narrowly joined to isthmus; a narrow pointed exposed spinous scapular process above base of pectoral. Dorsal spine strong, striate, serrate behind; pectoral spine strong, curved, with strong barbs behind; both spines smooth in front. Dorsal origin equidistant from tip of snout and anal origin; pectoral just not reaching to ventral origin, ventral just not to anal origin; caudal strongly forked with narrow pointed lobes, its rudimentary basal rays precurrent keel-like above and below; adipose with conspicuous false rays, narrowly free behind. Texture of skin below dorsal and on sides of head scaly.

Color dark gray, the fins somewhat browner. Dorsal and anal with dark bases, a blackish subterminal mark across the dorsal and anal, and a similar mark nearer the middle of the ventral.

This is apparently well distinguished by the bold, dark markings on the fins from *Glyptosternon majus* (Boulenger) of Borneo, to which it appears to be close. We have compared it with a specimen of *Glyptosternon sinense* from Tungting and with the description and figure of *Pimelodus asperus* McClelland from Chusan, a related fish.

Our only two specimens of *G. hainan* were brought out of the mountains south of Nodoa. It probably does not occur in the vicinity of that town.

COBITIDÆ. Loaches

Loaches are more or less elongate fresh-water fishes related to the carps. Mouth small, inferior, surrounded with barbels in more than two pairs; scales very small or absent; air bladder more or less completely inclosed in a bony capsule; sometimes an erectile spine beneath the eye. They are Eurasian, with center of abundance and variety in the Orient.

The aberrant genus *Gobiobotia* stands somewhat apart from both loaches and carps in an intermediate position between the two. Following the technical characters otherwise convenient to separate the two groups (presence of more than two pair of barbels, air bladder in a bony capsule) it is a loach. In general, however,—short body, comparatively large scales (between 40 and 50), etc.,—it resembles much more closely a gobionin carp, and we are inclined to follow Berg in placing it in the family Cyprinidæ. This decision hinges on our general concept of the history of the loaches, descended from loach-like carps now extinct, somewhat though not very closely related to this relic genus.

Related to the true loaches are several more specialized genera of bottom fishes wherein the front part of the body is depressed, the pectorals and, to a large extent, the ventrals expanded, rounded, placed in a more or less horizontal plane. These are commonly separated in the family Homalopteridæ. But we have seen a fish from Szechwan, China, very close to the genus *Barbatula* of true loaches, which is yet essentially a homalopterid, and we are too impressed with the close relationship of such forms to the other loaches to assign them more than subfamily rank.

Cobitinae

COBITIS Linnæus

LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., I, p. 300. Type: *Cobitis tænia* Linnæus.

Elongate, compressed, the head strongly compressed. An erectile spine beneath the eye. Four pairs of barbels about the mouth. Body covered with small scales, the lateral line evident. Caudal truncate or rounded. Sharply marked with lengthwise stripes or rows of blotches. A single widely distributed Eurasian fish more or less separable into geographic forms.

Cobitis tænia Linnæus

Cobitis tænia LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., I, p. 300.

Cobitis tænia dolichorhynchus Nichols

Cobitis dolichorhynchus NICHOLS, 1918, Proc. Biol. Soc. Wash., XXXI, p. 16, Fukien.

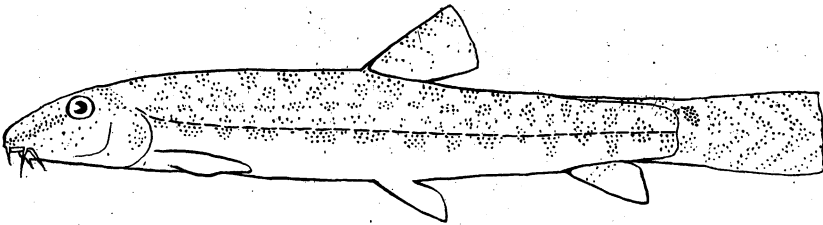


Fig. 8. *Cobitis tænia dolichorhynchus* Nichols. 61 mm. without caudal.

Cobitis tænia from Hainan is so close to material from Fukien with which it has been compared as to be indistinguishable. It appears to differ slightly from *Cobitis biwa* Jordan and Snyder (1901, Proc. U. S. Nat. Mus., p. 748) of Japan, synonymized with European *C. tænia tænia* by Jordan and Fowler and by Berg. It resembles the European fish, but is quite different from Yangtze material (*Cobitis [tænia] sinensis* Sauvage and De T., 1874-1875, Ann. Sci. Nat., Szechwan) having a

shorter body; shorter peduncle not conspicuously bordered with adipose keels; dorsal origin nearer base of caudal than tip of snout; more sharply marked color pattern in specimens of about 80 mm.

Specimens of 78 to 81 mm. length (to base of caudal) measure as follows. Head in length 4.4 to 4.6; depth 5.5 to 6.0. Eye in head 4.5 to 5; snout 1.9 to 2; depth of peduncle 2 to 2.4; its length 1.7 to 1.9.

Description of a specimen from Nodda, April 3, 1923.—Length to base of caudal 61 mm. Depth in length 5.6; head 4.3. Eye in head 4.5; snout 2.5; depth of peduncle 2.2; pectoral 1.5; ventral 1.6; longest dorsal ray 1.4; longest anal ray 1.6; caudal 1. Interorbital in eye 2; width of mouth 1.5; maxillary barbel 1.

Dorsal 10; anal $7\frac{1}{2}$. Scales before dorsal about 90.

Body compressed; head strongly so. Eye subcutaneous; an erectile spine before its lower anterior corner, with a short secondary basal cusp; mouth inferior, strongly curved; lips thick, the lower occupied by a pair of short thick barbels; longer barbels at the tip and at the side of the maxillary and a pair on the tip of the snout overhanging the mouth in front, the three pairs of about equal length. Gill slit slanting down somewhat backward, terminating below about in front of the first ray of the pectoral. Dorsal origin equidistant from front of eye and base of caudal; pectoral not quite reaching half way to ventral; ventral under middle of dorsal, half-way to anal; caudal truncate, its rudimentary rays precurrent above and below in short, slightly raised fleshy keels.

Some 19 dark spots along the back; about 13 bolder more or less linear blotches along the side; irregular rivulate spotting or streaking between; a dark stripe from eye to snout; cheek speckled; lower parts and lower fins pale. Dorsal spotted; caudal with a short vertical oval ocellate black spot on the upper angle of its base, and about four V-shaped, dark cross-bars.

MISGURNUS Lacépède

LACÉPÈDE, 1803, 'Hist. Nat. Poiss.,' V, p. 16. Type: *Cobitis fossilis* Linnæus.

Elongate, compressed; no spine about the eye; mouth surrounded with five pairs of barbels; scales small, striate, the lateral line slightly evident in front only; caudal truncate or rounded. Widely distributed in Eurasia, separable into few closely related species and races.

Misgurnus mizolepis Günther

Misgurnus mizolepis GÜNTHER, 1888, Ann. Mag. Nat. Hist., p. 433, Yang-tze.

Misgurnus decemcirrosus FOWLER, 1924, Bull. Amer. Mus. Nat. Hist., III, p. 395.

Misgurnus mizolepis hainan, new sub-species

Plate XXVI, Figure 1

?*Misgurnus psammismus* RICHARDSON, 1846, 'Ich. Chin.,' p. 300, Canton..

DESCRIPTION OF TYPE.—Number 8363, American Museum of Natural History. Locality: Nodda, Hainan, March 16, 1923. Length to base of caudal 83 mm. Depth in length 7.5; head 6. Snout in head 2.6; width of body 1.7; depth of peduncle 1.5; its length 0.8; pectoral 0.9; ventral 1.4; longest dorsal ray 1.3; longest anal ray 1.4; caudal 0.8. Eye in snout 2; interorbital 2; maxillary 1.7; barbel 1.2.

Elongate, moderately compressed; vent almost immediately before anal origin, not more than one-sixth distance to ventral axil. Snout rather blunt; interorbital convex; eye without trace of free rim; mouth inferior horizontal semicircular; lower lip weakly cleft; 3 subequal barbels above, two small ones below the anterior much the smaller; gill cleft slanting a little backward; the gill membranes adnate before the upper pectoral rays. Dorsal origin equidistant from base of caudal and middle of opercle; ventral origin slightly behind that of dorsal; pectoral pointed, extending

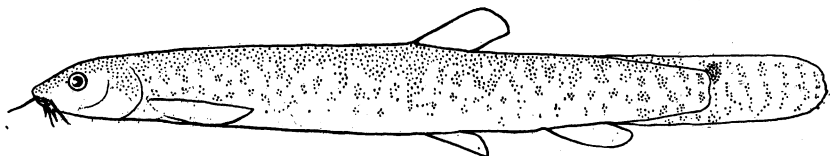


Fig. 9. *Misgurnus mizolepis hainan*, type. 83 mm. without caudal.

three-eighths distance to ventral, ventral one half to anal; caudal narrow, rounded subtruncate behind, with well-developed precurrent keels, not fleshy. Scales with close-set horizontal subparallel little radiating striae, embedded in thick slimy skin; short trace of a lateral line behind head only.

Dorsal 9; anal 7. Scales about 150.

Dark along the back, the sides pale with prominent irregular blackish spots, the largest about the size of eye. Black spot at upper caudal base; caudal with narrow irregular blackish barring; dorsal faintly spotted, pectoral and anal slightly marked, ventral pale, unmarked. A color sketch from life is olive on the back, buff beneath; the sides with sharply marked black spots of varying size; the pectoral, dorsal and caudal fins with a few faint specks; the side of the head, a livid bluish with one or two faint lengthwise streaks; the eye red and the barbels banded.

Various authors recognize two distinct loaches of the genus *Misgurnus* from China: the traditional *Misgurnus anguillicaudatus* and *Misgurnus decemcirrosus* (Basil.), which, being unidentifiable, has apparently not always been used for the same form. Fowler (1924, Bull. Amer. Mus. Nat. Hist., III, p. 395) uses *decemcirrosus* for the readily identifiable *Misgurnus mizolepis* Günther. With a rather extensive collection of *Misgurnus* from various parts of China at hand, we find a single distinct form in Hainan. On the basis of the Yang-tze valley material, this is as close to *anguillicaudatus* as to *mizolepis*, but *mizolepis* from Fukien indicates rather clearly that its relationships are with this latter fish.

The diagnostic characters of *Misgurnus mizolepis hainan* are as follows:

Skin more or less thickened and scales more or less embedded; body moderate or elongate, peduncular keels about precurrent caudal rays not fleshy or excessively developed; head small (6 or more in length); dark markings on side contrasted; peduncle long (slightly longer than head); spots on sides irregular, varying in size, some as large as eye; compressed (with of body 2 in head).

Misgurnus mizolepis punctatus Oshima

Misgurnus punctatus OSHIMA, 1926, Annot. Zool. Japon., XI, p. 5. Kachek River, Hainan.

Depth in length to base of caudal, 6.5; head 6.5. Eye in head 6; snout 2.25; interorbital 4.5; width of head 1.64; pectoral 1.56; ventral 2.40. Dorsal with 8 rays; anal with 7. Scales, about 140. Body elongate, cylindrical, tail compressed. Origin of dorsal much nearer to base of caudal than tip of snout, inserted slightly in advance of the root of the ventrals. Caudal rather short, tip broadly rounded; caudal peduncle deep, its depth 1.28 in head. Sides, cheeks, opercles, and maxillary barbels finely speckled with black; base of the caudal above with no black spot. Length 132 mm.

This loach does not agree with any specimen of *M. m. hainan* we have examined. It may prove to be an intermediate between that and *M. m. fukien* Nichols (1925, Amer. Mus. Novit., No. 169, p. 4).

NEMACHEILUS Van Hasselt

VAN HASSELT, 1823, 'Poissons de Java,' Allgemeine Konst en Letterbok, II, p. 133. Type: *Cobitis fasciatus* Valenciennés.

Small, rather short-bodied loaches with three pairs of long barbels about the mouth; no spine about eye; dorsal of moderate length (about 14); caudal truncate or lunate; nostril in a well-developed tube; scales very small or absent, lateral line complete. Numerous species in southern Asia, etc.

Nemacheilus pulcher, new species

Plate XXVI, Figure 2

A small brightly marked squarish tailed loach.

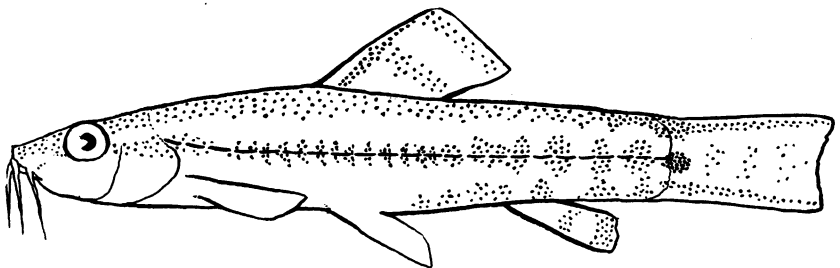


Fig. 10. *Nemacheilus pulcher*, type. 42 mm. without caudal.

DESCRIPTION OF TYPE.—Number 8364, American Museum of Natural History. Locality: Nodoa, Hainan, July 12, 1923. Length to base of caudal 42 mm. Depth in length 4.5; head 3.8. Eye in head 3.5; snout 2.4; interorbital 3; width of mouth 3.5; depth of peduncle, 1.8; pectoral 1.1; ventral 1.4; longest anal ray 1.5; longest dorsal ray 1.4; caudal lobe 0.9.

Dorsal 14; anal 8. Scales about 100.

Moderately compressed, more so posteriorly. Mouth small, inferior, curved, with papillose lips, two central papillæ of upper lip enlarged to small barbels; mouth overhung in front by two pairs of long barbels on the snout, a long maxillary barbel also present; eye with free rim; gill-membranes joining isthmus below base of pectoral; nostril in a rather long tube; conspicuous line of pores from snout below and behind eye, no evident spines on head. Ventral origin a little behind that of dorsal; pectoral not reaching ventral; ventral not reaching anal; caudal subtruncate, its margin slightly concave; its upper precurrent rays arched in a low keel. Body with small scales; lateral line complete.

Top of head and back dark; a dark lateral shade comprising small black cross-marks in center of side, larger oval blotches on the peduncle; a black spot on center of caudal base; a few dark blotches along the lower edges of the body from the ventrals to the caudal. Front of dorsal with a black submarginal streak, behind which are broad dark central and submarginal bands; anal with faint marginal and broken central bands; caudal with submarginal streak above and below, and a few spots on its middle rays.

A color sketch from life may be described as follows: ground color pale yellowish; back dusky crossed by five pale bars before the dorsal, and a similar curved pale bar downward from dorsal origin; a dusky shade backward in the middle of the side from the upper angle of the gill-cleft; changing to short blue bars, which extend back to about opposite anal origin, thence about four wider diamond-shaped bars to the middle of the peduncle, and a blue spot in the centre of the caudal base; fins pinkish; the front of the dorsal narrowly blackish and that fin crossed by a central and submarginal dusky band, a central and submarginal dusky band crossing the anal; caudal with submarginal blackish streaks above and below and a narrow dusky submarginal band across the end, dusky marks in the center.

Homalopterinae

HOMALOPTERA Van Hasselt

VAN HASSELT, 1823, 'Poissons de Java,' Allgemeine Konst. en Letterbok, II, p. 130. Type: *Homaloptera fasciata* Van Hasselt.

Ventrals separate, with 8 to 11 rays; three pairs of barbels, two of which are at front of snout. Numerous species in southern Asia and the Indies.

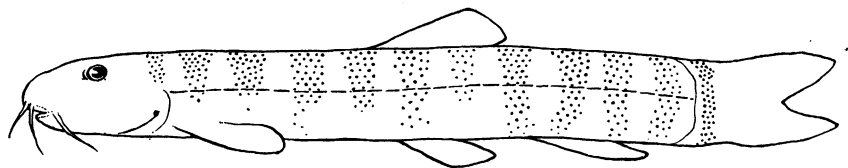


Fig. 11. *Homaloptera fasciolata* Nichols and Pope. 60 mm. without caudal.

Homaloptera fasciolata, new species

DESCRIPTION OF TYPE.—Number 8365, American Museum of Natural History. Locality: Nodoa, Hainan. Length to base of caudal 60 mm. Depth in length 7; head 4.4. Eye in head 6; snout 2.6; interorbital 3.4; maxillary 2.9; width of mouth

2.5; posterior snout barbel 2.7; greatest width (at back of head) 1.4; depth of peduncle 2; its length 1.6; pectoral 1.3; ventral 1.4; longest dorsal ray, 1.5; longest anal ray 1.6; caudal lobe 1.

Dorsal 10; anal 7. Scales very fine, scarcely evident except on sides posteriorly.

Elongate; head depressed; body squarish before dorsal, compressed behind it; peduncle with a low keel above and below confluent with the rudimentary caudal rays; vent slightly nearer anal origin than ventral axil. Lower surface of head, breast and belly flattish; front and sides of head above gently rounded, sloping; outline of snout from above a blunt rounded point; top of head flat, the orbital rim slightly raised; orbit with a free rim; two barbels at each side of the tip of the snout, the posterior slightly longer than a barbel near the tip of the maxillary, and decidedly longer than the anterior. Mouth inferior, transverse, slightly curved; the lips rather full and flaring, free from the jaws; the lower jaw and lower lip cleft; lower end of gill cleft curving downward and backward to terminate below the base of the pectoral. Dorsal origin equidistant from base of caudal and front part of snout; very slightly behind ventral origin; pectoral and ventral reaching a little more than one-half distance to ventral and anal respectively; caudal notched the lower lobe slightly the longer and less pointed.

About eleven more or less obscure broad dark bands across the back and sides; and a narrow blackish bar across caudal base. Dorsal more or less dusky at base and in center; lower fins plain. Of several individuals, the smaller are more sharply marked.

GASTROMYZON Günther

GÜNTHER, 1874, Ann. Mag. Nat. Hist., XIV, p. 454. Type: *Gastromyzon borneensis* Günther.

Body short, flattened below; ventrals with 18 to 21 rays, united to form a suction disk. Few species, East Indian.

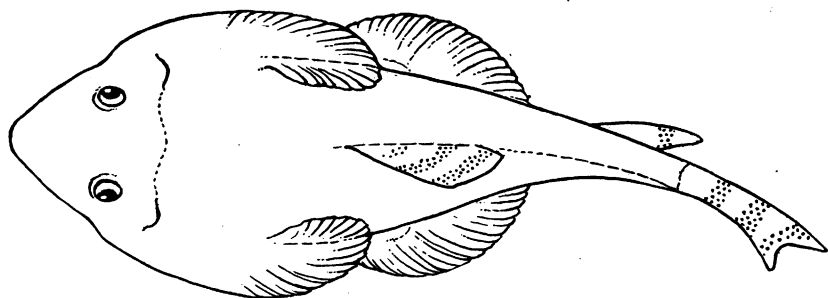


Fig. 12. *Gastromyzon leveretti*, type. 50 mm. without caudal.

Gastromyzon leveretti, new species

A small *Gastromyzon* with barred fins and exerted snout.

DESCRIPTION OF TYPE.—Number 8366, American Museum of Natural History. Locality: Nodoa, Hainan. Length to base of caudal 50 mm. Depth in length

5.6. head 4; pectoral 2.2; ventral 2.8; width between pectoral axils 4; width of ventral disk 2.5. Eye in head 5; snout 2; interorbital 2.2; depth of peduncle 2; its length 2.8; longest dorsal ray 1.4; height of anal 1.5; caudal 1. Width of mouth in snout 2.5; width of gill-cleft 2.6; snout to mouth 3.4.

Dorsal 10; anal 9; pectoral about 30; ventral about 23; scales about 75.

Ventral surface of head and body flat; the bases of the pectorals united with the lower surface of the body to form an oval disk; the ventrals so united to form a circular disk, overlapped by the free ends of the pectorals behind their axils; free end of pectoral 1.4 in its adnate base; tips of ventrals separated behind for about the distal one-third of the last ray; vent equidistant from axil of ventral and origin of anal. Head and body before dorsal depressed, evenly convex; the profile slanting down at an angle of about 45°; peduncle compressed. Mouth entirely inferior; small, semicircular, transverse; upper jaw protractile; a small barbel at the end of the maxillary; several barbels on lower surface of snout overhanging front of mouth; orbital rim free; head with small warty points; largest on edge of snout, small on top of head and on sides back of head. Dorsal origin equidistant from tip of snout and base of caudal; caudal obliquely emarginate, the lower lobe the longer. Lateral line complete, straight, in the center of side; an elongate fleshy flap in the upper axil of the ventral.

Dark olivaceous above; yellowish brown below. Dorsal and caudal barred with black, and anal with one black cross-mark.

Named for Rev. William J. Leverett, of the American Presbyterian Mission of Hainan, who contributed in no small degree to the success of our ichthyological work in Hainan.

Though not found about Nodoo, this fish is probably abundant in the mountain streams to the south.

CYPRINIDÆ. The Carps

Carps are the dominant fresh-water fishes of the present day. They reach their greatest development in Asia, particularly southeastern Asia. They are abundant in individuals and species in North America, though less divided into major forms, and are also well represented in Africa; but are absent in South America, which continent it would seem they have not yet invaded. Carps have no teeth in the mouth, but one or more rows of strong well-spaced teeth on the pharyngeal bones. The typical carp is a fish of normal shape; well scaled; a shortish dorsal fin in the center of the back with or without an initial spine; the caudal more or less lunate or forked. Barbels about the mouth may be present or absent, when present definite in position at the sides and end of the maxillary, not more than two pairs.

Aside from a few aberrant forms, inter-relation of the Cyprinidæ is close, but for convenience they may be divided into several series or subfamilies.

The dorsal and anal fins of cyprinid fishes regularly begin with two simple rays, the second, or last simple ray, long, the first short. These two rays figure in our fin-counts, whether (as in some cases) or not they are sufficiently spinous to be designated as spines (in roman). Occasionally a third simple ray or spine may be made out before these two, but this does not figure in the fin counts, even when sufficiently well developed so that it quite naturally would be counted.

Cyprininae

This subfamily is frequently restricted to the aberrant carp (*Cyprinus*) and goldfish (*Carassius*) with long dorsal fin and serrate anal spine, but these have an obvious affinity to *Barbus* and related forms included in the Cyprininae by Weber and de Beaufort (1916, 'Indo-Australian Fishes,' III) and by the present writers also. Whereas the series from *Barbus* through primitive *Labeo* to *Garra* (better known as *Discognathus*) is likely an evolutionary one; supposing *Varicorhinus* and *Xenocypris* in turn to be derivatives of *Garra*, we would accord this phylum or trend with *Garra* as a primitive member subfamily rank, and also separate the gudgeons from the carps proper in like manner.

BARBUS Cuvier

CUVIER, 1817, 'Regne Animal,' 1st Ed., II (Reptiles, Fishes, etc.), p. 192. Type: *Cyprinus barbus* L.

This large genus is most deversified in the warmer parts of Asia, in Africa, and the Indies. Its type species, however, is a comparatively fine-scaled fish from Northern Europe. *Barbus* has been split into many genera differing but slightly. The aims of nomenclature would seem to be best served for the present by leaving its multitude of closely related species in the genus *Barbus* and recognizing a comparatively few main divisions as subgenera.

Symmetrical free-swimming forms for the most part of small or moderate size; mouth normal or slightly specialized, terminal or somewhat inferior, with two pairs of barbels, occasionally reduced to one pair or absent; scales moderate or large; dorsal short with or without an initial spine (present or absent in otherwise closely related forms) which is frequently serrate when present, caudal forked; no anal spine. Vent situated immediately before anal origin.

Subgenus **SPINIBARBUS** Oshima***Barbus denticulatus*, (Oshima)**

Barbus putitora McCLELLAND, 1844, Calcutta Journ. Nat. Hist., IV, p. 399, fig.; not *B. putitora* Hamilton-Buchanan. *Spinibarbichthys denticulatus* Oshima, 1926, Annot. Zool. Japon., XI, p. 11. Kachek River, Hainan.

Description of a specimen (Number 8388, American Museum of Natural History). Locality: Nodda, Hainan.

Length to base of caudal 85 mm. Depth in length 3; head 3.7. Eye in head 3.3; snout 3.5; interorbital 2.5; maxillary 2.9; posterior barbel 3; depth of peduncle 2; its length 1.9; pectoral 1.1.; ventral 1.4; longest dorsal ray 1.1; longest anal ray 1.4; caudal lobe 0.8.

Dorsal II, 9; anal 8. Scales 29. Teeth 3-rowed, 5, 3 or 4, 2; stout, slightly hooked.

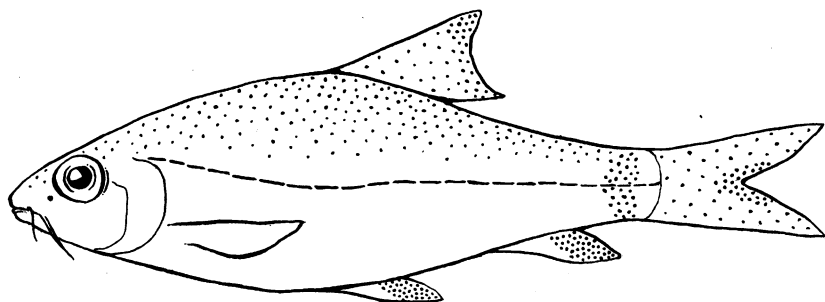


Fig. 13. *Barbus denticulatus* (Oshima). 85 mm. without caudal.

Compressed. Interorbital flat; snout rather pointed; extending slightly beyond the inferior horseshoe-shaped mouth; maxillary protractile; upper lip with cross striæ; the lower free in front; 2 barbels, the posterior decidedly the longer; gill-membranes narrowly joined to isthmus under edge of preopercle. Last simple dorsal ray a slender spine in its basal part, with a soft tip (heavier and finely serrate behind in larger specimens); dorsal origin equidistant from base of caudal and front of eye; over ventral base; pectoral extending three-quarters the distance to ventral; ventral two-thirds the distance to anal; caudal forked with narrow pointed lobes. Scales rough, with radiating striæ; lateral line complete, dropping a little over pectoral, thence running straight, below the center but rising on peduncle and terminating in center.

Dark gray above, the scales narrowly dark-edged, and ill-defined streaks following their centers lengthwise the fish; lower surfaces pale; a vague dark blotch on peduncle at base of caudal; dorsal more or less dusky, its last rays tipped with whitish; pectoral pale; ventral and anal black distally, margined with whitish at the inner corner; caudal grayish, dusky on tips and in notch.

Barbus nigrodorsalis (Oshima)

Spinibarbus nigrodorsalis Oshima, 1926, Annot. Zool. Japon., XI, p. 10. Kachek River, Hainan.

A large-scaled *Barbus*, two pairs of barbels, dorsal black-bordered.

Description of a specimen (Number 8367, American Museum of Natural History). Locality: Nodoa, Hainan, April 23, 1923.

Length to base of caudal 115 mm. Depth in length 4.1; head 3.6. Eye in head 4; snout 3; interorbital 2.7; maxillary 3.5; posterior barbel 3.5; anterior barbel 5; depth of peduncle 2.5; length of peduncle 2.5; pectoral 1.5; ventral 1.6; longest dorsal ray, 1.8; height of anal 1.9; caudal lobe 1.1.

Dorsal 11; anal 7. Scales 20 (last on base of caudal). Teeth 3-rowed, 5, 3, 2; with narrow pointed tips; slightly bent, the main teeth stout.

Head broad, flat-topped, blunt; mouth horizontal, lower jaw slightly the shorter; two slender maxillary barbels; gill-membranes joined to the isthmus;

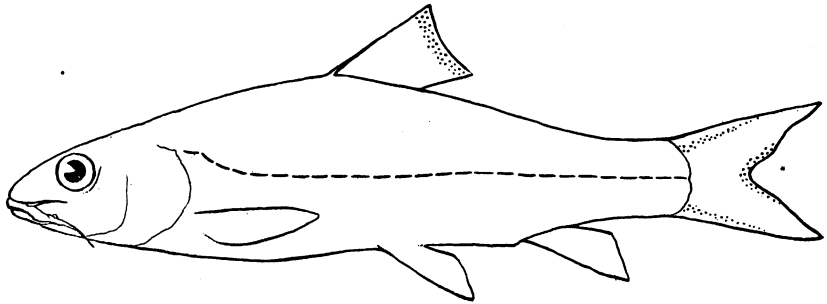


Fig. 14. *Barbus nigrodorsalis* (Oshima). 115 mm. without caudal.

patch of small horny warts on right preorbital; maxillary to under front margin of eye. Last simple ray of dorsal not enlarged or spiny; ventral under center of dorsal; pectoral not reaching ventral; ventral not reaching anal. Lateral line complete; scales roughened with close-set subparallel horizontal striæ.

Dark along the back; scales of sides with dark outlines; belly and lower fins pale; dorsal with conspicuous black upper posterior border; caudal with submarginal dusky streak on the lobes basally, and faint dusky edge in the notch. A color sketch from life is silvery; greenish on the top of head and on the back; scales of back and sides narrowly margined with dark; pectoral, dorsal and caudal fins greenish, the dorsal with a black margin; the caudal with sub-marginal dusky streak above and below; its tips tinged with orange as also the distal portion of the dorsal next to the black margin; ventral and anal fins orange.

Subgenus **PUNTIVUS** Hamilton-Buchanan

Barbus semifasciolatus Günther

Barbus semifasciolatus GÜNTHER, 1868, 'Cat.,' VII, p. 484.

Description of a specimen from Nodoa, Hainan, March 6, 1923:

Length to base of caudal 34 mm. Depth in length 2.6; head 3.2. Eye in head 2.8; snout 3.8; interorbital 2.5; maxillary 4; depth of peduncle 1.7; its length 1.7; pectoral 1.6; ventral 1.6; longest dorsal ray 1.6; longest anal ray 2; caudal lobe 1.2; barbel in eye 1.7.

Dorsal II, 8; anal 8. Scales 24.

Body deep and compressed. Lower jaw slightly included; mouth small oblique; maxillary not reaching front of orbit, with a single short subterminal barbel; gill-

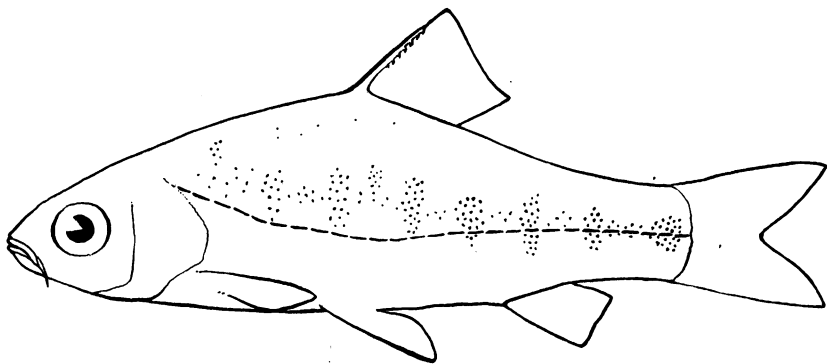


Fig. 15. *Barbus semifasciolatus* Günther. 34 mm. without caudal.

membranes narrowly joined to isthmus. Ventral origin under that of dorsal; pectoral just reaching ventral; ventral not reaching anal; last simple ray of dorsal a slender spine with barbs behind terminally. Body covered with thin cycloid scales with radiating striae; lateral line complete, little depressed, running in the center of the peduncle.

A series of short black bars along middle of side; scales of back and sides edged with dusky. A color sketch from life is olive silvery on the sides, lower parts red; several narrow black bars in the middle of the sides and a black spot at the base of the caudal; fins tinged with red.

This brilliantly colored little fish was common in the many small, grass-grown irrigation reservoirs and ditches of the rice fields about Nodoo. It is hardy, and very variable in color.

Subgenus **LISSOCHILICHTHYS** Oshima

***Barbus barbodon*, new species**

DESCRIPTION OF TYPE.—Number 8368, American Museum of Natural History. Locality: Nodoo, Hainan. Length to base of caudal 193 mm. Depth in length 3.5; head 4.3. Eye in head 5.2; snout 2.5; interorbital 3; maxillary 3.1; greatest width of body 1.9; depth of peduncle 2.2; its length 1.6; pectoral 1.2; ventral 1.3; longest dorsal ray 1.1; longest anal ray 1.2; caudal lobe 0.8. Posterior barbel 1.3 in eye.

Dorsal II, $8\frac{1}{2}$; anal $7\frac{1}{2}$. Scales 41. Teeth 3-rowed, 5, 3, 2, pointed, the tips little bent.

Compressed. Interorbital gently convex; snout pointed, extending a little beyond the inferior slightly oblique mouth; lower jaw with a free tip with horny sheath, projecting beyond the lip the front margin of which is notched in the center; maxillary not nearly to under front of eye; with 2 small barbels, the posterior decidedly the larger; gill-membranes broadly joined to side of breast behind the edge of the preopercle. Last simple ray of dorsal a broad spine with row of sheathed barbs on each

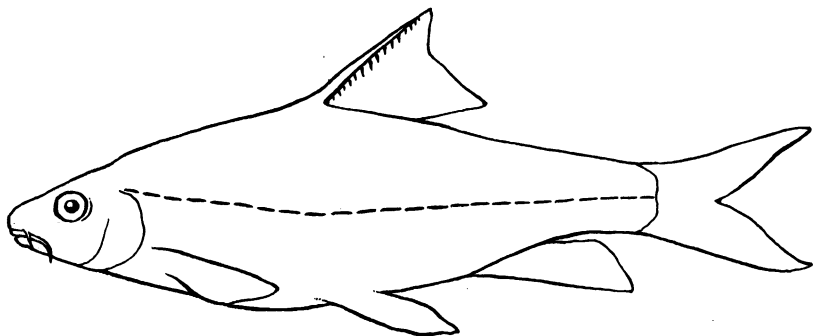


Fig. 16. *Barbus barbodon*, type. 193 mm. without caudal.

side behind, but with a soft tip. Dorsal origin equidistant from tip of snout and posterior part of peduncle; ventral origin slightly behind that of dorsal; pectoral reaching two-thirds the distance to ventral; ventral four-sevenths to anal; anal to caudal base; caudal well forked with pointed equal lobes, the lower the broader. Scales rough with close spaced slightly radiating striæ, subparallel in the center of the scale; lateral line complete, very slightly bent down, in the center of peduncle.

Color darkish, uniform; caudal narrowly margined with blackish behind, especially the lower lobe; and blackish on the membranes of the dorsal.

Two other specimens were obtained.

***Barbus matsudai* (Oshima)**

Lissochilichthys matsudai OSHIMA, 1920, Proc. Acad. Phila., LXXII, p. 121, Pl. III, fig. 2. Formosa.

Oshima (1926) refers to *Barbodes paradoxus* (Günther) a fish from the Kachek River, which seems to us rather to belong with this species which we have in abundance from Fukien province.

Length 55 mm. Sides with vertical black bands. Depth, 3.75; head 4.10. Eye in head 2.75. Dorsal with 10 rays; anal with 7. Scales 40.

CYCLOCHEILICHTHYS Bleeker

BLEEKER, 1859, Nat. Tijdschr. Ned.-Ind., XX, p. 431. Type: *C. armatus* Bleeker.

This genus resembles four-barbelled barbs of the subgenus *Lissochilichthys*, and perhaps represents a further development of the same

trend or phylum. The mouth is conspicuously inferior and somewhat peculiar, lips are connected around the corner of the mouth. An initial serrate dorsal spine. Species of the East Indies and southern China.

***Cyclocheilichthys iridescens*, new species**

Barbels not fringed; end of tubes of scales of lateral line simple, not bifid; eye 1.5 in postorbital part of head; 16 scales around caudal peduncle; 4 scales between ventrals and lateral line. With finer scales than any East Indian species.

DESCRIPTION OF TYPE.—Number 8369, American Museum of Natural History. Locality: Nodoa, Hainan. Length to base of caudal 102 mm. Depth in length 3.3; head 4.1. Eye in head 3.8; snout 2.8; interorbital 2.8; maxillary 5; posterior barbel 4.2; depth of peduncle 2.5; its length 1.6; dorsal spine (with filamentous tip) 1; pectoral 1.1; ventral 1.2½; longest anal ray 1.2½; caudal lobe 0.9.

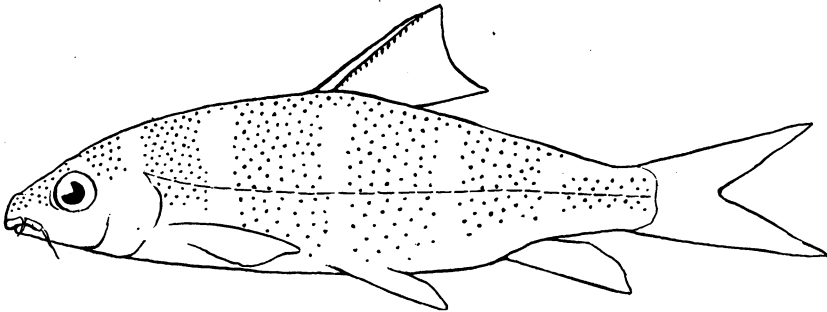


Fig. 17. *Cyclocheilichthys iridescens*, type. 102 mm. without caudal.

Dorsal II, 8; anal 7. Scales 42. Teeth 3-rowed, 4, 3, 2; more or less blunt or imperfectly truncate.

Elongate, moderately compressed, back slightly elevated, breast narrowly rather flat. Snout rather pointed. Mouth small, inferior, horseshoe-shaped, horizontal; maxillary protractile, not reaching eye; with 2 slender barbels, the posterior sub-terminal, decidedly the longer; lips thick, slightly grooved, crossing the base of the mandible, the narrow fused shank of which extends beyond the lip to a somewhat spatulate end which is striate above (inside), the end of the lower jaw thus resembling condition in *Chilogobio*; gill-membranes joined to breast behind the margin of the preopercle. Dorsal origin equidistant from tip of snout and base of caudal; slightly in advance of that of ventral; front of dorsal with a strong spine, serrate behind, which has a soft filamentous tip forming the apex of the fin; pectoral not reaching ventral, ventral not reaching anal, anal almost to caudal base; caudal strongly forked with pointed equal lobes. Scales rough, with subparallel or slightly radiating striæ; lateral line complete, straight, in center of peduncle.

Above dark, belly pale; scales of sides more or less margined with (or with marginal bars of) dark; 4 or 5 broad dark shades across sides with narrow paler interspaces; fins plain.

OSTEOCHILUS Günther

GÜNTHER, 1868, 'Cat.,' VII, p. 40. Type: *Rohita melanopleura* Bleeker.

Two pairs of barbels; mouth inferior with expanded conspicuously striate lips, the upper confluent with the lower; dorsal rather long, without a spine; scales of moderate size.

Osteochilus salsburyi, new species

Peduncle surrounded by 16 scales; eye above the level of the upper lip; several (varying in number and distinctness) very small indentations on snout, each at times provided with a minute tubercle, no conspicuous pores. Between ventral and lateral line $4\frac{1}{2}$ series of scales; $6\frac{1}{2}$ series below lateral line before ventral; 6 series between lateral line and dorsal. Depth of peduncle 1.3 in its length.

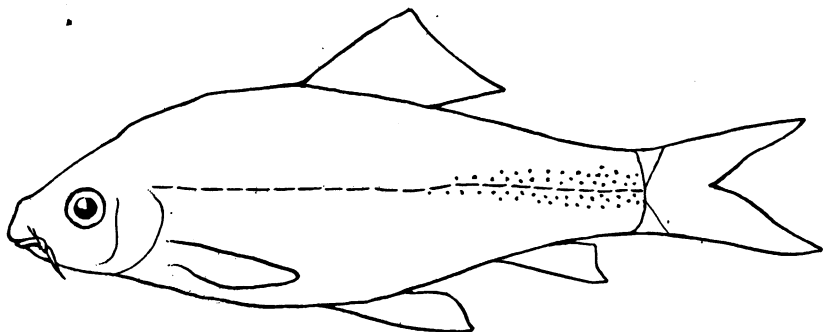


Fig. 18. *Osteochilus salsburyi*, type. 85 mm. without caudal.

DESCRIPTION OF TYPE.—Number 8371, American Museum of Natural History. Locality: Nodda, Hainan. Length to base of caudal 85 mm. Depth in length 3.1; head 4. Eye in head 3.9; snout 2.5; interorbital 2; maxillary 3; width of mouth 3.5; maxillary barbel 4.5; depth of peduncle 1.9; its length 1.5; pectoral 1.1; ventral 1.3; longest dorsal ray 1.3; longest anal ray 1.5; caudal lobe 0.8.

Dorsal 13; anal $7\frac{1}{2}$. Scales 34.

Compressed; head broad and blunt. Mouth inferior transverse horizontal horseshoe-shaped, very slightly behind tip of snout; overhung squarely in front by the thick free vertical snout membrane; lower jaw broad and squarish at the end; lips thick fringed striate-papillose, the lower broadly free in front, confluent with chin behind; a barbel at the corner of the snout membranes and subterminally on the maxillary, the latter decidedly the longer; interorbital convex; gill-membranes broadly joined to side of breast behind edge of preopercle. Dorsal and anal without spinous rays; dorsal origin equidistant from tip of snout and anal axil; ventrals situated before the center of dorsal base; pectoral reaching $\frac{2}{3}$ the distance to ventral; ventral $\frac{3}{4}$ to anal; caudal well forked with bluntly pointed equal lobes. Scales rough, with conspicuous close-spaced subparallel horizontal striae; lateral line complete, straight, in the center.

Color dark, paler on opercle and lower surfaces; a dark central longitudinal band on peduncle faintly indicated; sides with obscure blackish bars on the scale tips.

Apparently slightly different from *Osteochilus vittatus* (Cuvier and Valenciennes, 1842) from Borneo, Java, Sumatra, Tonkin, which is described as having 3 conspicuous pores on snout; and also close to *Osteochilus brachynotus* (Bleeker, 1855) from Sumatra. See Weber and de Beaufort, 1916, III, pp. 124-141, for an analysis of this finely divided genus.

Named for Dr. Clarence G. Salsbury, of the American Presbyterian Mission of Hainan, in appreciation of his interest and aid in the work.

A number of specimens. An unusually large one (155 mm. to base of caudal) has 3 small warts in a triangle in center of snout somewhat larger than the others of 20 or so scattered ones.

This is probably what Oshima (1926) has identified with *Osteochilus brachynotus* (Bleeker) of Sumatra.

CYPRINUS Linnaeus

LINNAEUS, 1758, 'Syst. Nat.', 10th Ed., I, p. 320, after Artedi. Type: *Cyprinus carpio* Linnaeus.

Anal as well as dorsal with a serrate spine; dorsal long (rarely shorter); two pairs of barbels (rarely one pair); teeth in 3 rows, molar-like.

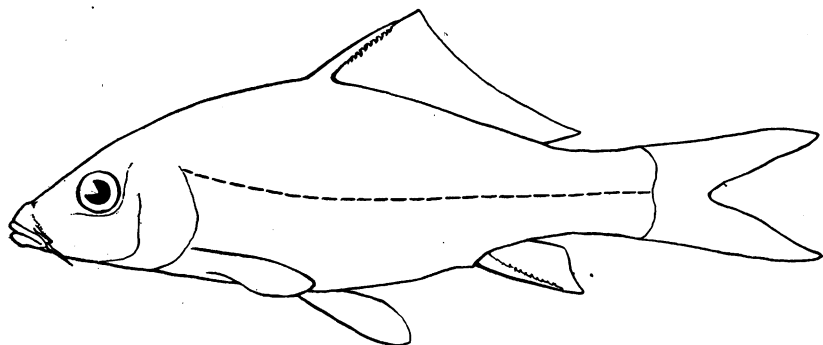


Fig. 19. *Cyprinus carpio* Linnaeus. 122 mm. without caudal.

Cyprinus carpio Linnaeus

Cyprinus carpio LINNAEUS, 1758, 'Syst. Nat.', 10th Ed., I, p. 320.

Description of a specimen from Nodda, Hainan:

Length to base of caudal 120 mm. Depth in length 3; head 3.2. Eye in head 4.3; snout 2.6; interorbital 3; maxillary 3.4; maxillary barbel 5.5; depth of peduncle 2.4; its length 2; pectoral 1.5; ventral 1.6; longest dorsal ray 1.7; longest anal ray 1.7; caudal lobe 1.

Dorsal II, $20\frac{1}{2}$; anal II, $5\frac{1}{2}$. Scales 35.

Compressed. Interorbital a little convex; snout pointed; lower jaw very slightly included; mouth horizontal; maxillary not nearly to under front of eye; with 2 barbels, the terminal somewhat the longer; gill cover with faint striæ, radiating downward and backward; gill-membranes joined to sides of isthmus under edge of preopercle. Dorsal and anal with stout spines, barbed behind, that of the dorsal strongly, of the anal weakly so; the dorsal especially with a soft tip; axils of dorsal and anal apposed; dorsal origin equidistant from tip of snout and base of caudal, over center of ventral base; pectoral and ventral rounded; pectoral passing ventral origin; ventral reaching two-thirds distance to anal; caudal well forked with broad pointed lobes. Scales rather rough with faint radiating striæ; lateral line complete, slightly bent down, in the center of peduncle.

Dark; scales with narrow dark edges; paler on lower surfaces; fins dusky. Several specimens of which this is one of the smaller.

CARASSIUS Nilsson

NILSSON, 1832, 'Prodromus Ichthyologiæ Scandinaviæ.' IV, p. 290. Type: *Cyprinus carassius* L.

Anal as well as dorsal with a serrate spine; dorsal long; no barbels; teeth in one row, compressed.

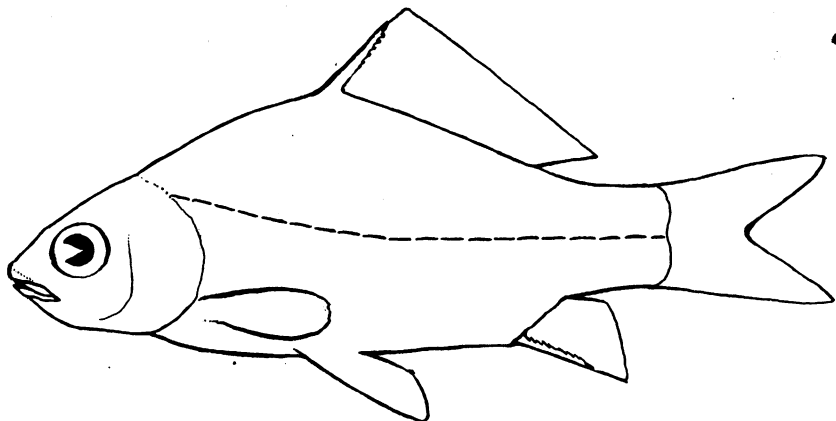


Fig. 20. *Carassius auratus* (Linnæus). 83 mm. without caudal.

Carassius auratus (Linnæus)

Cyprinus auratus LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., I, p. 322.

Description of a specimen from Nodda, Hainan:

Length to base of caudal 80 mm. Depth in length 2.4; head 3.2. Eye in head 3.6; snout 3.6; interorbital 2.7; maxillary 3.2; pectoral 1.5; ventral 1.4; caudal lobe 1; dorsal spine 1.6; anal spine 1.8; depth of peduncle 1.8.

Dorsal II, 18; anal II, $5\frac{1}{2}$. Scales 29.

Mouth small, lower jaw slightly the shorter. First spine of dorsal and anal rudimentary, the last stout and serrate behind. Pectoral reaches front of ventral, ventral not to anal. Color brownish.

Description (for comparison) of a small specimen from Tungting Lake, Hunan, December 25, 1921. Length to base of caudal 99 mm. Depth in length 2.4; head 3.6. Eye in head 3.4; snout 3; interorbital 2.5; maxillary 3.1; pectoral 1.5; ventral 1.3; caudal lobe 1; dorsal spine 1.6; anal spine 1.7; depth of peduncle 1.7.

Dorsal II, 20; anal II, 5. Lateral line 28.

Mouth small, jaws equal. First spine of dorsal and anal rudimentary, the last stout and serrate behind. Pectoral reaches front of ventral, ventral not to anal. Color brownish.

In life the upper margin of the Hainan gold-fish's eye is red. In this respect Hainan examples differ from the northern ones.

Gobioninæ¹

The gudgeons are a numerous and variable Eurasian group or series tending towards elongate forms, strictly inferior mouth with free, more or less papillose or striate lips, vent placed well forward towards ventral axil, small scales, naked breast. They are characterized by a single, well-developed pair of barbels at the end of the maxillary, rarely absent, and we know of no case where the anterior pair, characteristic of the Cyprininae, is present. The dorsal spine, the presence or absence of which is of so little moment in the Cyprininae, is with the Gobioninae present only in the aberrant genus *Hemibarbus* (and *Acanthogobio*), where it is strong and smooth. *Hemibarbus* is placed outside this group and close to *Barbus* by some authors. The above-mentioned gobionin tendencies are variously present or absent in each of the many species and form an unsatisfactory basis for their separation into genera. The most primitive gudgeons, if they stood alone, might well enough be classed with the Cyprininae.

¹While this paper is in press several specimens of a minnowlike gudgeon from Nodda have been referred to the genus *Gnathopogon* as follows:

***Gnathopogon atromaculatus*, new species**

Length to base of caudal (of type, No. 8442, Amer. Mus. Nat. Hist.) 54 mm. Depth in length 4.2; head 3.5. Eye in head 2.8; snout 3.5; interorbital 3.4; maxillary 3.7; width of mouth 3.3; barbel 3; width of body (at shoulder) 2; depth of peduncle 2.6; its length 1.5; pectoral 1.5; ventral 1.7; longest dorsal ray 1.3; longest anal ray 1.7; caudal lobe 1.

Dorsal 9; anal 8. Scales 36.

Moderately compressed; breast and belly rounded; vent at $\frac{3}{4}$ the distance from anal origin to ventral axil. Interorbital slightly concave; eye large, oval, slightly superolateral; snout broad, sharp, soft (apparently an age character); upper jaw protractile; maxillary slightly oblique not reaching to under front of eye; lower jaw without free lip, distinctly included; a subterminal barbel, very slender distally; gill-membranes joined to isthmus under posterior margin of eye. Dorsal and anal without spinous rays; dorsal origin slightly nearer tip of snout than tip of depressed anal; pectoral reaching more than $\frac{3}{4}$ the distance to ventral; ventral $\frac{3}{4}$ to anal; caudal well forked with narrow pointed lobes. Scales thin; body completely scaled; lateral line complete, dipping slightly in front, in the center of peduncle.

Pale. Some black marking along base of dorsal, particularly a black spot at its origin; a faint dark stripe in the center of peduncle, rising above lateral line over ventral; a short dark stripe behind the vent; a faint dark shade at the base of each caudal lobe. Smaller specimens have the scales of back slightly outlined in dark, peduncular stripe bolder, marking along lateral line as in *G. wolterstorffi* sometimes faintly indicated. The spot at dorsal origin is constant.

Though an indefinite group baffling definition, the Gobioninæ as here understood (with the exception of *Sarcocheilichthys*, which we have been tempted to place in the Cyprininae) may be rather easily referred to two or three parallel basally approximate phyla. The forms are most numerous in central China but do not extend into the Indies and apparently form a much smaller part of the Hainan fauna than of the fauna at any point on the mainland to the north.

SARCOCHEILICHTHYS Bleeker

BLEEKER, 1859, Nat. Tijdschr. Ned. Ind., XX, p. 435. Type: *Leuciscus variegatus* Temminck and Schlegel.

The type of *Sarcocheilichthys* is Japanese. In dealing with related mainland forms, Berg retains *Sarcocheilichthys* for *S. sinensis* and its allies, and proposes *Chilogobio* Berg for the others. But *S. variegatus* appears to be more closely related to *Chilogobio* than to *S. (sinensis) lacustris* figured by him. We believe that three subgenera should be recognized including *Barbodon* Dybowski with *Barbodon lacustris* Dybowski as type.

Subgenus **CHILGOBIO** Berg

BERG, 1914, 'Faune de la Russie, Poissons,' III, part 2, p. 488. Type: *Chilogobio sotdatovi* Berg = *Georgichthys* NICHOLS, 1918, Proc. Biol. Soc. Wash., XXXI, p. 17.

Small fishes with a general resemblance to *Barbus*. No barbels; mouth small, somewhat inferior; lower jaw with a narrow shaft, expanded at the tip, conspicuous lips stopping at its sides. Vent in an intermediate position between ventral axil and anal origin. Scales about 40, lateral line complete, straight, in the center; a single row of pharyngeal teeth. Several closely related forms in eastern Asia.

This subgenus is closely related to *Barbodon* (subgenus) which has a more gobioninoid form, a minute barbel at the end of the maxillary, and horny tip to the lower jaw, and it has likely at times been mistaken for the young of same. We had in mind the possibility of its being such until convinced of its distinctness by comparable material (same size) of each from Tungting Lake, Yang-tze.

Sarcocheilichthys hainanensis, new species

Plate XXVI, Figure 3

DESCRIPTION OF TYPE.—Number 8370, American Museum of Natural History. Locality: Nodoa, Hainan, July 28, 1923. Length to base of caudal 62 mm. Depth in length 4.0; head 4.0. Eye in head 3; snout 3; interorbital 3; maxillary 3.7; length of peduncle 1; depth of peduncle 1.8; pectoral 1.1; ventral 1.3; longest dorsal ray 1; longest anal ray 1.5; caudal lobe 1.

Dorsal 9; anal 9; scales 40.

Body moderately compressed. Mouth protractile, small, curved, inferior, with thick smooth lips, those of the lower jaw at base only, completely separated by narrow shaft and expanded tip of same; maxillary barely reaching front of orbit; gill-membranes united to isthmus, distance between the slits less than half eye. Dorsal with its anterior rays neither stiffened nor thickened; center of its base equidistant from front of eye and base of caudal; pectoral extending not quite to ventral; ventral falling far short of anal, and anal of caudal; ventral inserted a little behind dorsal origin; caudal well forked. Scales with somewhat roughened surface and close-set parallel or subparallel horizontal striæ; lateral line complete.

Dark along back and irregularly dark along middle of side, with an elevated dark blotch or area under dorsal; dorsal with a black vertical streak in front and behind; caudal with black stripes in center of lobes; ventral and anal with broad black central cross-blotches, and pectoral with a fainter linear black spot along the upper edge. A

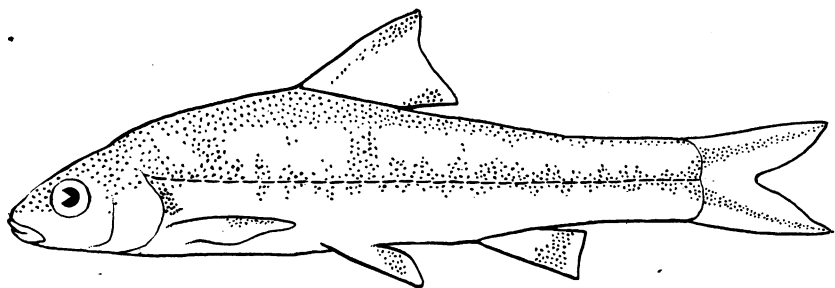


Fig. 21. *Sarcocheilichthys hainanensis*, type. 62 mm. without caudal.

color sketch from life is as follows: midline of back dusky, sides straw-yellow, lower parts silvery white; a narrow dusky stripe in the middle of the side from the head to the base of the caudal fin, scattered scales along this stripe and irregularly above it especially below dorsal, black; fins pale, the front, and posterior corner of the dorsal, center of caudal lobes, band across ventral and anal and a rather faint mark along upper pectoral rays, black.

This is a rare fish about Nodda. We saw only three or four examples: one was taken in the small stream that rises just northeast of Nodda.

Chilogobio appears to be one of the commonest and most widely distributed groups of small fishes in China. Berg has given an analysis of the genus (subgenus) wherein he recognizes six forms: *czerskii* Berg, Lake Chanka; *soldatovi* Berg, Amur; *sciistius* (Abbott), Chihli; *nigripinnis* (Günther), Shanghai; *imberbis* (Sauvage and De Thiersant), Shensi; *nitens* (Günther), Shanghai. From the type description of *nitens* we are convinced that it is not a closely related fish, and should be excluded from *Chilogobio* and *Sarcocheilichthys* altogether. On the other hand, *scaphignathus*, type of the genus *Georgichthys* Nichols (1918, Proc. Biol. Soc. Wash., XXXI, p. 17), is a *Chilogobio*. In addition to

nigripinnis from Anhwei, *scaphignathus* from Fukien, and the present species, Hainan, our Chinese collections contain another undescribed form from Tungting Lake, middle Yang-tze, so comparatively closely allied to *soldatovi* and *sciistius* on the one hand and *nigripinnis* on the other that the four may best be considered subspecies. This Yang-tze fish may stand as follows.

***Sarcocheilichthys nigripinnis tungting*, new subspecies**

DESCRIPTION OF TYPE.—Number 8387, American Museum of Natural History. Locality: Huping, Tungting Lake, Hunan. Length to base of caudal 80 mm. Depth in length 3.9; head 4. Eye in head 4; snout 3.5; interorbital 3; maxillary 3.3; width of mouth 4; width of body 1.8; depth of peduncle 2; its length 1.5; pectoral 1.4; ventral 1.6; longest dorsal ray 1.1; longest anal ray 1.7; caudal lobe 1.1.

Dorsal 9; anal 8. Scales 42.

Moderately compressed; the back somewhat elevated; breast broadly rounded; vent a little nearer anal origin than to ventral axil. Interorbital flattish, very slightly convex; snout bluntly pointed; mouth nearly horizontal, transverse, curved; upper jaw protractile; lower jaw included; maxillary not reaching to under front of eye; no barbels; sides of snout and cheeks with small scattered, poorly developed warty prominences; gill-membranes broadly joined to isthmus behind edge of preopercle. Dorsal and anal without spinous rays; dorsal origin equidistant from snout and anal axil; ventral origin under center of dorsal base; pectoral rounded, not reaching ventral, ventral not reaching anal; caudal moderately forked with bluntly pointed lobes. Scales rough with subparallel slightly radiating striæ; lateral line complete, in center, rising very slightly to meet opercle.

A black oblique bar immediately behind opercle; sides with many irregular dark cross blotches, and slight tendency for these to form a lateral stripe. Fins dusky grayish more or less uniform, the ventral and anal darker with pale edges.

A number of specimens, of which the type is one of the largest. Smaller ones have a definite blackish lateral stripe; one of 50 mm. colored much as typical *nigripinnis* from Anhwei but in most the fins are more uniform. *Barbodon* from the same locality compared down to a smaller size than this specimen, readily separated from it by blunter head, less compressed body, horny tip of lower jaw, small barbel, and different color.

Pseudogobio maculatus Günther (1888, Ann. Mag. Nat. Hist., p. 432) from farther up the Yang-tze seems to be a *Chilogobio*, not a *Barbodon* as supposed by Berg; but, from color, close to *czerskii* and *scaphignathus* rather than the *nigripinnis* group.

Analysis of *Chilogobio*

- 1.—Slender (depth less than head); ventral under first third versus middle of dorsal.
S. (Chilogobio) imberbis (Sauvage and De Thiersant).
 Not as above. 2.
- 2.—Lower fins pale, unmarked; scales 39 to 40; depth 3.7 to 3.8; eye 3.4 to 3.6; length of peduncle 1 to 1.1; dark mark on front of dorsal, dark center to caudal lobes. Ventral origin before center of dorsal base. 3.

Lower fins grayish, dusky, or largely occupied by blackish blotches; scales 38 to 42; depth 3.9 to 4.2; eye 3.7 to 4; length of peduncle 1.1 to 1.7; dorsal dusky more or less darker before and behind, or with extensive black marks before and behind and a pale center; marks on caudal lobes obscure or absent. Ventral origin about under center of dorsal base.

S. (Chilogobio) nigripinnis (Günther).....4.

Body and fins pale with sharp blackish marks, such on front and back of dorsal, center of lower fins, center of caudal lobes; scales 40; depth 4; eye 3; length of peduncle 1. Ventral origin before center of dorsal base.

S. (Chilogobio) hainan Nichols and Pope.

3.—Mouth slightly oblique; pectoral 1.4.....*S. (Chilogobio) czerskii* Berg.

Mouth horizontal; pectoral 1.....*S. (Chilogobio) scaphignathus* (Nichols).

4.—Length of peduncle 1.1; scales 39 to 41; depth 4 to 4.2; dorsal dusky; body dark with conspicuous blackish bar behind head.....*S. (C.) n. soldatori* Berg.

Length of peduncle 1.3 to 1.5; scales 38 to 42; depth 3.9 to 4.5; dorsal darker before and behind; body dark with more or less conspicuous blackish bar behind head.....5.

Length of peduncle 1.7; scales 38; depth 4.1; dorsal black before and behind; pale in center; lower fins largely covered with dark blotches.

S. (C.) n. nigripinnis (Günther).

5.—Dorsal origin equidistant from tip of snout and middle of peduncle; depth 4 to 4.5; scales 38 to 40; length of peduncle 1.3; pectoral 1.3.

S. (C.) n. sciistius (Abbott).

Dorsal origin equidistant from tip of snout and anal axil; depth 3.9; scales 42. length of peduncle 1.5; pectoral 1.4....*S. (C.) n. tungting* Nichols and Pope.

HEMIBARBUS Bleeker

BLEEKER, 1859, 'Conspectus syst. Cyp.,' Nat. Tijdschr. Ned-Ind., XX, p. 431. Type: *Gobio barbatus* Temminck and Schlegel.

Moderately elongate, head below and breast moderately flattened; tip of snout somewhat expanded, with a dent behind it; eye large, placed high, very slightly superolateral; mouth inferior, with thick lips; a single pair of barbels at the end of the maxillary; vent immediately before anal origin; dorsal with a long stout smooth spine. Teeth 3-rowed, 5, 2 or 3, 1.

Hemibarbus labeo (Pallas)

Cyprinus labeo PALLAS, 1776, 'Reise,' III, pp. 207, 703.

Description of a specimen from Nodua, Hainan:

Length to base of caudal 131 mm. Depth in length 4.3; head 3.3. Eye in head 4; snout 2.3; interorbital 4; maxillary 2.7; dorsal spine 1.2½; pectoral 1.1; ventral 2; longest anal ray 1.9; caudal lobe 1.3; depth of peduncle 3.3; its length 1.9. Barbel in eye 2.

Dorsal II, 7; anal 8. Scales 47.

¹*S. (C.) maculatus* (Günther) probably comes here. Depth 4; head 4; pectoral slightly less than head; scales 41; interorbital as wide as orbit.

Moderately compressed, the back little elevated; vent immediately before anal; head below and breast moderately flattened; the ventrals but not the pectorals in a horizontal plane. Snout pointed, its tip expanded with a dent behind well in advance of nostril; eye placed high, very slightly superolateral; mouth inferior, with rather

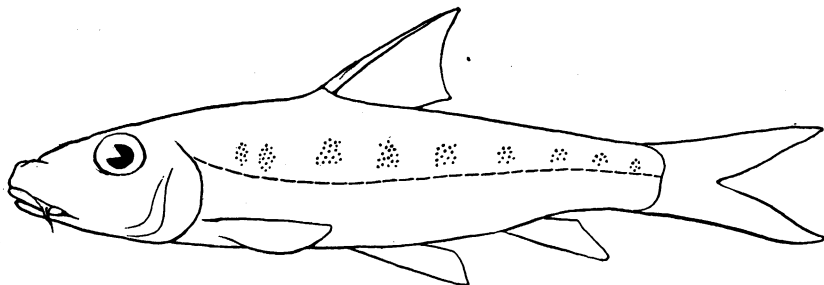


Fig. 22. *Hemibarbus labeo* (Pallas). 131 mm. without caudal.

thick lips, the lower jaw decidedly the shorter; a slender barbel near the end of the maxillary; interorbital very slightly concave; gill-membranes joined to isthmus under edge of preopercle. Last simple dorsal ray a long strong smooth spine, extending approximately to the tip of the fin; dorsal origin appreciably nearer tip of snout than base of caudal; ventral base under middle of dorsal; pectoral not quite reaching ventral; ventral not nearly reaching anal; caudal strongly forked with even pointed lobes. Lateral line complete, dipping slightly in front, running straight in center of tail.

Brownish; darker along the back; about 9 small blackish marks along side above lateral line; fins unmarked.

PSEUDOGOPIO Bleeker

BLEEKER, 1860, Prodr. Cypr., p. 215. Type: *Gobio esocinus* Temminck and Schlegel.

Short-bodied or moderately elongate, little compressed, more or less flattened on the breast; tip of snout usually marked off by a dent behind it; eye superolateral; mouth inferior; lips thick, free behind across chin, corrugated papillose; a barbel at the end of the maxillary; vent nearer ventral axil than to anal origin; breast naked. A main row of 5 teeth, sometimes 1 tooth in a second row. Scales in lateral line less than 45.

Pseudogobio kachekensis Oshima

Pseudogobio kachekensis OSHIMA, 1926, Annot. Zool. Japon., XI, p. 13. Kachek River, Hainan.

Length 62 mm. Depth in length, 6.4; head 4.25. Snout in head 2.4; eye 3. Dorsal rays 10; anal 8. Scales 34. Back indistinctly maculated with black; dorsal and caudal grayish; the rest of the fins whitish.

From the description this species is closer to *P. fukiensis* Nichols (1926, Amer. Mus. Novit., No. 224, p. 5, fig. 4) than to *P. labeoides* from Nodda. It is slenderer than the former.

***Pseudogobio labeoides*, new species**

This fish bears a superficial resemblance to *Hemibarbus labeo*.

DESCRIPTION OF TYPE.—Number 8372, American Museum of Natural History. Locality: Nodoa, Hainan. Length to base of caudal 90 mm. Depth in length 4.8; head 3.4. Eye in head 3.7; snout 2; interorbital 5; maxillary 2.6; greatest width (at back of head) 1.9; depth of peduncle 3.5; its length 2; pectoral 1.3; ventral 1.8; longest dorsal ray 1.4; longest anal ray 2; caudal lobe 1.3; Barbel in eye 1.5.

Dorsal 9; anal 8. Scales 40. Teeth compressed, with a slight hook and pronounced shoulder.

Little compressed; head somewhat cuboid, broader beneath than above; vent more than twice as distant from anal origin as from ventral axil. Snout long and somewhat pointed, its end marked off by a dent before the nostril; upper jaw protractile downward; lower jaw much included; maxillary not reaching to opposite

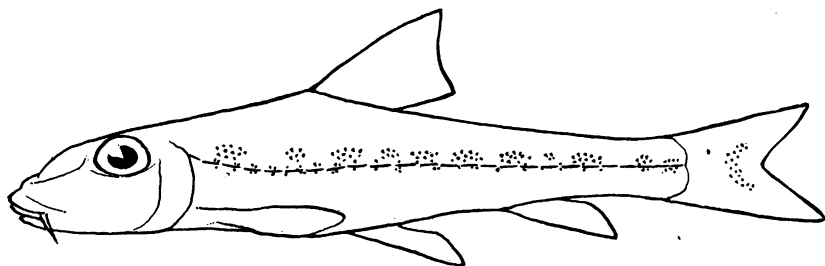


Fig. 23. *Pseudogobio labeoides*, type. 90 mm. without caudal.

front of eye; lips loose, corrugated-papillose, free behind across the chin; a small subterminal maxillary barbel; eye superolateral; interorbital a little concave; orbit with free rim and narrow membranous lids; gill-membranes joined to isthmus under hind border of eye. Dorsal and anal without spinous rays; dorsal origin equidistant from tip of snout and tip of last anal ray; ventral origin under middle of dorsal base; pectoral reaching ventral origin; ventral $\frac{2}{3}$ to anal; caudal moderately forked. Scales with close-spaced slightly radiating striæ; no scales on breast before pectoral axil; lateral line complete, straight in the center, rising a little in front to meet opercle.

Color pale, a series of small faint dark blotches along middle of side mostly above lateral line, with tendency to confluence; small blackish spots here and there along lateral line; back with a few spots and marks; short dark stripes forward from nostril meeting on snout; a small dark spot above pectoral axil; faint curved dark bar on caudal, fins otherwise plain.

Xenocypridinae

Members of the genus *Xenocypris* are slender, free-swimming fishes, not unlike certain of the Abramidinae in contours, but with a peculiar inferior transverse mouth. We are of the opinion that this mouth is a relic which they have from ancestral bottom-living fishes such as *Garra*, and include *Garra*-like and *Xenocypris*-like forms in a distinct subfamily.

GARRA Hamilton-Buchanan

HAMILTON-BUCHANAN, 1822, 'Fishes of the Ganges,' p. 393. Type: *Cyprinus lamita* Hamilton-Buchanan.

Little or moderately compressed; mouth inferior, transverse, curved; usually 1 or 2 pairs of barbels, sometimes absent; dorsal without a spine; gill-membranes broadly and conspicuously united to isthmus, a suction disc on the chin, free behind.

Garra imberbis (Vinciguerra)

Discognathus imberbis VINCIGUERRA, 1890, Ann. Mus. Genov., (2) IX, p. 277, Pl. IX, fig. 7. Karengé Hills, Burma.

Discognathus imberbis BOULENGER, 1899, Proc. Zool. Soc. London, pt. 2, p. 961.

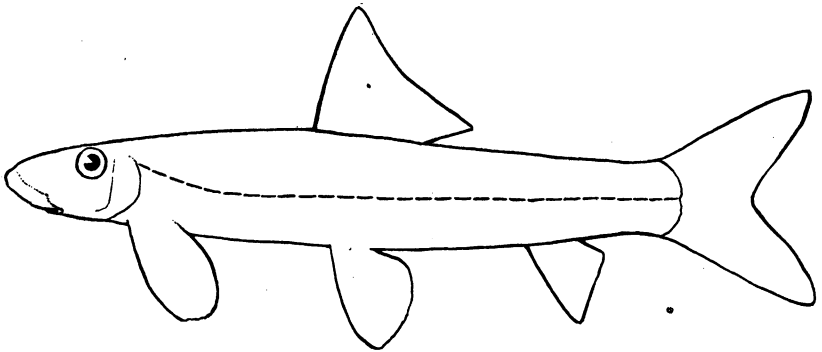


Fig. 24. *Garra imberbis* (Vinciguerra) after Vinciguerra.

Depth $5\frac{3}{4}$ to $6\frac{3}{4}$, head $4\frac{1}{2}$ to $5\frac{1}{2}$ in length of body. Width of head about $1\frac{1}{2}$ in its length. Eye small, $2\frac{1}{4}$ to $2\frac{1}{2}$ in length of snout, 2 to $2\frac{1}{2}$ in interorbital. No barbels. Dorsal 11; anal 7; lateral line 44. Teeth 5,4,1.

Boulenger lists this fish from Hainan. There is a possibility that he has confused it with *Varicorhinus discognathoides* Nichols and Pope, which it certainly is not.

Garra schismatorhyncha, new species

DESCRIPTION OF TYPE.—Number 8373, American Museum of Natural History. Locality: Nodoa, Hainan. Length to base of caudal 108 mm. Depth in length 4.5; head 4.1. Eye in head 4.6; snout 2; interorbital 2.7; maxillary 2; width of mental disk 2.1; depth of peduncle 1.9; its length 1.6; pectoral 1; ventral 1.2; longest dorsal ray 1; longest anal ray 1.4; caudal lobe 0.8. Barbels in eye 1.9.

Dorsal 10; anal 7. Scales 33.

Moderately compressed; top of head flat; lower surface of head breast and belly flat so that pectorals and ventrals are in a horizontal plane; vent something more than twice as far from ventral axil as from anal origin. Forehead ending in a triangular

projection, beneath which a deep re-entrance, and there is also a more anterior groove across lower level of snout; tip of forehead and top of snout with small horny warts; mouth transverse on lower surface of head about half-way between tip of snout and eye; overhung in front by membrane of lower surface of snout which has a finely papillose margin and regularly and rather finely notched edge; smooth chin and surrounding semicircular finely papillose lip forming a large disk, at the corner of which

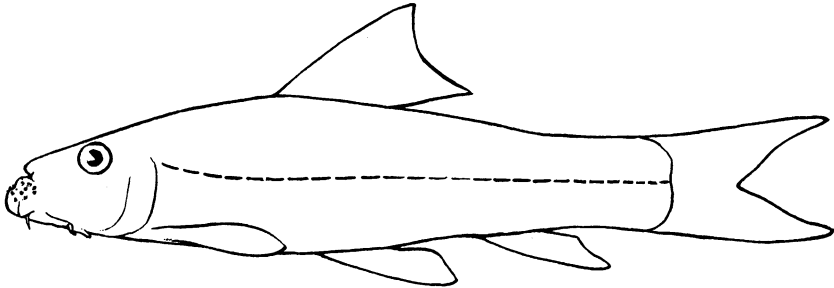


Fig. 25. *Garra schismatorhyncha*, type. 108 mm. without caudal.

there is a small maxillary barbel, about the same length as a small barbel at side of lower surface of snout; eye placed high, almost strictly lateral; gill-membranes conspicuously joined to isthmus on lower surface of head under posterior edge of eye; maxillary to under front of eye. Dorsal and anal without spines; dorsal origin equidistant from tip of snout and anal axil; ventral beneath the middle of dorsal; pectoral not reaching ventral, ventral not reaching anal; caudal forked, the lobes about equal. Scales rough, with fine parallel horizontal striæ; lateral line complete, straight, in the center; large scales running well out on caudal base.

Color brownish; top and sides of head darker; as also an area on the end of the pectoral toward the inside, and distal outer margins of caudal.

Schismatorhynchos heterorhynchos of Sumatra and Borneo is deeper-bodied, with barbels shorter relative to the eye, and upper caudal lobe decidedly longer than the lower. Otherwise it resembles this species closely in appearance, but *G. schismatorhyncha* has a *Garra* mouth; unlike that figured for *S. heterorhynchos*.

G. schismatorhyncha was not a common fish in Hainan, for we got only two or three specimens. They were taken in the cascades of the river that flows three miles southwest of Nodoa.

VARICORHINUS Rüppell .

RÜPPELL, 1836, Museum Senckenberg, II, p. 14. Type: *Varicorhinus beso* Rüppell = *Labeo varicorhinus* Cuvier and Valenciennes. BERG, 1916, 'Les Poissons des Eaux Douces de la Russie,' p. 244.

Free-swimming fishes with inferior mouth, less curved, more strictly transverse than in *Garra*; lower jaw coming to a sharp, cartilaginous edge; without free sucking disc at the chin; usually one or two pairs of

small or minute barbels; dorsal without a developed spine. Vent immediately before anal origin. Berg unites *Gymnostomus* and other genera under the comprehensive genus *Varicorhinus*. This may doubtless be apportioned into various subgenera to advantage, and our Hainan species appears to differ subgenerically from barbelled mainland forms. Many species and several generic names of long standing are involved.

***Varicorhinus discognathoides*, new species**

DESCRIPTION OF TYPE.—Number 8389, American Museum of Natural History. Locality: Nodda, Hainan. Length to base of caudal 225 mm. Depth in length 3.6; head 4.6. Eye in head 6; snout 2.3; interorbital 2.3; maxillary 2.1; width of mouth 2; width of body 1.4; depth of peduncle 1.5; its length 1.4; pectoral 1; ventral 1.1; longest dorsal ray 1; upper caudal lobe 0.6; distance between gill clefts 4.5.

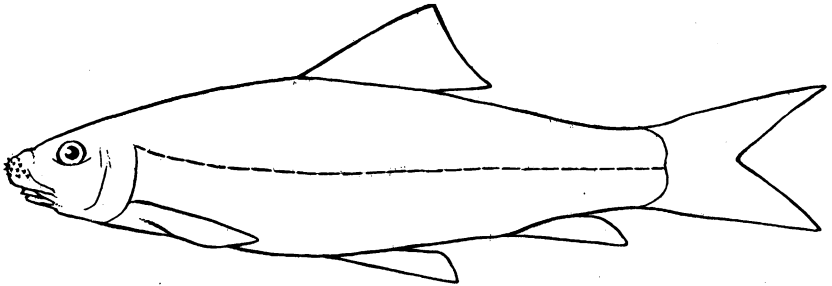


Fig. 26. *Varicorhinus discognathoides*, type. 225 mm. without caudal.

Dorsal 12; anal 7. Scales 39. Teeth in 3 rows 5, 4, 2, not hooked, some of them truncate.

Compressed, front of back slightly elevated; vent almost immediately before anal origin. Head bluntly pointed, its top and lower surface flattish, the snout squarish. Tip of snout slightly gibbous, marked off by a transverse crease above; with a cross-band of small horny warts; mouth inferior, semicircular transverse; no barbels; maxillary slightly produced in a rounded point which reaches to under anterior margin of eye; free edges of vertical hanging snout membrane and upper lip slightly dented; lower jaw ending in a smooth curved leathery horizontal edge; lower lip papillose, broadly free in front and narrowly so behind; eye placed high, almost strictly lateral; with a free rim; gill-membranes broadly joined to side of breast under corner of preopercle. Dorsal origin equidistant from tip of snout and middle of peduncle; ventral under middle of dorsal base; pectoral reaching $\frac{3}{4}$ distance to ventral; ventral $\frac{5}{8}$ to anal; caudal moderately forked, the upper lobe the more pointed and slightly the longer. Scales rough with close set almost horizontal subparallel striæ; lateral line complete, in the center, rising a little in front.

Dark, a little paler below; fins dusky.

ONYCHOSTOMA Günther

GÜNTHER, 1896, Ann. Mus. Zoöl. St. P., pt. 1, p. 211, Pl. I, fig. b. Type: *Onychostoma laticeps* Günther.

This genus differs from *Varicorhinus* in having a serrate dorsal spine.

Onychostoma leptura (Boulenger)

Gymnostomus lepturus BOULENGER, 1899, Proc. Zoöl. Soc. London, pt. 2, p. 961.

Description based on a specimen 125 mm. long to base of caudal from Nodoa:

Depth in length 4; head 4.5 (to 5). Eye in head 3.3; snout 2.5 (to 3.5); inter-orbital 2.4; maxillary 2.5; width of mouth 2.4; depth of peduncle 2.5; its length 1.2; pectoral 1.2; ventral 1.2; longest dorsal ray 1.3; longest anal ray 1.4; caudal lobe 0.6.

Dorsal 10; anal 7 (or 8). Scales 46 (to 49). Teeth 3-rowed, 4, 4, 2, loosely attached, with bluntly pointed tips.

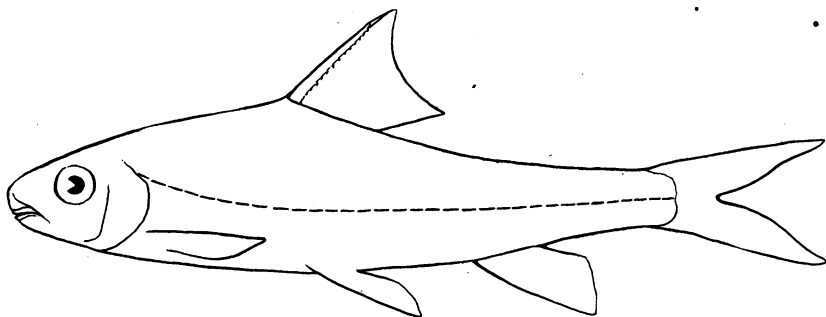


Fig. 27. *Onychostoma leptura* (Boulenger). 135 mm. without caudal.

Moderately compressed; head short and blunt; lower surface of snout and lower jaw flat; upper jaw protractile; maxillary horizontal, to under front margin of eye; no barbels. Mouth inferior, straight across, without free lips; edge of lower jaw thin, leathery, red-brown; edge of snout with three conspicuous horny warts in center, a smaller one at each side; gill-membranes united to breast under edge of preopercle. Last simple dorsal ray stiffened (spinous) for most of its length, concave behind with sheathed barbs at the edges, and with a soft tip; center of dorsal base equidistant from front of eye and base of caudal, situate over anterior rays of ventral; pectoral not reaching ventral, ventral not reaching anal; caudal deeply forked, the lobes equal. Scales rough-pimply, with inconspicuous radiate striæ; lateral line complete; dipping slightly anteriorly, otherwise straight and in the center of side.

Dark above; paler below; scales of back and sides conspicuously outlined with dark.

This *Onychostoma* agrees in general so well with Boulenger's figure of *Gymnostomus lepturus* that we have little hesitation in referring it to that species. Boulenger does not describe or figure the serrate dorsal spine, which is less strong than in *O. laticeps*.

LABEO Cuvier

CUVIER, 1817, 'Regne Animal,' II, p. 194. Type: *Cyprinus niloticus* (Forsk.) Geoffroy.

The species described here is related to *Labeo garnieri* Sauvage, 1884, Tonkin and *Labeo jordani* Oshima, 1919, Formosa. With them it might perhaps as well be placed in the heterogeneous genus *Varicorhinus* or stand apart as a distinct genus.

Labeo collaris, new species

DESCRIPTION OF TYPE.—Number 8399, American Museum of Natural History, Locality: Nodda, Hainan. Length to base of caudal 202 mm. Depth in length 2.9; head 4.7. Eye in head 3.6; snout 2.7; interorbital 1.9; maxillary 3.5; width of mouth 2.6; greatest width of body 1.5; depth of peduncle 1.5; its length 1.4; pectoral 1.1; ventral 1; longest dorsal ray 0.7; longest anal ray 1.3; upper caudal lobe 0.5.

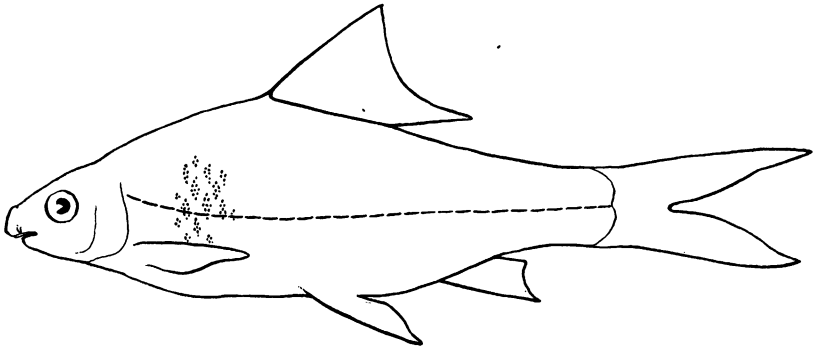


Fig. 28. *Labeo collaris*, type. 202 mm. without caudal.

Dorsal 14; anal $7\frac{1}{2}$. Scales 39. Pharyngeal bone peculiar, pierced by foramina; teeth 10 in all, crowded into a double row, loosely attached, some of them compressed, broad, truncate.

Compressed; the head short broad and blunt; breast and belly rounded; vent immediately before anal origin. Mouth inferior, transverse, slightly curved, about halfway between end of snout and front of eye; upper lip slightly fluted, overhung by snout membrane; lower lip narrow, slightly papillose, free behind, separated by a slight crease in front from the narrow, curved, only slightly leathery, uncolored edge of the jaw; a pair of small barbels on the snout before the mouth, none at the corner of the mouth; maxillary not nearly reaching to under front of eye; interorbital slightly convex; eye strictly lateral; gill-membranes broadly joined to isthmus under edge of preopercle; a number of small horny warts on the tip of snout. Dorsal without spinous rays; its origin equidistant from the end of snout and anal axis; ventrals placed under middle of dorsal; pectoral reaching $\frac{1}{2}$ the distance to ventral; ventral $\frac{3}{4}$ to anal; caudal deeply forked with pointed lobes, the upper the longer. Scales with close-spaced subparallel slightly radiating striae; lateral line complete straight in the center, rising very slightly in front; a triangular plate above the base of the pectoral and long pointed ventral axillary flat.

Small blackish bars at the bases of many of the scales, these larger and more distinct in a vertical band over the middle of pectoral. A whitish patch under the eye.

Named from the peculiar cross-mark above the pectoral which appears to be characteristic.

XENOCYPRIS Günther

GÜNTHER, 1868, 'Cat.,' VII, p. 205. Type: *Xenocypris argentea* Günther.

Like *Varicorhinus*; dorsal with an initial strong smooth spine; no barbels; vent immediately before anal origin. Teeth 3-rowed, 6 or 7, 3 or 4, 2.

Xenocypris insularis, new species

DESCRIPTION OF TYPE.—Number 8374, American Museum of Natural History. Locality: Nodoa, Hainan. Length to base of caudal 213 mm. Depth in length 3.7; head 4.9. Eye in head 4; snout 3.2; interorbital 2.8; maxillary 4.5; width of mouth 4.6; greatest width of body 1.8; depth of peduncle 1.9; its length 1.8; pectoral 1.3; ventral 1.4; longest dorsal ray 0.9; longest anal ray 1.9; upper caudal lobe 0.7.

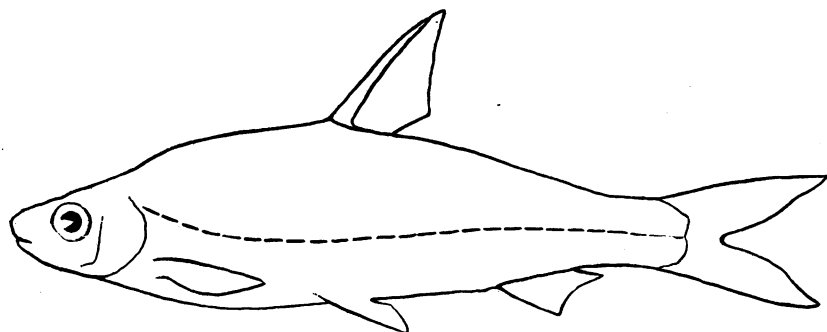


Fig. 29. *Xenocypris insularis*, type. 213 mm. without caudal.

Dorsal II, 7; anal 13. Scales 63.

Compressed; a division between the scales in the center on the posterior part of the belly as though for a low rudimentary keel. Mouth small, inferior, slightly curved, transverse; maxillary not nearly to front of eye; no barbels; interorbital convex; gill-membranes joined to isthmus under edge of preopercle. Dorsal origin equidistant from tip of snout and base of caudal or slightly nearer the former, dorsal with a long strong spine almost reaching tip of fin; ventral origin under that of dorsal; pectoral reaching $\frac{3}{4}$ the distance to ventral; ventral about $\frac{1}{2}$ to anal; caudal strongly forked with pointed lobes, the upper a little the longer. Scales with rather close set conspicuous moderately radiating striæ; lateral line complete, a little bent down, in the center of peduncle; a large triangular bluntly pointed scapular plate over base of pectoral.

Darkish above; lower sides, cheeks and most of opercle pale; fins plain.

This is very likely what Oshima (1926) has identified with the widely distributed *X. davidi* Bleeker, to which it is close.

Rasborinæ

When the various series of whiskered Cyprininae, bottom-living Gobioninae, cross-mouthed Xenocyprininae, keeled Abramidinae, and others have been taken from the Cyprinidae, there remains a vast number of minnow- and club-like species occurring anywhere in the range of the family; usually slender; belly keelless or rarely with a trace of a keel; dorsal short, without developed spine; barbels absent or rarely present, then small or minute; vent immediately before anal origin. Lacking a more complete knowledge of their relationships, we are inclined to place all these in the Rasborinae, though that subfamily might better be and doubtless usually has been by authors restricted to species with more clearly traceable relationship to the genus *Rasbora*.

RASBORA Bleeker

BLEEKER, 1859, 'Conspectus Syst. Cypr.,' Nat. Tijdschr. Ned.-Ind., XX, p. 435.
Type: *Cyprinus rasbora* Hamilton-Buchanan.

Mouth normal, moderately oblique, lower jaw projecting; no barbels and no keel on belly; lateral line complete, running low, below the center for most or all its course on peduncle. Small fishes of southern Asia. Teeth 4, 3, 2.

Rasbora cephalotænia (Bleeker)

Leuciscus cephalotænia BLEEKER, 1852, Nat. Tijdschr. Ned.-Ind., III, p. 97.
Rasbora cephalotænia Weber and de Beaufort, 1916, III, p. 74, fig. 25.

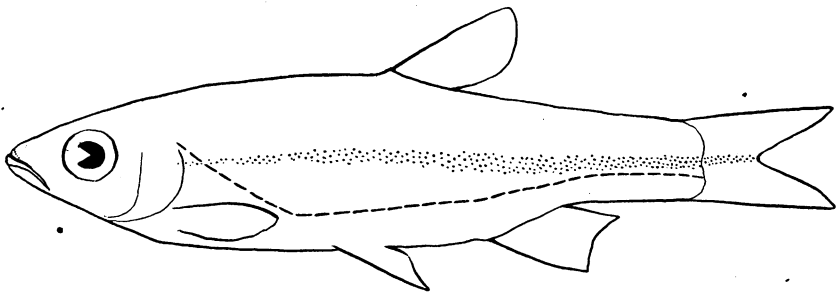


Fig. 30. *Rasbora cephalotænia steineri*, type. 65 mm. without caudal.

Rasbora cephalotænia steineri, new subspecies

Seven rows of scales between the lateral lines counted over the back of the middle of the caudal peduncle. Origin of dorsal behind the center point between snout and hindmost caudal scales; over the ventral

axil. Base of dorsal in middle between ventrals and anal or slightly nearer the former. A black band on the sides. Pectoral $\frac{1}{2}$ length of head. Scales 30; origin of dorsal opposite 12th scale; $4\frac{1}{2}$ scales between lateral line and dorsal, one between lateral line and ventrals.

DESCRIPTION OF TYPE.—Number 8375, American Museum of Natural History. Locality: Nodoa, Hainan, July 15, 1923. Length to base of caudal 65 mm. Depth in length 3.6; head 3.7. Eye in head 3.5; snout 3; interorbital 2.9; maxillary 3; depth of peduncle 2; length of peduncle 1; pectoral 1.5; ventral 1.6; height of dorsal 1.4; longest anal ray 1.8; caudal lobe 1.4.

Dorsal 9; anal 7. Scales 30.

Mouth moderately oblique; lower jaw projecting; end of lower jaw broad, its center and corners prominent, fitting slight emarginations in the upper; maxillary mostly concealed by preorbital. Gill-membranes free or very narrowly attached to one another or isthmus. No barbels. Last simple ray of dorsal not enlarged or spinous; ventral origin before dorsal; pectoral not reaching ventral; ventral not reaching anal; caudal forked, the lobes bluntly pointed. Scales thin and rather deciduous, striæ numerous and somewhat radiating; lateral line complete, slanting down over pectoral and running low; slanting up on peduncle, terminating at about its center.

A black stripe from opercle to caudal, continued narrowly across same; scales of sides margined with dark; belly whitish; fins grayish. A color sketch from life is olive greenish, on the sides and below silvery; fins tinged with olive, ventrals pale; a sharp black stripe from the head to the notch of the caudal fin.

Probably distinguishable as a race from East Indian *Rasbora cephalotænia*, having slightly fewer scales, greater depth and other slight differences.

Named for Rev. J. F. Steiner, of the American Presbyterian Mission of Hainan, in appreciation of his interest in the work.

BARILIUS Hamilton-Buchanan

HAMILTON-BUCHANAN, 1822, 'Fishes in the Ganges,' p. 384. Type: *Cyprinus barila* Hamilton-Buchanan.

Slender, peduncle long, caudal deeply forked. Mouth terminal but the lower jaw tends to be the shorter and the snout to project. No dorsal spine. Anal rather long. Scales rather small. Fishes of southern Asia and of Africa.

Barilius hainanensis Boulenger

Barilius hainanensis BOULENGER, 1899, Proc. Zoöl. Soc. London, pt. 2, p. 961, Pl. LXIX, fig. 2.

This species is not found in our collection. We quote Boulenger's description:

Depth of body equal to length of head, $4\frac{1}{2}$ times in total length. Head twice as long as broad; snout pointed, not projecting beyond the mouth, as long as diameter

of eye, which is $3\frac{1}{2}$ times in length of head and equals interorbital width; mouth extending hardly to below anterior border of eye; suborbitals entirely covering the cheek. Dorsal II, 7, originating just behind ventral and situated at equal distance

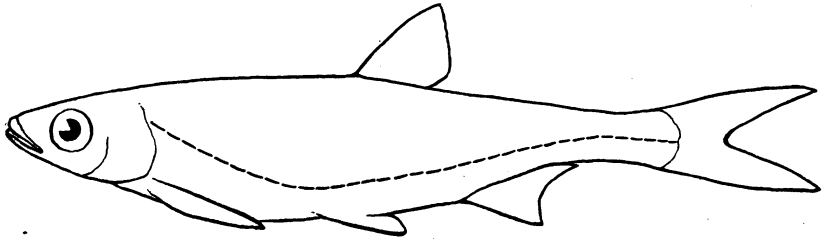


Fig. 31. *Barilius hainanensis* Boulenger after Boulenger.

from the eye and the root of the caudal; first branched ray $\frac{2}{3}$ length of head. Pectoral a little shorter than head, not reaching ventral. Anal II, 14. Caudal deeply bifurcate, as long as head. Caudal peduncle nearly thrice as long as deep. Sq. $46\frac{2}{3}$. Silvery, darker on the back; scales above the lateral line black at the base. Total length 130 mm. A single specimen.

Zacco Jordan and Evermann

JORDAN AND EVERMANN, 1902, Proc. U. S. Nat. Mus., XXV, p. 322. Type: *Leuciscus platypus* Temminck and Schlegel.

Large-mouthed species related to *Rasbora* and *Opsariichthys*. Scales rather small, lateral line running low. Jaws equal or the lower projecting. The anal is rather long and in the adult its rays are widened with exerted tips. Belly more or less keeled behind ventrals. Eastern China and Japan.

Zacco asperus, new species

Opsariichthys platypus, BOULENGER, 1899, Proc. Zool. Soc. London, pt. 2, p. 961, not *platypus* of Temminck and Schlegel.

DESCRIPTION OF TYPE.—Number 8376, American Museum of Natural History. Locality: Nodda, Hainan. Length to base of caudal 106 mm. Depth in length 3.5; head 3.5. Eye in head 4; snout 3; interorbital 3; maxillary 2.1; depth of peduncle 2.3; its length 1.8; longest dorsal ray 1.4; pectoral 1.3; ventral 1.6; longest anal ray 1; caudal lobe 1.

Dorsal 9; anal $14\frac{1}{2}$. Scales 47; $8\frac{1}{2}$ rows between lateral line and dorsal origin, 2 between lateral line and ventral.

Compressed; head pointed, its top flat; nape somewhat elevated; belly between ventrals and vent a narrow compressed ridge, across which the scales pass anteriorly but apparently not posteriorly. Mouth oblique, lower jaw projecting, with a point at the tip fitting into a notch in the tip of the upper jaw; cleft of mouth a little curved in front to suggest *Opsariichthys* slightly; maxillary narrow, not quite to under center of eye; no barbels; gill-membranes very narrowly joined to isthmus behind hind edge

of eye; a close row of horny tubercles across lower preopercle; a similar row on side of mandible; a double or triple row of smaller ones across face below eye. Tubercles on head more pronounced and regular than in related species. Dorsal and anal without spinous rays; dorsal origin equidistant from front of eye and base of caudal, immediately behind axil of ventral; pectoral barely reaching ventral, ventral not to anal; anal with its central rays simple, elongate exerted; caudal forked with pointed lobes the lower a little the longer. Scales with subparallel or slightly radiating striæ; lateral line complete, much decurved, running low, rising on peduncle to gain its center several scales before the end.

Dark along the back, pale below. Scattered irregular narrow dark vertical marks on side; a vague dark central stripe at base of peduncle. Caudal and base of dorsal dark grayish.

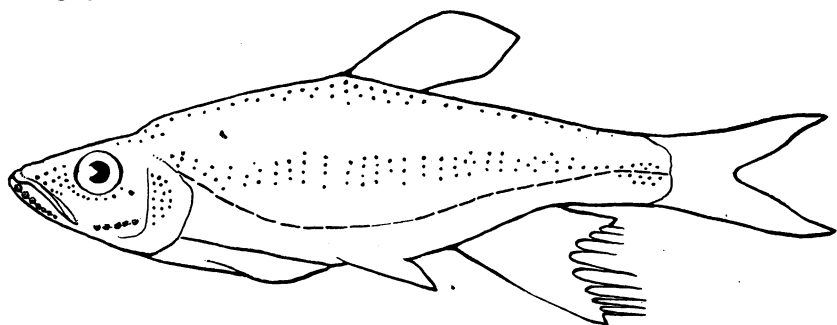


Fig. 32. *Zacco asperus*, type. 106 mm. without caudal.

Seventeen specimens (cotypes), length 85 to 110 mm., measure as follows: depth 3.9 to 3.2; head 3.3 to 3.6; eye 3.6 to 4.4; interorbital 3.5 to 2.9. Dorsal rays 9 to 10; anal 13 to 15; scales 47 to 51.

OPSARIICHTHYS Bleeker

BLEEKER, 1863, *Neder. Tijdschr. Dierk.*, I, p. 203. Type: *Leuciscus uncistrostris* Temminck and Schlegel.

Large-mouthed species closely related to *Zacco*. A conspicuous projection on upper jaw at side of snout, fitting into a notch in lower jaw. Scales rather small, lateral line running low, etc. A few closely related species in eastern Asia.

***Opsariichthys hainanensis*, new species**

DESCRIPTION OF TYPE.—Number 8377, American Museum of Natural History. Locality: Nodda, Hainan. Length to base of caudal 115 mm. Depth in length 3.8; head 3.4. Eye in head 5.3; snout 2.8; interorbital 3.2; maxillary 2; depth of peduncle 3; its length 1.8; pectoral 1.5; ventral 2; longest dorsal ray 1.5; longest anal ray 1.4; lower caudal lobe 1.1.

Dorsal 9; anal 12. Scales 40; $7\frac{1}{2}$ rows between lateral line and dorsal origin, $2\frac{1}{2}$ between lateral line and ventral.

Body compressed; snout pointed; profile low; top of head flat. Mouth large, oblique; a projection on upper jaw at side of snout fitting into a re-entrance in lower jaw; lower jaw slightly projecting, its narrow tip received in a notch at tip of snout; maxillary to under posterior border of eye. Dorsal and anal without spinous rays; dorsal origin equidistant from tip of snout and base of caudal; ventral origin under that of dorsal; pectoral not quite reaching to that of ventral, ventral not to anal; anal falcate; caudal well forked, lower lobe the longer. Scales with radiating striae; lateral line complete, curving downward and running low, slanting up across peduncle to end in its center.

No color markings.

Deeper and with fewer scales than *Opsariichthys bidens*.

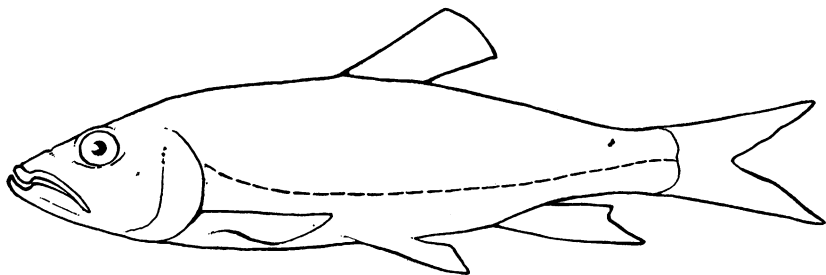


Fig. 33. *Opsariichthys hainanensis*, type. 115 mm. without caudal.

Among other *Nodoa* material we find a specimen (cotype) closely resembling this one, which has length 123 mm.; depth 3.5; head 3.2; eye 4.8; dorsal rays $9\frac{1}{2}$; anal $11\frac{1}{2}$; scales 43. There are also three specimens 97 to 105, and 128 mm. long which are probably males of the same. They have fine warts, thickly placed on the lower jaw, scattered below the eye, and a row along the lower limb of the preopercle; higher anal fin; faint dark marks on the sides, especially posteriorly, membrane between dorsal rays dusky; depth 4 to 4.1, 4.3; head 3.2 to 3.1; eye 5 to 5.5; longest anal ray 1.2, 1.4; dorsal rays $9\frac{1}{2}$; anal 11, $11\frac{1}{2}$; scales 42 to 43, 44. The largest of these three however looks quite different, and it may be that two or even three closely related forms are involved. It has a stouter head, less compressed more slender body, and hook in the jaws most pronounced; its lower jaw is slightly projecting as in the type and cotype, whereas in the two other specimens with warts, the jaws are even.

Abramidinae

The primary, conspicuous character in this sub-family is a keel on the belly between the ventral and anal fins. Barbels are lacking; vent immediately before anal origin. A well-developed dorsal spine may be present or absent and when present is almost invariably smooth. The

anal is usually rather long. They are free-swimming fishes, frequently deep-bodied, sometimes slender. Good generic characters are to be found in extension of the keel onto the breast before the ventrals, presence or absence of dorsal spine, projecting or included lower jaw, course of the lateral line. We include here all species with keeled belly, except for one or two with obvious affinities elsewhere, and call to mind no species without a keel entitled to be considered an Abramidin. This treatment will include in the Abramidinæ one or two aberrant genera like *Hypophthalmichthys*, the true position of which is uncertain.

MEGALOBrama Dybowski

DYBOWSKI, 1872, Verh. Zool. Bot. Gesell. Wien, XXII, p. 212. Type: *Megalobrama skolkovii* = *Chanodichthys terminalis*.

Deep- or moderately deep-bodied; dorsal with an initial spine; jaws approximately equal; lateral line slightly and evenly decurved; keel confined to the belly behind ventrals. A few species of eastern Asia not very closely related one to the other, nor very different from *Erythroculter* and *Hemiculter*.

Megalobrama melrosei, new species

DESCRIPTION OF TYPE.—Number 8378, American Museum of Natural History. Locality: Nodoa, Hainan. Length to base of caudal 66 mm. Depth in length 3.1; head 3.8. Eye in head 2.7; snout 3.8; interorbital 3.8; maxillary 3.4; depth of

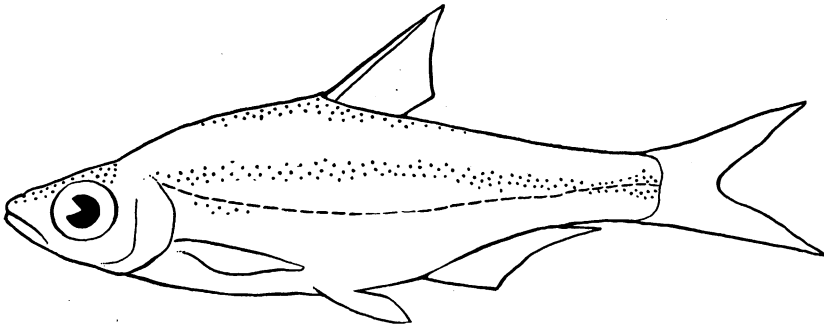


Fig. 34. *Megalobrama melrosei*, type. 66 mm. without caudal.

peduncle 2.5; its length 1.9; pectoral 1.3; ventral 1.5; longest dorsal ray 1; longest anal ray 2.2; lower caudal lobe 0.8.

Dorsal II, 7; anal 23. Scales 54. Teeth 3-rowed 5, 4, 2, slightly hooked.

Compressed; breast broad and rounded; a low keel between ventrals and anal, which keel is scaled to its margin; top of head flattish; back somewhat elevated. Interorbital very slightly convex; jaws equal, the upper protractile; maxillary concealed, to under front margin of eye; no barbels; eye with a free rim; gill-membranes

broadly joined to one another and to isthmus under back of eye. Dorsal with a strong slender spine, which however has a filamentous tip; dorsal origin equidistant from tip of snout and base of caudal; over ventral axil; pectoral almost or quite reaching ventral origin; ventral not quite to anal; caudal well forked with narrow pointed lobes, the lower slightly the longer. Scales with a few faint radiating striæ; lateral line complete, gently bent down, in the center of most of the peduncle.

Pale; top of head and crest of back dark; a plumbeous stripe from shoulder to base of caudal above lateral line; 2 or 3 lines of small spots following rows of scales paralleling anterior part of lateral line.

This species is very close to *Megalobrama macrops* (Günther) from Formosa, which apparently also is found in Fukien. Obvious slight differences which it shows are jaws equal versus lower slightly included; a ray or two less in the anal; a few less scales in the lateral line.

Named for Mrs. J. C. Melrose, of the American Presbyterian Mission of Hainan, in appreciation of her interest in the work.

This is very likely what Oshima (1926) identifies with *Chanodichthys affinis* Vaillant from Indo-China.

PARABRAMIS Bleeker

BLEEKER, 1865, Ned. Tijdschr. Dierk., II, p. 21. Type: *Abramis pekinensis* Basilewski.

A smooth bony spine in the dorsal. Keel present before as well as behind the ventrals. Lateral line comparatively little bent down. Jaws approximately equal. Anal long. Teeth in 3 rows.

Parabramis pekinensis (Basilewski)

Abramis pekinensis BASILEWSKI, 1855, N. Mem. Soc. Nat. Mosc., X, p. 238, Pl. VI, fig. 2. North China.

Chanodichthys stenzi PORTA, Oshima, 1926, Annot. Zool. Japon., XI, p. 18. Kachek River, Hainan

Chanodichthys stenzi is a synonym of *Parabramis pekinensis*. There is some doubt if Oshima (1926) has correctly identified his fish so recorded, and for which the following measurements are given.

Length 170 mm. Depth 3.55; head 4.10. Eye in head 3.34; snout 3.34; interorbital 2.85. Dorsal II, 7; anal 30. Scales 53.

CULTER Basilewski

BASILEWSKI, 1865, N. Mem. Soc. Nat. Mosc., X, p. 236. Type *Culter alburnus* Basilewski.

A smooth bony spine in the dorsal. Keel extending the whole length of the lower profile, from between the axils of the pectorals to the anal. Lateral line little bent down. Lower jaw projecting, the mouth sub-vertical. Teeth in 3 rows.

Culter breviceauda Günther

Culter breviceauda GÜNTHER, 1868, Cat. VII, p. 329. Formosa.

Recorded by Oshima (1926) from the Kachek River, Hainan. One of his Hainan specimens measured as follows.

Length 211 mm. Depth in length 3.95; head 4.57. Eye in head 4.22; snout 4.22; interorbital 4.75; pectoral 1; ventral 1.26. Dorsal II, 7; anal 30. Scales 65.

ERYTHROCULTER Berg

BERG, 1909, Mem. Ac. Sc. St. Petersburg, (8) XXIV, p. 138. Type: *Culter erythropterus* Basilewski.

Slender or moderately deep; the mouth oblique and lower jaw projecting; dorsal with a well-developed spine in front; belly with a keel behind ventrals only; lateral line little decurved; anal rather long, scales rather small.

Berg identifies *Culter alburnus*, the type of *Culter*, with a species wherein the keel extends forward of the ventrals, and proposes *Erythroculter* as a subgenus for those wherein it is confined to the region behind these fins. *Culter breviceauda*, one of the former category which we have examined, is generically distinct from those of the later category. Whereas we suspect that Basilewski's *alburnus* was actually a species with posterior keel only, quite likely identical with his *erythropterus*, one opinion is as good as another as to this and we follow Berg's ruling. Incidentally, the Hainan fish approaches *Culter breviceauda* more closely than any other *Erythroculter* known to us.

Erythroculter pseudobrevicauda, new species

DESCRIPTION OF TYPE.—Number 8400, American Museum of Natural History. Locality: Nodua, Hainan. Length to base of caudal 170 mm. Depth in length 3.9; head 4. Eye in head 3.3; snout 3.8; interorbital 5; maxillary 3; greatest width (the back of head) 2.5; depth of peduncle 2.5; its length 1.5; dorsal spine 1.2; longest dorsal ray 1.2; longest anal ray 2; pectoral 1.4; ventral 1.5; lower caudal lobe 1.

Dorsal II, 7; anal 26. Scales 75; before dorsal 56.

Slender, compressed, breast rounded; belly behind ventrals sharply keeled; vent immediately before anal origin. Top of head flattish rising to tip of maxillary; nape elevated; interorbital narrow, a little convex; lower jaw strongly projecting; mouth strongly oblique; maxillary not quite to front of eye; no barbels; gill-membranes narrowly joined under center of eye, free from isthmus; opercle with a well-developed membranous edge. Dorsal with a strong sharp spine; its origin equidistant from end of snout and base of caudal, behind ventral axil; pectoral not quite reaching ventral, ventral $\frac{3}{4}$ to anal; caudal deeply forked, its lower lobe decidedly the longer. Scales with conspicuous radiating striae, those on front of back very small; lateral line complete, almost straight in the center, rising slightly in front.

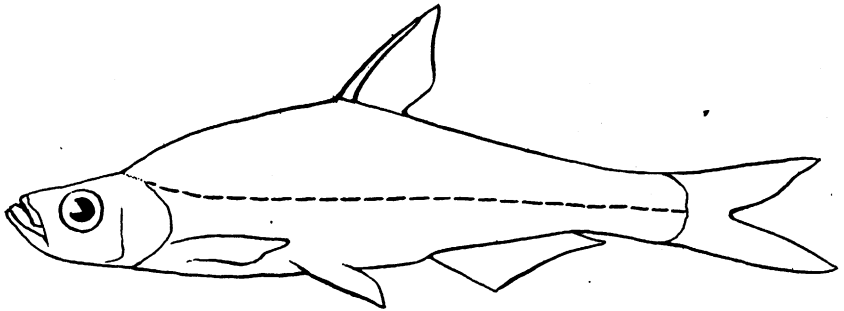


Fig. 35. *Erythroculter pseudobrevicauda*, type. 170 mm. without caudal.

Pale, darker on top of mandible, top of snout and along back; caudal with narrow dusky tips and edge within the fork.

Close to *Erythroculter aokii* (Oshima) from Formosa, differing in straighter lateral line with fewer scales, etc.

HEMICULTER Bleeker

BLEEKER, 1859, 'Conspectus Syst. Cypr.,' Nat. Tijdschr. Ned.-Ind., XX, p. 432. Type: *Culter leucisculus* Basilewski.

Slender; an initial dorsal spine; jaws about equal; lateral line running low with three abrupt turns, slanting down over pectoral, thence horizontal to about anal axil, thence slanting up to center of peduncle; teeth 3-rowed, 5, 4, 1 or 2. The abdominal keel may extend forward on breast (subgenus *Hemiculter*)¹ or stop at the ventrals (subgenus *Pseudohemiculter* new; type *Hemiculter hainanensis*).

Hemiculter hainanensis, new species

DESCRIPTION OF TYPE.—Number 8379, American Museum of Natural History. Locality: Nodoa, Hainan. Length to base of caudal 115 mm. Depth in length 3.7; head 3.5. Eye in head 3.8; snout 3.4; interorbital 3.8; maxillary 3; depth of peduncle 2.8; its length 2; pectoral 1.2; ventral 1.7; longest dorsal ray 1.4; longest anal ray 2.4; lower caudal lobe 1.

Dorsal II, 7; anal 17. Scales 56. Teeth 3-rowed, 5, 4, 2, mostly slightly hooked

Compressed; profile almost horizontal; breast broad and rounded; belly behind ventrals, with a low keel which scales do not cross; vent opening in a wide back-

¹We follow Berg (1916, 'Poiss. Eaux. Douc. Russ.,' p. 324) in identifying *Culter leucisculus* Basilewski, the type of *Hemiculter* Bleeker, with a species wherein the abdominal keel extends forward of the ventrals. Those species wherein the keel is present only behind the ventrals are at least subgenerically distinct, but the Formosan fish to which Oshima (1919, Ann. Carn. Mus., XII, p. 253) assigns the name *Cultrisculus*, is apparently close to *H. leucisculus* as understood by us. However, he makes *Hemiculter kneri* Kreyenberg the type of *Cultrisculus*, and the Yang-tze fish which we identify therewith, and which is certainly not his Formosan one, may stand as a third subgenus,—less compressed, first bend in lateral line little pronounced, scales deciduous. *Hemiculter kneri* Kreyenberg and Pappenheim, 1908 is antedated by *Hemiculter kneri* Warpachowski, 1888. A more detailed study of the names involved is recommended to those who enjoy the complexities of nomenclature.

wardly directed tube. Jaws equal; mouth oblique; tip of maxillary concealed, barely reaching to under front of eye; no barbels; upper jaw protractile; corner of the preopercle projecting slightly backward; opercle with faint downwardly radiating striæ; and a well-developed membranous edge; sides of snout with a few small poorly developed warty points; interorbital flattish; orbit with a free rim and narrow membranous lid all round; gill-membranes joined to one another and center of

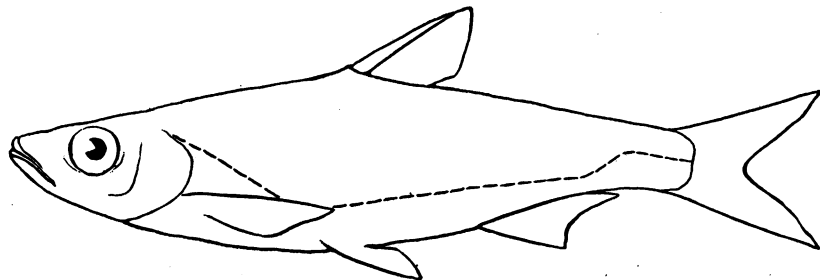


Fig. 36. *Hemiculter hainanensis*, type. 115 mm. without caudal.

isthmus under posterior border of eye. Dorsal with a sharp slender spine reaching almost to its tip; dorsal origin equidistant from base of caudal and middle of snout; slightly behind ventral axil; pectoral passing ventral origin; ventral reaching $\frac{2}{3}$ distance to anal; caudal forked with narrow pointed lobes, the lower the longer. Scales with radiating striæ; lateral line complete, slanting down abruptly over pectoral, running low to anal axil, thence rising abruptly to center of peduncle.

Pale, a little darker along the back.

This species is apparently close to *Hemiculter dispar* Peters from Hongkong, but deeper and with smaller scales. The two should be compared and may prove identical.

***Hemiculter serracanthus*, new species**

A long pointed, big-eyed *Hemiculter*, with keel confined to the belly, very strong dorsal spine, finely serrate behind.

DESCRIPTION OF TYPE.—Number 8380, American Museum of Natural History. Locality: Nodda, Hainan. Length to base of caudal 113 mm. Depth in length 4.5; head 3.8. Eye in head 3.1; snout 3.3; interorbital 3.6; maxillary 3; width of body 2.8; depth of peduncle 2.9; its length 1.9; pectoral 1.2; ventral 1.8; dorsal spine 1.1; longest anal ray 2; caudal lobe 1.

Dorsal II, 7; anal 16. Scales 53. Teeth 3-rowed, 5, 4, 2, with hooked tips.

Elongate, compressed; breast rather broadly rounded; belly with a naked keel. Head narrowly pointed; orbital rim raised and center of interorbital slightly convex so that space between the eyes, as a whole, is flattish; lower jaw very slightly included; maxillary concealed, barely reaching front of eye; tip of mandible fitting into a notch in tip of upper jaw; its edges somewhat expanded to close the mouth tightly when center slips within upper jaw; sides of lower jaw with small crowded poorly developed warty points; gill-membranes narrowly joined to center of isthmus behind the back

of the eye; opercle with well-developed membranous edge. Dorsal with a long strong spine which reaches approximately to tip of fin, very finely serrate on its hind edges; dorsal origin equidistant from base of caudal and middle of snout; immediately behind ventral axil; pectoral long, narrow, pointed, reaching ventral; ventral $\frac{3}{8}$

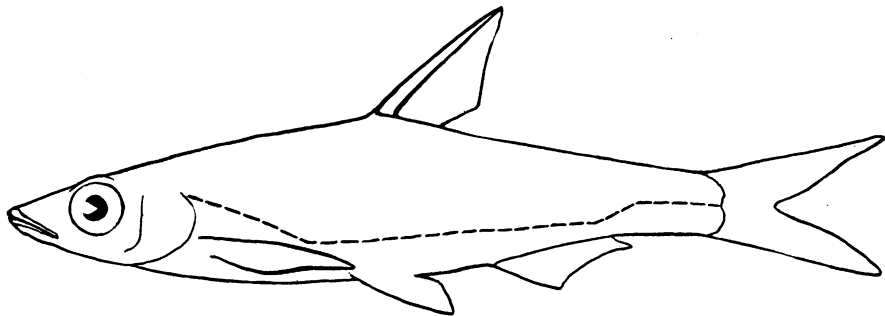


Fig. 37. *Hemiculter serratocanthus*, type. 113 mm. without caudal.

to anal; caudal well forked with narrow pointed lobes, the lower slightly the longer. Scales with well-marked somewhat radiating striae; lateral line complete, slanting down abruptly to over end of pectoral, running low, and rising by an abrupt slant to the center on front of peduncle.

Dark above, whitish below.

ISCHIKAUIA Jordan and Snyder

JORDAN AND SNYDER, 1900, Proc. U. S. Nat. Mus., XXIII, p. 346. Type: *Opsariichthys steenackeri* Sauvage.

Body of moderate depth; dorsal without a spine; lower jaw projecting; keel not extending forward of ventrals; scales small; lateral line running low as in *Hemiculter* but less abruptly bent. Two or three species near the Pacific coast of Asia, to which the relationship of others in the interior is of doubtful closeness.

Ischikauia hainanensis, new species

DESCRIPTION OF TYPE.—Number 8390, American Museum of Natural History. Locality: Nodoa, Hainan. Length to base of caudal 71 mm. Depth in length 3.6; head 3.6. Eye in head 3; snout 3.4; interorbital 3.5; maxillary 2.5; greatest width of body 2.5; depth of peduncle 2.5; its length 1.4; pectoral 1.5; ventral 1.5; longest dorsal ray 1.4; longest anal ray 1.8; caudal lobe (tip broken) about 1.1.

Dorsal 9; anal 18. Scales 50. Teeth slender, slightly hooked, 3-rowed, 5, 3 or 4, 1 or 2.

Compressed; nape somewhat elevated; top of head straight, the ends of jaws rising above its level; breast broadly rounded, belly keeled. Mouth subvertical; lower jaw projecting; maxillary to under front margin of eye; interorbital gently convex; gill-membranes narrowly joined to isthmus under hind edge of pupil; opercle with a conspicuous membranous edge. Dorsal without spinous rays, its origin equi-

distant from base of caudal and middle of eye, nearer anal origin than ventral axil; anal origin under posterior part of dorsal; pectoral reaching ventral, ventral not quite to anal; caudal well forked. Scales with radiating striæ; lateral line complete, slanting down steeply to over ventral, thence running low to over anal axil, thence rising to run in the center of the posterior part of peduncle, its changes of direction not very abrupt.

Pale; a plumbeous stripe in center of peduncle from under front of dorsal.

Description of a small specimen (43 mm. to b.c.), Nodua, Hainan, February 23, 1923. Depth in length 3.6; head 3.6. Eye in head 2.7; snout 3.5; interorbital 3.5; maxillary 2.7; depth of peduncle 2.7; length of peduncle 1.4; pectoral 1.2; ventral 1.4; dorsal lobe height 1; anal lobe height 1.4; caudal lobe 0.8.

Dorsal 9; anal 9. Scales not sufficiently developed to count; about 30 rows between nape and dorsal.

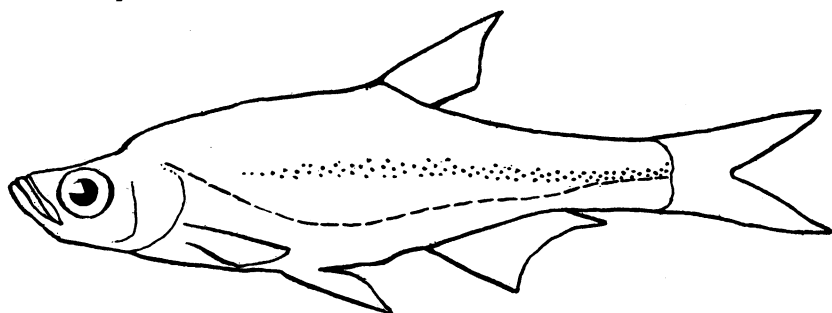


Fig. 38. *Ischikauia hainanensis*, type. 71 mm. without caudal.

Slender, compressed; the slender peduncle with a slight keel behind confluent with rudimentary precurrent rays of caudal, above and below; breast rounded; an elevated keel between ventrals and anal; profile low, slightly concave. Mandible projecting; mouth moderately oblique; maxillary mostly concealed, to or not quite to front of eye; no barbels; gill-membranes free from one another or joined at very base, free from isthmus. Simple rays in front of dorsal and anal not thickened or spinous; dorsal and anal falcate; caudal deeply forked; pectoral reaching slightly past ventral origin; ventral just to anal; dorsal origin equidistant from base of caudal and front of eye, its first ray behind ventral base, last over anal origin. Lateral line complete, slanting down steeply over pectoral, running low to near axil of anal, then slanting up to center of peduncle, and ending slightly below its center.

Pale, a little darker along back, and a dark area on nape; narrow blackish stripe from near gill-opening to base of caudal. Pale in life, body and fins translucent.

APHYOCYPRIS Günther

GÜNTHER, 1868, 'Cat. [Fishes,] VII, p. 201. Type: *Aphyocypris chinensis* Günther.

Hemigrammocypripis FOWLER, 1910, Proc. Acad. Nat. Sci. Phila., LXII, p. 483.

Small species with no dorsal spine and keel on the belly only; mouth oblique. Resemble *Rasbora*, but anal short. Lateral line sometimes incomplete. Teeth 5, 3, 1; or 4, 3.

Aphyocypris normalis, new species

Plate XXVI, Figure 4

DESCRIPTION OF TYPE.—Number 8381, American Museum of Natural History. Locality: Nodda, Hainan, March 2, 1923. Length to base of caudal 64 mm. Depth in length 4; head 4. Eye in head 4; snout 4; interorbital 2.5; maxillary 2.8; depth of peduncle 2; length of peduncle 1.4; pectoral 1.2; ventral 1.7; longest dorsal ray 1.5; longest anal ray 1.7; caudal lobe 1.

Dorsal 10; anal 10½. Scales 35. Teeth 2-rowed, pointed, the tips slightly bent, 4, 3. (The teeth vary 4, 3; 4, 4, or 5, 3; 5, 4.)

Head rather broad and blunt, body compressed, interorbital flat; mouth moderately oblique; maxillary to under front of eye; jaws equal; no barbels; band of

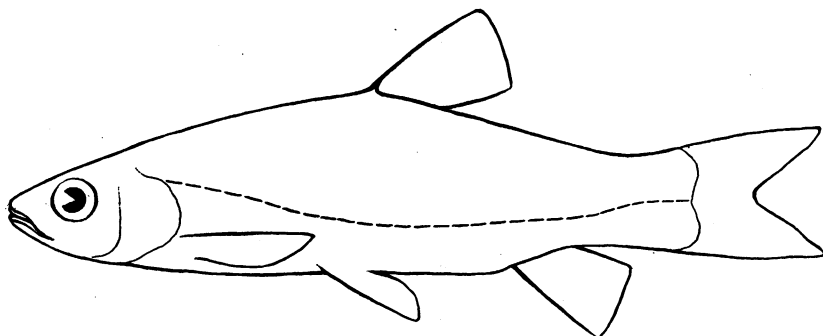


Fig. 39. *Aphyocypris normalis*, type. 64 mm. without caudal.

small warts on lower jaw; conspicuous pores on lower edge of preopercle. Gill-membranes narrowly joined at base, free from isthmus. Dorsal midway between ventrals and anal; pectoral just reaching ventral origin; ventrals not reaching anal; last simple ray of dorsal not enlarged or spiny; caudal forked, the lobes bluntly pointed. Lateral line complete, running low but terminating in center of peduncle; scales with radiating striae and very fine irregular parallel markings.

Scales on side with faint dark margins; no other markings. A color sketch from life is olive on the back; sides and below silvery, the scales on back and sides narrowly edged with dark; vertical fins tinged with red and paired fins pale.

RASBORINUS Oshima

OSHIMA, 1920, Proc. Phila., LXXII, p. 130. Type: *Rasborinus takakii* Oshima; Ako, Formosa.

Body rather deep; jaws equal or the lower slightly the shorter; keel behind ventrals only; no dorsal spine; origin of dorsal behind ventral base; anal rather long. Lateral line dipping well down in a very even curve. Teeth 3-rowed. A few species in east China and adjacent islands.

Rasborinus hainanensis, new species

DESCRIPTION OF TYPE.—Number 8382, American Museum of Natural History. Locality: Nodoa, Hainan. Length to base of caudal 95 mm. Depth in length 3.2; head 3.8. Eye in head 3.8; snout 4; interorbital 3.2; maxillary 3.2; depth of peduncle 2.3; its length 2.3; pectoral 1.5; ventral 1.7; longest dorsal ray 1.6; longest anal ray 2.

Dorsal 9; anal 19. Scales 41. Teeth 3-rowed, 5, 4, 2; stout, smooth, tips slightly bent.

Deep and compressed; interorbital gently convex; back somewhat elevated; a naked keel from ventrals to vent, which however is crossed by 2 or 3 scales at its

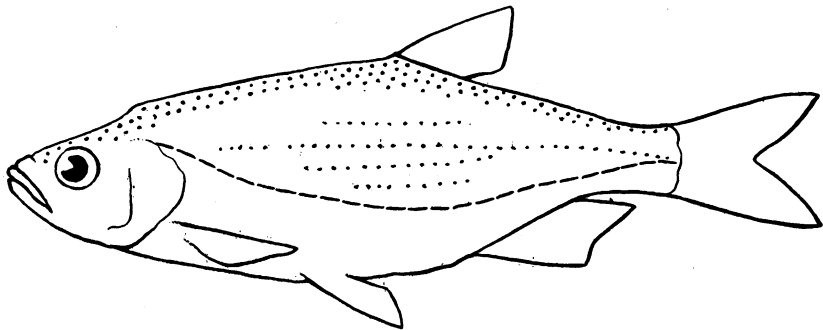


Fig. 40. *Rasborinus hainanensis*, type. 95 mm. without caudal.

front end; breast rounded. Mouth strongly oblique; somewhat curved, the lower jaw slightly included; upper jaw protractile; maxillary barely to under front of eye; no barbels; a groove across snout before nostril; gill-membranes delicately joined to isthmus under hind margin of eye. Dorsal and anal without spinous rays; dorsal origin equidistant from base of caudal and edge of preopercle; ventral origin about equidistant from tip of snout and axil of anal; pectoral blunt, not reaching ventral; ventral reaching about half-way to anal; caudal forked. Scales with radiating striæ; lateral line complete, much decurved, rising on peduncle to end near its center; a pointed ventral axillary scale, and also a narrow specialized scale under the lower axil of ventral; anal with a conspicuous basal sheath of scales.

Brownish; dark along back; faint narrow horizontal dark streaks following rows of scales along side above lateral line.

This is very likely what Oshima (1926) identifies with *Rasborinus takakii* Oshima from Formosa.

Rhodeinæ

Usually small, deep-bodied compressed fishes; one or more initial smooth spines variously developed or absent in the dorsal and usually in the anal to correspond, a pair of barbels present or absent; ventral bases close to the anal origin; the vent placed well forward between them, this character associated with the presence of an external ovipositor

with which the female is known in some forms to place her eggs in the mantle cavity of fresh-water mussels. Mouth small, the lower jaw usually slightly included, and the snout somewhat swollen and pimply in males, overhanging the mouth. Teeth one-rowed, 5. A small closely related Eurasian group, with a widely distributed species in Europe and numerous species in the Orient.

ACANTHORHODEUS Bleeker

BLEEKER, 1870, Vers. Akad. Amsterdam, (2) XV, p. 253. Type: *Acanthorhodeus macropterus* Bleeker.

Dorsal and anal with two or three initial spines more or less developed; small barbel present or absent; lateral line complete; teeth serrate.

Acanthorhodeus tonkinensis Vaillant

Acanthorhodeus tonkinensis VAILLANT, 1892, Bull. Soc. Phil. Paris, 1891-92, p. 127. Upper Tonkin. BERG, 1907, Annals and Mag. of Nat. Hist., XIX, p. 162.

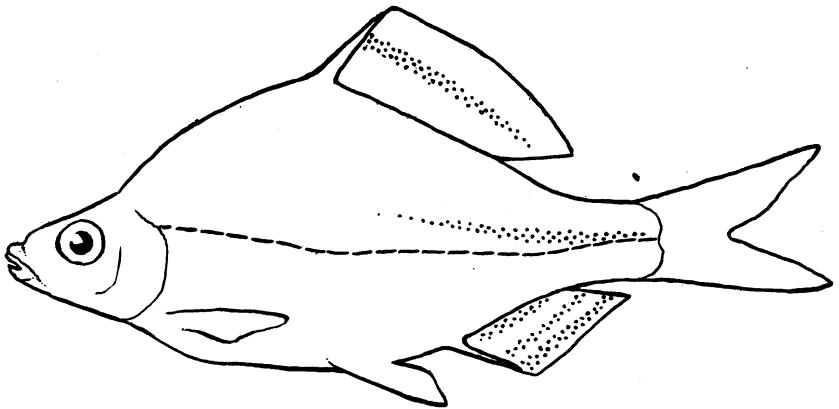


Fig. 41. *Acanthorhodeus tonkinensis* Vaillant. 77 mm. without caudal.

Head 4 in length to base of caudal; depth 2 to 2.1.

Dorsal with 13 to 15, anal with 11 to 12 soft rays; scales 36.

A minute barbel present. Teeth in one row, 5, with flat bevelled inner face one edge of which is somewhat serrate. Dorsal and anal spines well developed though with slender perfectly filamentous tips. Lateral line complete, very slightly bent down.

Two dark lengthwise stripes on dorsal and anal more or less distinct.

This seems to be the southern representative of *Acanthorhodeus guichinoti* (a common species widely distributed in central China). It is probably what Oshima (1926) has described as *Acanthorhodeus longispinus* from Kachek, Hainan.

RHODEUS Agassiz

AGASSIZ, 1835, Mem. Soc. Nat. Neuf., I, p. 37. Type: *Cyprinus amarus* Bloch.

No barbels. Lateral line incomplete. Teeth not serrate. Dorsal and anal usually rather short.

***Rhodeus spinalis* Oshima**

Rhodeus spinalis OSHIMA, 1926, Annot. Zool. Japon., XI, p. 16, Kachek River, Hainan.

Length 78 mm. Depth in length 2; head 4.15. Snout in head 3. Eye 3; interorbital 3; pectoral 1.25; ventral 1.5; depth of peduncle, 1.88. Dorsal rays II, 10; anal II, 14. Scales 34. Black "rhodein" streak present, vertical fins dusky.

Distinguished from other members of the genus by the presence of osseous dorsal and anal spines.

PSEUDOPERILAMPUS Bleeker

BLEEKER, 1863, Neder. Tijdschr. Dierk., I, p. 214. Type: *Pseudoperilampus typus* Bleeker.

Lateral line incomplete; no spines in dorsal and anal, and no barbels; teeth one-rowed, 5, serrated. Deeper, more compressed, and smaller scaled than *Rhodeus*, with more rays in dorsal and anal.

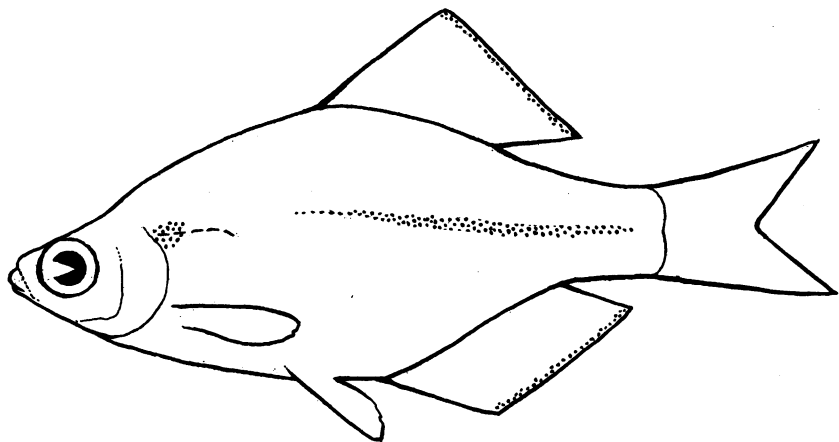


Fig. 42. *Pseudoperilampus hainanensis*, type. 39 mm. without caudal.

***Pseudoperilampus hainanensis*, new species**

DESCRIPTION OF TYPE.—Number 8386, American Museum of Natural History. Locality: Nodda, Hainan, February 27, 1923. Length to base of caudal 39 mm. Depth in length 2.3; head 3.9. Eye in head 2.5; snout 4; interorbital 2.4; width of mouth 4.4; depth of peduncle 1.7; length of peduncle 1.3; pectoral 1.3; ventral 1.8; longest dorsal ray 1.2; longest anal ray 1.3; caudal lobe 0.7.

Dorsal 14; anal 18. Scales 34.

Body deep and compressed; profile concave over the eye; top of head flat; breast not keeled. Mouth very small, curved, inferior; maxillary not reaching orbit; no barbels; mouth overhung by a double warty hood on tip of snout; also a line of warts passing over the large double nostril (with flap between) to the eye; gill-membranes narrowly joined to the isthmus. Ventrals approximate; the dorsal inserted over their middle; pectoral just reaching ventral; ventral just reaching anal; first two (simple) rays of dorsal and anal slender, stiffened at base soft at tip. Body covered with medium sized narrow scales which have radiating striæ; lateral line on about anterior 5 only.

A black streak in center of tail region; dorsal and anal narrowly edged with black; no other markings. A color sketch from life is dark silvery on the body tinged with purple; a narrow blue stripe in the center of the tail region; dorsal and anal tinged with purplish pink with narrow blackish margins; the dorsal also with a vague dark central band; caudal pale, its middle rays bright red.

PŒCILLIDÆ. The Tooth-Carps

Small fishes of temperate and tropical fresh, brackish and salt water. A single small, dorsal fin without spines placed posteriorly. Mouth small, oblique transverse with small teeth, the lower jaw projecting. Few species in Asia, a moderate number in the Indian region and in Africa, the group best developed in middle America.

APLOCHEILUS McClelland

MCCLELLAND, 1839, 'Ind. Cyprin.,' p. 301. Type: *Aplocheilus melastigmus* McClelland.

Anal fin unmodified; ventrals present; teeth pointed; in a narrow band.

Aplocheilus curvinotus, new species

Premaxillaries not protractile; orbital rim adnate or with a very slight fold; teeth small, pointed, in a single irregular series or very narrow band.

DESCRIPTION OF TYPE.—Number 8398, American Museum of Natural History. Locality: Nodoa, Hainan. Length to base of caudal 23 mm. Depth in length 3.4; head 3.4. Eye in head 2.6; snout 4; interorbital 2; width of mouth 2.5; width of body 1.6; depth of peduncle 2.3; its length 2.4; pectoral 1.2; ventral 2.4; longest dorsal ray 1.5; longest anal ray 1.6; caudal 1.3.

Dorsal 6; anal 25. Scales about 35.

Compressed; the head broad and wedge-shaped, flat forward, flattened above and below; belly narrow, vent immediately before anal origin. Mouth small, transverse, directed upwards; the lower jaw projecting; interorbital broad and flat; eye large, somewhat infralateral; gill-membranes narrowly joined under hind margin of eye, free from isthmus. Dorsal far back, its origin nearer caudal base than to anal origin, its tip when depressed reaching caudal base; anal long, its origin equidistant from the base of caudal and center of eye; ventrals short, extending $\frac{2}{3}$ the distance to

anal; pectoral placed high and directed somewhat upward; caudal slightly emarginate. No evident lateral line.

Top of head dark, and center of back with a dark streak. A dark streak in the center of peduncle extending forward half the length of the fish above the center of side. Viscera showing through, dark.

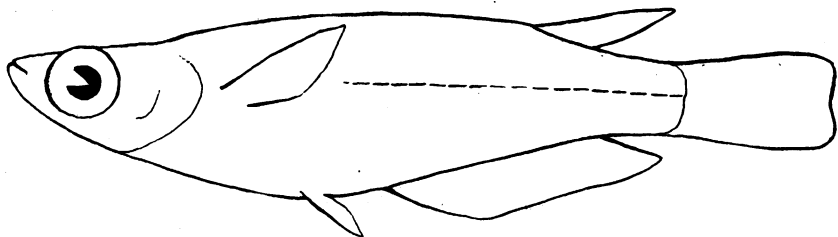


Fig. 43. *Aplocheilichthys curvinotus*, type. 23 mm. without caudal.

The greater number of anal rays separate this species from *A. latipes* of Japan and Formosa, type of *Oryzias* which should probably stand as a subgenus to include *curvinotus* also. In recording *Oryzias latipes* from Kachek, Hainan, Oshima (1926) probably confused *curvinotus* therewith.

AMBASSIDÆ. The Ambassids

Small, perch-like fishes, with body elevated, compressed, more or less diaphanous. Lower limb of preopercle with a double serrated edge, opercle without prominent spine. A forwardly directed recumbent spine in front of the dorsal. Spinous and soft dorsals distinct or with slight connection at the base; anal with 3 spines. Caudal well forked. Mouth oblique, the lower jaw projecting. Scales smooth, rather small, frequently deciduous.

AMBASSIS Cuvier and Valenciennes

CUVIER AND VALENCIENNES, 1828, 'Hist. Nat. Poiss.,' II, p. 175. Type: *Centropomus ambassis* Lacépède (*Ambassis commersoni* Cuvier and Valenciennes).

Ambassis gymnocephalus (Lacépède)

Lutjanus gymnocephalus LACÉPÈDE, 1802, 'Hist. Nat. Poiss.,' III, Pl. XXIII, fig. 3.

Dorsal rays VII-I, 9 to 10; anal III, 9 to 10. Scales 27 to 29. Interopercle not serrated; lateral line interrupted; two rows of scales on suborbitals.

A widely distributed coastal species from east Africa to the Malay Peninsula. Sometimes entering fresh water, and recorded from the Kachek River, Hainan by Oshima (1926).

SERRANIDÆ. The Sea Basses

Symmetrical, rather large-mouthed fishes with a spiny anterior and soft-rayed posterior portion to the dorsal fin, the two usually, not always, connected at the base. Eye moderate in position and size. Pseudobranchiæ well developed. Ventral fins without a scaly flap at their base. Upper corner of operculum with one or two more or less obscure flattened spines. The fins not densely scaled, lateral line not extending across the caudal. Ventral fins usually inserted slightly behind the pectorals, their rays regularly I, 5. Scales moderate or small, more or less rough. Teeth pointed, in bands, some of them generally hinged. Caudal rounded, squarish, or weakly forked.

Sea basses are dominant, specialized, spiny-rayed shore fishes of temperate and warm temperate seas. A few genera run into fresh water or occur exclusively in fresh water.

LATES Cuvier and Valenciennes

CUVIER AND VALENCIENNES, 1828, 'Hist. Nat. Poiss.,' II, p. 88. Type: *Perca nilotica* Linnæus.

Large fishes with spinous and soft dorsal fins separate, rough scales of moderate or small size, rounded caudal, three anal spines, large oblique mouth, eye far forward. Teeth villiform; preorbital and shoulder bone serrated; preopercle with strong spines at its angle, and denticulated along its horizontal border; opercle spiny.

Lates calcarifer (Bloch)

Holocentrus calcarifer BLOCH, 1785, 'Ichthyologie,' Pl. CCXLIV.

Depth in total length (with caudal) 3.5 to 3.7; head 3.7 to 4. Eye in head 5 to 6; snout 4; maxillary 2.4.

Dorsal rays VII to VIII-I, 10 to 12; anal III, 8 to 9. Scales 52 to 60. Dorsal spines strong, the third the highest.

Mouths of rivers in the Indian Ocean. Recorded by Oshima (1926) from the Kachek River, Hainan.

COREOPERCA Herzenstein

HERZENSTEIN, 1896, Ann. Ac. St. Petersburg., p. 11. Type: *C. herzi* Herzenstein.

This genus is characterized as follows by Boulenger:

Body compressed; scales small, cycloid, concentrically striated. Lateral line complete; tubes straight, occupying the greater length of the scale. Mouth large, protractile; maxillary exposed, with supplemental bone; villiform teeth in jaws and on vomer and palatines; no canines; tongue smooth; head partly naked; preopercle serrated, with a few antrorse spines on the lower border; opercle with two spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present. Dorsal

fins confluent, XIV–XV, 11–14, the spinous portion much longer than the soft; anal short, III, 7–11; caudal rounded. Pectoral symmetrical, ventral with a strong spine and five branched rays, the last of which is connected with the belly by a membrane.

One species from North Korea and one from Hainan.

***Coreoperca whiteheadi* Boulenger**

Coreoperca whiteheadi BOULENGER, 1899, Proc. Zool. Soc. London, pt. 2, p. 960.

A small perch-like fish with ocellus on opercular flap.

Description based on a small specimen 68 mm. in length to base of caudal, Nodda, April 6, 1923:

Depth in length 2.6 (to 3); head 2.3 (to 3). Eye in head 4; snout 4; interorbital 4.5; maxillary 2.4; depth of peduncle 3; pectoral 2.2; ventral 2; its spine 3.5;

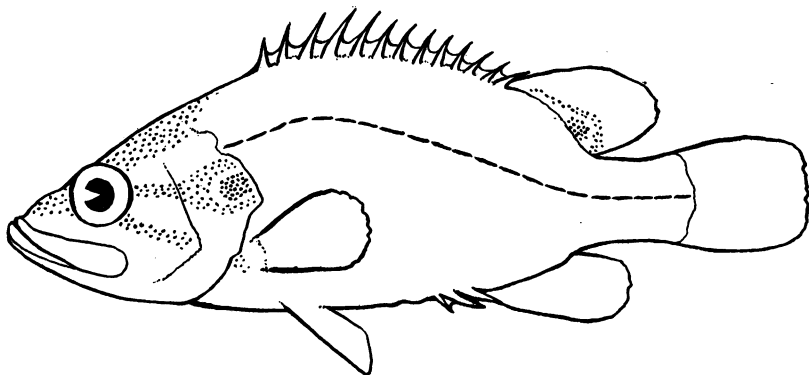


Fig. 44. *Coreoperca whiteheadi* Boulenger. 97 mm. without caudal.

longest dorsal spine 3; dorsal ray 2.5; longest anal spine (2nd) 4; anal ray 2.5; caudal 1.8. Base soft dorsal in base spinous 2.

Dorsal XIV, 17 (to XV, 14); anal 12 (to 11). Scales about 70 (to 80).

Snout pointed; lower jaw projecting; eye with a free rim, impinging on profile; interorbital flat or slightly concave; preopercle finely serrate, serrations a little coarser on angle and lower limb; opercle with a small sharp spine crossing a black ocellus on the flap. Gill-membranes free and independent. Dorsal and anal spines with cutaneous scaled sheaths at base, soft rays without sheath; caudal rounded subtruncate. Body covered with small cycloid scales with prominent concentric ridges; breast and cheek with smaller scales; a few scales on opercle; none on interorbital, top of snout, jaws and gill-membranes.

Color dark, with vague irregular pale mottling, breast paler. Two dark radiating stripes downward and backward from eye. Spinous dorsal dusky; ventral dusky with a broad pale edge; pectoral hyaline; soft vertical fins pale with dusky marks at the bases.

A color sketch from life is irregularly blotched, vermiculated with bluish greenish on a blackish ground; the mid-line of the head above, to include the first two dorsal

spines, and the top of the peduncle light brown; two dark stripes radiating backward from the eye; a dark blue blotch with a narrow pale margin on the corner of the opercle; paired fins more or less dusky; spinous dorsal more or less black and the other vertical fins pale grayish.

This fish seemed to be rare immediately about Nodda but common in streams of the low country some miles to the west. My fisherman knew these streams and could get the fish only by going there.

OPHICEPHALIDÆ. The Snake-heads

Body elongate, subcylindrical anteriorly, head more or less depressed. Mouth large. A single long spineless dorsal fin and similar though shorter anal. Body covered with small concentrically striate or embossed scales; lateral line abruptly curved or almost interrupted. Ventral fins thoracic or absent. Fresh-water fishes of southern Asia, the Indies, and 1 or 2 species in Africa.

OPHICEPHALUS Bloch

BLOCH, 1794, 'Ausländischen Fische,' VIII, p. 137. Type: *Ophicephalus punctatus* Bloch.

Ventral fins present. A number of species in southern Asia and the Indies, and 1 or 2 species in Africa.

Ophicephalus maculatus (Lacépède)

Bostrychus maculatus LACÉPÈDE, 1802, 'Hist. Nat. Poiss.,' III, pp. 140, 143.

Ophiocephalus maculatus GÜNTHER, 1861, 'Cat.,' III, p. 480.

Description of a specimen from Nodda, July 19, 1923:

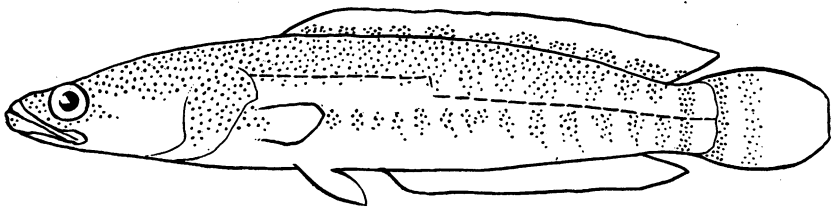


Fig. 45. *Ophicephalus maculatus* (Lacépède). 110 mm. without caudal.

Length to base of caudal 110 mm. Depth in length 5.1; Head 2.7. Eye in head 6.6; snout 4.9; interorbital 4.9; maxillary 2.6; depth of peduncle 3.4; width of body 2.3; pectoral 3.7; ventral 3.4; height (posterior) dorsal lobe 3.3; anal lobe 3.3; caudal 1.8.

Dorsal 46; anal 30. Scales 55.

Lower jaw projecting; snout and interorbital low, flat, orbital rim slightly raised; margin of eye free; maxillary extending slightly beyond eye; gill-membranes joined at base, free from isthmus. Body little compressed in front, well compressed behind.

Pectoral extending beyond ventral origin; ventral not reaching anal; dorsal inserted behind pectoral base; anal origin equidistant from base of caudal and center of eye; axil of dorsal behind that of anal. Body and head covered with small striate scales, except snout, jaws, and chin; scales extending forward on mid-line of snout above to a distance equal $\frac{2}{3}$ of eye from tip of snout; lateral line complete; dropping 2 scale rows over front part of anal.

Base of caudal and peduncle with vague alternating pale and dark crossbands; a double row of dark marks forward on side; a dark line slanting down from back of eye; dark marks along the base of the dorsal. A color sketch from life is dark brown on the back; bluish silvery on the sides and below; a double row of closely spaced dusky blotches along the side, the upper carried forward from the angle of the gill-cleft to the eye as a dusky band, narrowing before the eye as a dusky stripe to the end of the lower jaw; irregular radiating streaks below the eye; two complete dusky bands crossing the peduncle and the base of the caudal; a reddish band between them and another behind the last; fins brownish; the paired fins tinged with orange at the base; dorsal with a series of dusky blotches on its base, and anal more or less dusky at the tip.

***Ophicephalus gachua* Hamilton-Buchanan**

Ophicephalus gachua HAMILTON-BUCHANAN, 1822, 'Fishes of the Ganges,' p. 68; WEBER AND DE BEAUFORT, 1922, IV, p. 321.

An *Ophicephalus* with barred fins (in the young) and very broad head, the upper surface of which covered with rather large shields.

Description of a small specimen from Nodoa, March 9, 1923:

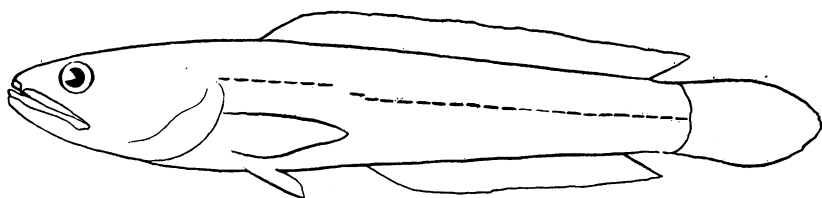


Fig. 46. *Ophicephalus gachua* Hamilton-Buchanan. 120 mm. without caudal.

Length to base of caudal 50 mm. Depth in length 5.5; head 3.2. Eye in head 5.3; snout 5.3; interorbital 3; maxillary 3; width of head 1.7; depth of peduncle 3.1; pectoral 1.5; ventral 3; height of (posterior) dorsal lobe 3; anal lobe 2.7; caudal 1.2.

Dorsal 32; anal 22. Scales 40.

Head broad, depressed; body compressed behind. Lower jaw slightly projecting; maxillary not quite to posterior edge of eye; nasal tube long; eye with a free rim; gill-membranes joined, free from isthmus. Dorsal and ventral origins apposed, a short distance behind base of pectoral; anal origin equidistant from tip of maxillary and base of caudal; dorsal axil behind anal; caudal rounded, subacuminate. Body and head covered with striate scales, absent before the eye, on tip of snout, jaws and chin; lateral line complete, dropping down a single scale row at tip of pectoral.

Brownish olive, paler along belly; sides faintly chequered; faint dark bars slanting forward and downward on back; a short bar above and a streak behind tip

of maxillary; ventrals pale, other fins barred. A color sketch from life of this small specimen is brownish, more or less mottled; the body crossed by vague zigzag blackish bands; the lower side of the head varied light and dark; pectoral, dorsal, caudal and anal fins barred; eye, and a short bar near the base of the pectoral reddish.

A somewhat larger individual of 120 mm. has head 3; caudal in length 4.5 (5.5 in total); width of head 1.5 in its length, interorbital 3.5. Maxillary to under posterior edge of eye; a few teeth at side of lower jaw somewhat enlarged. Pectoral not quite to vent, more than twice length of ventral. Shields on upper surface of head rather large. Head and body dark colored; dorsal and anal dusky with a narrow whitish margin; caudal dark gray; pectoral gray with 2 or 3 narrow dark bars basally.

This species is listed from British India and Ceylon, Borneo, Java, Sumatra, Malay Peninsula, and Siam. Our two specimens agree particularly well with *Ophicephalus kelaartii* from Ceylon, synonymized with *O. gachua* by Weber and de Beaufort.

CHANNA Scopoli

Channa (Gronow, 1763, 'Zoophylaceum') SCOPOLI, 1777, 'Int. Hist. Nat.,' p. 459. Type: *Channa orientalis* Bloch and Schneider.

Ventral fins absent. A single, or two or three closely related species in southern and eastern Asia.

Channa ocellata Peters

Channa ocellata PETERS, 1864, Monather. Acad. Wiss. Berl., p. 384. China.

Description from a small specimen (87 mm. to base of caudal) from Tungting Lake, Hunan. (Hainan material is indistinguishable):

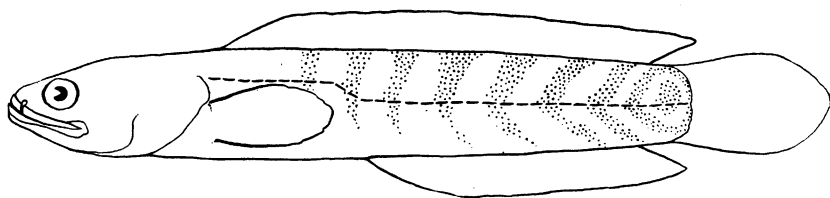


Fig. 47. *Channa ocellata* Peters. 143 mm. without caudal.

Depth in length 6.2; head 3.3. Eye in head 5.2; snout 4.8; interorbital 3.8; maxillary 2.5; depth of peduncle 2.7; pectoral 1.7; middle dorsal rays 2.8; middle anal rays 3.5; caudal 1.5.

Dorsal 46; anal 28. Scales 60.

Depressed in front, compressed behind. No ventrals. A conspicuous nasal tube on side of snout; lower jaw slightly projecting. Body and head, except snout, chin and jaws, scaled. Scales sculptured with more or less parallel concentric wavy ridges. Lateral line complete, starting high, descending gently to center of side behind tip of

pectoral. Dorsal commencing behind base of pectoral. Peduncle short but evident, dorsal axil appreciably behind anal. Gill-membranes rather broadly joined, free from isthmus. Maxillary to or beyond posterior edge of eye.

Dark on top of head, pale brown on belly, sides posteriorly with V-shaped cross-bars, black ocellus at base of caudal.

A color sketch from life is as follows:—body and fins coppery olive; body crossed with irregular dark blue bands, more or less horizontal on the head behind the eye; vertical and curved on the body, to end in an oval ocellated blotch at the base of the caudal; body with points of red; head, body and dorsal with numerous scattered chalky white specks. In another sketch the bands on head and sides are black, the ocellated blotch at the caudal base dark blue bordered with orange, a blotch at the shoulder dark blue narrowly bordered with white; and the iris orange.

ANABANTIDÆ. The Labyrinth Fishes

Dorsal and anal fins of a variable number of spines and rays. Scales small or of moderate size, ctenoid; lateral line interrupted or absent. A cavity above the third or upper portion of the first branchial arch contains an elaborate apparatus consisting of thin laminae of bone, covered by a vascular mucous membrane, and employed as an auxiliary organ of respiration. Fresh-water and estuary fishes of southern Asia and of Africa.

MACROPODUS Lacépède

LACÉPÈDE, 1802, 'Hist. Nat. Poiss.,' III, p. 416. Type: *Macropodus viridiauratus* Lacépède.

No teeth on the palate; ventral I, 5; dorsal and anal spines much more numerous than the rays. Small highly colored fishes, a few species in southern and eastern Asia and adjacent islands.

Macropodus viridiauratus Lacépède

Macropodus viridiauratus LACÉPÈDE, 1802, 'Hist. Nat. Poiss.,' III, p. 416.

Description of a specimen from Nodda, March 14, 1923:

Length to base of caudal 36 mm. Depth in length 2.8; head 2.8. Eye in head 3.9; snout 3.9; interorbital 3; maxillary 3.9; depth of peduncle 2; pectoral 1.2; ventral 0.8; last dorsal spine 2.5; last anal spine 2.5; longest dorsal ray 1.2; longest anal ray 1.1; caudal 0.8.

Dorsal XV, 8; anal XVIII, 16. Scales 35.

Body strongly compressed. Mouth small, oblique, lower jaw slightly projecting, maxillary not nearly reaching eye. Preopercle and posterior limb of preorbital finely serrate; eye with free rim; gill-membranes joined, free from isthmus. Pectoral long, narrow fan-shaped; ventral with a filamentous ray reaching soft anal; spinous dorsal and anal long, spines increasing in length backward; lobes of shorter higher soft fins

ending in filaments; axil of dorsal separated from, of anal contiguous with caudal base. Origin of dorsal and anal appreciably behind bases of paired fins, that of anal slightly the further forward. Caudal with graduated margin and forked center. Body and head covered with rough ctenoid scales, except naked preorbital; one or more broken lateral lines running high, anteriorly,—a single almost complete one posteriorly, near center of peduncle. A scaly sheath at the base of dorsal and anal.

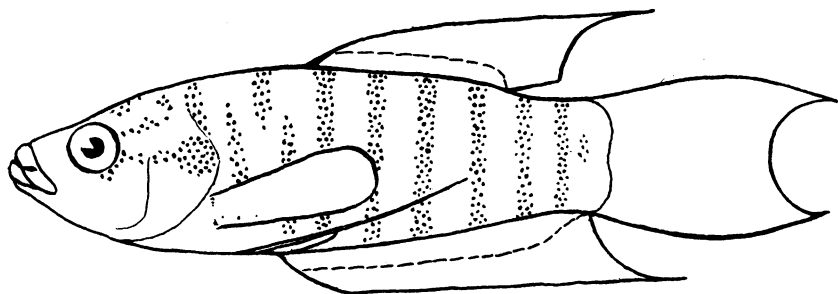


Fig. 48. *Macropodus viridiauratus* Lacépède. 36 mm. without caudal.

Two or three radiating dark lines back of eye; a black blotch on opercular angle; eight narrow vertical blackish bands on body. A color sketch from life has an olive head, red iris and blue blotch on the opercle; the body is red banded with blue; pectoral translucent; ventral filaments bright red; dorsal red at the base, bluish distally, with dark spots in the center; anal red, dusky distally; caudal red.

This fish is close to, if not identical with, material from Fukien, but quite distinct from material from Anhwei, near the mouth of the Yang-tze (*Macropodus opercularis*¹). In recording *Polycanthus operculatus* (Linnaeus) from Hainan, Oshima (1926) probably failed to differentiate *viridiauratus*.

ANABAS Cuvier

CUVIER, 1817, Règne Animal, (1st Ed.) II, p. 339. Type: *Perca scandens* Daldorff.

Teeth on the palate. Opercles and preorbital serrate.

Anabas scandens (Daldorff)

Perca scandens DALDORFF, 1797, Trans. Linn. Soc. London, III, p. 62.

Depth in total length (with caudal), 3 to 4; head 3.5 to 3.7. Eye in head 4.5 to 5; equal to or greater than the snout or than $\frac{1}{2}$ the interorbital. Dorsal rays XVII to XVIII, 8 to 10; anal IX to X, 9 to 11. Scales, 28 to 32. Caudal rounded.

Fresh waters and estuaries of India and the Malay region. Recorded by Oshima (1926) from Haiho, Hainan.

¹According to G. S. Myers [in conversation] *viridiauratus* Lacépède is a synonym of *opercularis* L., and this other form should stand as *chinensis* Bloch.

MASTACEMBELIDÆ. Spiny Eels

Compressed eel-like fishes with pointed more or less proboscis-like snout, many small sharp spines along the back, and frequently concealed spines on the side of the head. A number of species in southern Asia, the Indies, and Africa.

• **MASTACEMBELUS** Scopoli

SCOPOLI, 1777, 'Int. Hist. Nat.,' p. 458. after Gronow. Type: *Ophidium simack* Walbaum, 1792 = *Rhynchobdella haleppensis* Bloch and Schneider, 1801 (*Mastacembelus maxillis subacutis*, Gronow).

Preorbital spine present.

Mastacembelus armatus, (Lacépède)

Macrognathus armatus LACÉPÈDES, 1800, 'Hist. Nat. Poiss.,' II, p. 286.

Mastacembelus armatus BOULENGER, 1912, Journ. Ac. Nat. Sci. Phila., XV.

Mastacembelus armatus undulatus (McClelland)

Macrognathus undulatus MCCLELLAND, 1844, Calcutta Journ. Nat. Hist., IV, p. 398, Pl. xxii.

Description of a specimen from Nodoa, August 2, 1923:

Length to base of caudal 160 mm. Depth in length 8.6; head 5.4. Eye in head 8; snout 3; interorbital 8; maxillary 3.6; pectoral 3.3; caudal 4; 2nd anal spine 4.5; tentacle in eye about 1; snout beyond mouth 1.5. Thickness of body 1.7 in depth.

Dorsal XXXIII, about 75; anal III, about 75 (the first spine obscure).

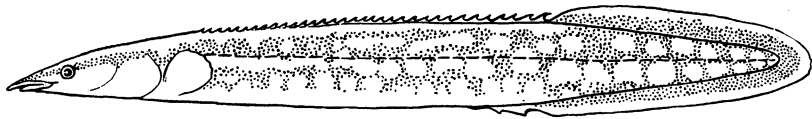


Fig. 49. *Mastacembelus armatus undulatus* (McClelland). 160 mm. without caudal.

Greatest depth of body under middle of spinous dorsal. Eye impinging slightly on profile; gill-cleft not extending above pectoral; eye without free rim; 2 pre-opercular spines, the upper the longer; a smaller preorbital spine. Scales very small, not evident on snout, jaws or gill-membranes, present elsewhere. Pectorals broad; dorsal spines small in front gradually increasing backward; last anal spine much the larger; first dorsal spine just behind pectoral base.

A dark band from snout through eye to dark back, and wide dark reticulations posteriorly enclosing large pale oval areas, roughly in 2 rows; fins dark, edged with whitish. A color sketch from life is pale brownish on the top of the head and on the back, including the dorsal spines; sides dark olive marked by black reticulations which are confluent anteriorly in a black band which passes forward to the eye and more narrowly from the eye to the tip of the snout; soft vertical fins around the tail black with a pale margin, this broadest, occupying most of the width of the fin, at the front of the soft dorsal; eye dull red.

This fish was common about Nodoa, though seldom taken in numbers. My fisherman was generally able to get one or two any day that he was told to do so, providing it had not rained too recently. It was only after the seventh or eighth attempt that we succeeded in keeping one alive and in good color long enough for Mr. Wang to record its form and color. A specimen would often die in less than a day after capture and its colors would change long before death.

ELEOTRIDÆ. Primitive Gobies

Small carnivorous fishes, mostly of small size, living on the bottom near shore in warm regions. Numerous in brackish as well as salt water, and some in fresh water. Body scaled; teeth weak; orbital rim adnate; dorsal fins separate, the first of a few weak flexible spines; ventral fins close together, separate, I, 5; soft dorsal and anal similar; caudal usually rounded or pointed. Opercle unarmed, preopercle frequently with a spine. Related to the true gobies (Gobiidæ) from which they differ obviously in having ventral fins separate.

PHILYPNUS Cuvier and Valenciennes

CUVIER AND VALENCIENNES, 1837, 'Hist. Nat. Poiss.,' XII, p. 255. Type: *Gobiomorus dormitator* Lacépède.

Vomer with teeth, preopercle spineless, gill openings wide, to under front part of eye. Tropical rivers.

Philypnus chalmersi, new species

DESCRIPTION OF TYPE.—Number 8384, American Museum of Natural History. Locality: Nodoa, Hainan. Length to base of caudal 102 mm. Depth in length 4.8; head 3.8. Eye in head 4.6; snout 3.3; interorbital 5; maxillary 2.4; width of head 1.8; depth of peduncle 3; its length (from dorsal axil) 1.4; longest dorsal spine 2; longest dorsal ray 1.8; pectoral 1.4; ventral 1.6; longest anal ray 2; caudal 1.3.

Dorsal VIII, 13; anal 10. Scales 42.

Little compressed deepest at nape which is slightly gibbous; vent shortly before anal origin, with a large papilla behind it. Head rather pointed, its outlines gently convex; cheeks slightly swollen; mouth oblique; maxillary to under front of eye; lower jaw projecting; eye somewhat superolateral, without free rim; gill-membranes free from one another and from isthmus. Ventrals separate. Scales finely ctenoid on sides; those on breast smaller; body completely scaled; side of head scaled, interorbital snout and jaws scaleless; lateral line almost complete.

Brownish, head darker on snout, behind eye, along margin of opercle and gill-membranes. Upper parts speckled with black, dorsals and caudal finely barred.

A SMALLER SPECIMEN.—Number 8385, American Museum of Natural History. Locality: Nodoa, Hainan, July 21, 1923. Length to base of caudal 58 mm. Depth in length 5; head 3. Eye in head 4.5; snout 3.2; interorbital 6.5; maxillary 2.7; thick-

ness of body 2.1; depth of peduncle 3.3; pectoral 1.6; ventral 1.6; longest dorsal spine 2.5; longest dorsal ray 2.7; longest anal ray 3; caudal 1.6.

Dorsal VIII, 12; anal 10. Scales about 40, irregular. Ventral 6.

Body little compressed, back elevated; snout rather narrow, pointed; breast and belly flattened. Lower jaw projecting; maxillary passing front of eye; gill-membranes free from one another and from isthmus; 3 or 4 rows of conspicuous pores below the eye; no spines about head. Teeth small in broad bands in jaws, the inner teeth of the upper jaw slightly enlarged and notably depressible, a curved band of fine teeth on the vomer, tongue toothless. Gill rakers well developed, lanceolate, rather short and numerous, about 15 on the lower limb of the first arch. Pectoral long and narrow with a broad base; ventral origin behind pectoral base and before origin of spinous dorsal;

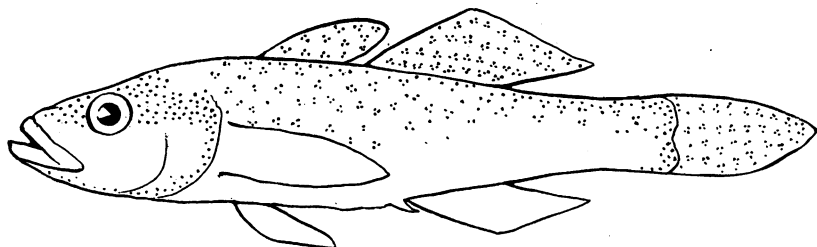


Fig. 50. *Philypnus chalmersi*, type. 102 mm. without caudal.

anal origin behind that of 2nd dorsal; caudal narrow, subtruncate; bases of ventrals separated by $\frac{2}{3}$ that of one; spines of 1st dorsal slender and soft. Body and back covered with small thin ctenoid scales, none on interorbital, snout, or jaws; lateral line somewhat obscure and broken, running straight from under pectoral and stopping a scale or two short of caudal, scales of lateral line and peduncle somewhat larger, on shoulder small and crowded.

Dark vertical mark below eye and horizontal marks along center of side. Dark spot on upper pectoral base, and band across base of caudal; caudal barred, dorsals spotted. A color sketch from life of a small specimen is: brownish, paler below; three or four vague dark areas on the back; several dark streaks radiating from the eye, and along the centre of the side; a blue spot on the opercle; a dark bar across the base of the caudal; dorsals and caudal spotted on the rays; posterior corner of the first dorsal dusky; other fins pale.

Named for Chalmers Salisbury, son of Dr. Clarence G. Salisbury.

ELEOTRIS Gronow

GRONOW, 1763, Zoophylaceum, p. 83. BLOCH AND SCHNEIDER, 1801. Type: *Gobius pisonis* Gmelin.

Vomer without teeth; preopercle with a concealed spine; isthmus wide, gill openings extending no farther forward than posterior angle of preopercle.

Eleotris oxycephala, Temminck and Schlegel

Eleotris oxycephala TEMMINCK AND SCHLEGEL, 1847, 'Fauna Japonica,' p. 149, Pl. LXXVII, fig. 4 and 5. Japan.

Depth in length 6; head 4; eye in head 5.5; snout, 5; interorbital 3.7; maxillary 2.6. Lower jaw strongly projecting. Dorsal VI, 9; anal 9.

Recorded by Oshima (1926) from Haiho and the Kachek River, Hainan. The species is close to and may have been confused with *Eleotris balia* Jordan and Seale from China, probably Hongkong.

Gobiidæ. The Gobies

A large family of small, bottom fishes, everywhere abundant in warm seas. Allied to the more primitive Eleotridæ but with ventral fins united.

Gobius Linnæus

LINNÆUS, 1758, 10th Ed., I, p. 263. Type: *Gobius niger* Linnæus.

Dorsal fins separate, free from the caudal; ventral disk free from the belly; dorsal spines 6; eyes well developed; teeth simple; body with more or less ctenoid scales; interorbital area without fleshy crest and inner edge of shoulder girdle without fleshy cirri or papillæ.

A large cosmopolitan genus, mostly marine but occurring also in fresh water. Recently much divided, the divisions best recognized as subgenera.

Subgenus **Rhinogobius** Gill

One or more species of small fishes representing this subgenus occur in most of the fresh waters of eastern Asia.

Gobius hadropterus (Jordan and Snyder)

Ctenogobius hadropterus JORDAN AND SNYDER, 1902, Proc. U. S. Nat. Mus., XXIV, p. 60. Japan.

We have several small specimens from Nodoo, mostly under 35 mm. in length to base of caudal, provisionally identified with this Japanese species. They have the caudal crossed by narrow dark bars.

A larger specimen from Fukien may be described as follows:

Length to base of caudal 65 mm. Depth in length 5; head 3.2. Eye in head 5; snout 2.5; maxillary 2.1; width of head 1.6; depth of peduncle 2.6; its length 1.3; pectoral 1.3; ventral 1.6; longest dorsal spine 2.3; longest dorsal ray (last) 1.3; longest anal ray (last) 1.5; caudal 1.3. Interorbital in eye 1.5.

Dorsal VI, 9; anal 9. Scales 30.

A little depressed in front, compressed behind; lower surface of head and breast flattish, sides above them sloping to mid-dorsal line; vent situated behind a flat flap, almost immediately before anal origin. Cheeks swollen; eyes superolateral, close

together; interorbital a little concave; mouth very slightly oblique; lower jaw very slightly included; maxillary to under front of pupil; lips broad. Ventral origin a little behind pectoral base, slightly before origin of dorsal; pectoral reaching almost to over anal origin, ventral not reaching quite so far back; caudal pointed; ventrals united into a disk, free behind, with a rounded tip, its anterior flap truncate in the center with pointed exerted corners. Scales more or less pointed; with comb edges and converg-

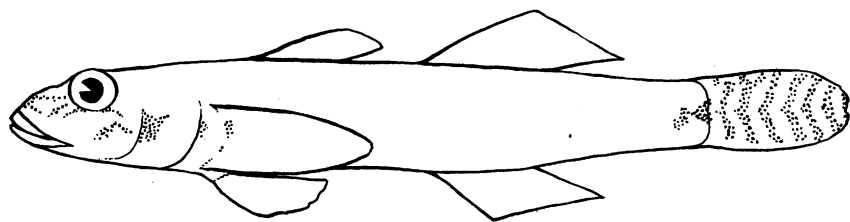


Fig. 51. *Gobius hadropterus* (Jordan and Snyder). 38 mm. without caudal.

ing striae; small and imbedded on the belly; lateral line very little developed, on the tail only. Orbital rim adnate above with a rather deep fold below; Gill-membranes broadly joined to side of breast beneath branchiostegals under edge of preopercle.

A small dark mark at upper corner of pectoral base, and on base of the central caudal rays; snout faintly vermiculated; fins grayish, dorsal and anal lobes dusky. Several other specimens from Fukien, mostly a little smaller with pale fins.

This species has previously been listed from China by Rendahl (1924, *Arkiv for Zoologi*, Stockholm, XVI, p. 18).

***Gobius giurinus* Rutter**

Gobius giurinus RUTTER, 1897, *Proc. Acad. Phila.*, XLIX, p. 86. Swatow.

Recorded by Oshima (1926) from the Kachek River, Hainan. If we are correct in identifying with this species a specimen 75 mm. in standard length from Fukien, it is close to *Gobius hadropterus*. At this size the soft dorsal and anal are less high, their longest rays contained respectively 1.7 and 1.8 in the head. The head is less deep, more pointed, the lower jaw distinctly included instead of very slightly so; peduncle more slender. Depth 5; head 3.3. Eye in head 4.5; snout 2.7; maxillary 2.4; depth of peduncle 3.4; its length 1.1. Dorsal rays, VI, 10; anal 8. Scales 32.

***Gobius hainanensis* (Oshima)**

Rhinogobius hainanensis OSHIMA, 1926, *Annot. Zool. Japon.*, XI, p. 23. Kachek River, Hainan.

Length 104 mm. Depth 4.59; head 3.90; depth of peduncle 7.8. Eye in head 4; snout 3.35; interorbital 4; maxillary 2.65. Dorsal rays VI, 11; anal 11. Scales 50. Mouth slightly oblique; jaws subequal, the lower very slightly projecting. Ventrals extending as far back as pectorals, not reaching vent. Body with uniform, conspicuous scales, those on the nape small, breast anterior to ventrals almost naked. Back maculated with black; sides with about 10 dark V-shaped cross-bands, the angle of

which is directed backward. A dark triangular blotch below the eye; dark brown spot at upper part of pectoral base; dorsal banded longitudinally; anal membrane dark gray.

Subgenus **Glossogobius** Gill

Gobius brunneus Temminck and Schlegel

Gobius brunneus TEMMINCK AND SCHLEGEL, 1847, 'Fauna Japonica,' p. 142, Pl. LXXIV, fig. 2. Japan.

Depth in total length (with caudal) about 6; head 4 plus. Eye in head 6.7; snout 3.5. Lower jaw projecting. Dorsal rays VI, 10; anal 8. Scales about 32. Color brownish, without bold markings.

This member of the subgenus (*Glossogobius*) is recorded by Oshima (1926) from Kachek River, Hainan.

Gobius grammepomus Bleeker

Gobius grammepomus BLEEKER, 1849, Verh. Bat. Gen., XXII, p. 34. East Indies.

Depth in total length 5.5 to 7.5; head 4 to 4.7; caudal rounded 5 to 5.5. Eye in head 4 to 5; snout longer than eye. An oblique streak from the eye to the maxillary. Dorsal rays VI, 10; anal 10. Scales 50 to 55.

Recorded by Oshima (1926) from Kachek River, Hainan.

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PLATE XXVI

PLATE XXVI.

In color, from life.

- Fig. 1. *Misgurnus mizolepis hainan*, type.
- Fig. 2. *Nemacheilus pulcher*, type.
- Fig. 3. *Sarcocheilichthys hainanensis*, type.
- Fig. 4. *Aphyocypris normalis*, type.



