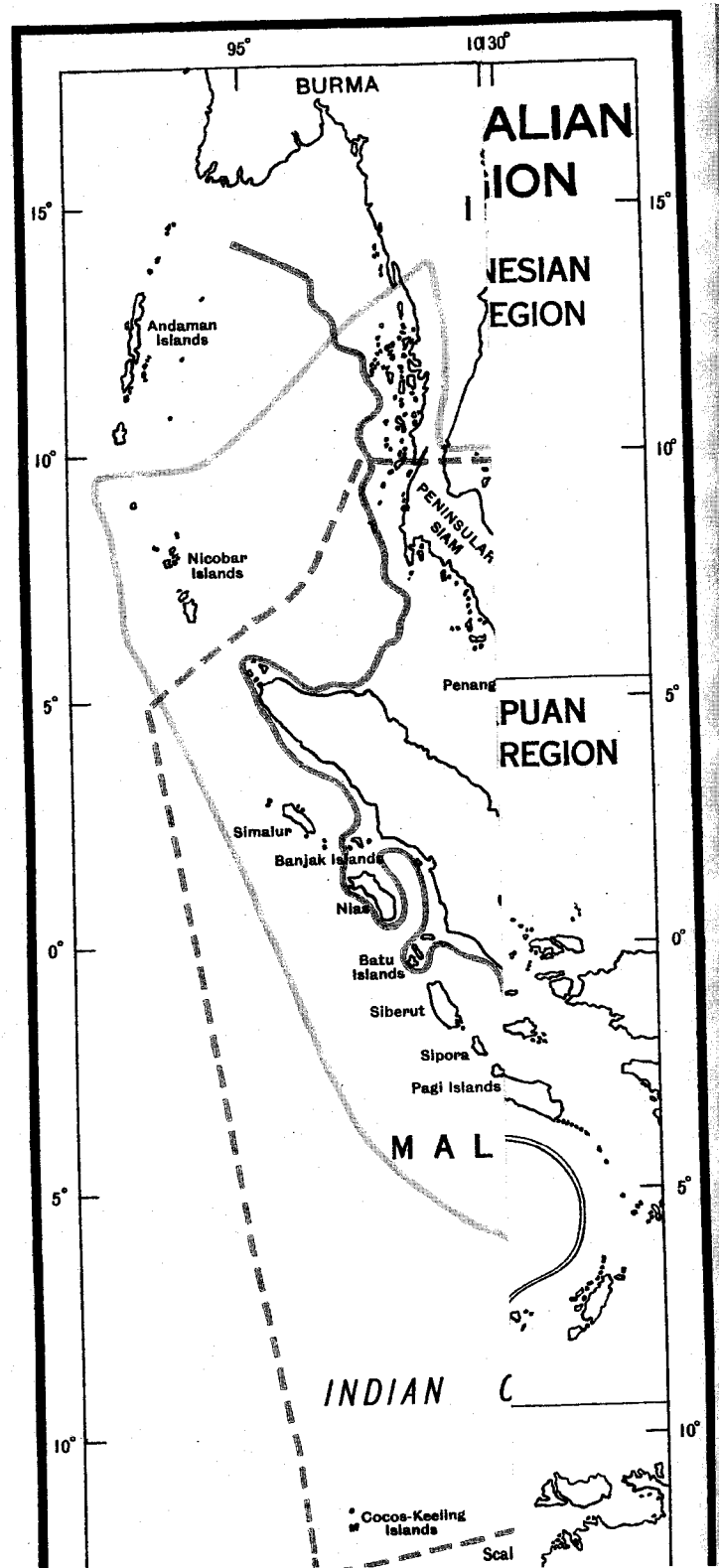


*Bulletin of the Raffles Museum, Singapore, Straits Settlements*
*No.* 15, *April,* 1940

# A HANDLIST OF MALAYSIAN MAMMALS

## A SYSTEMATIC LIST OF THE MAMMALS OF THE MALAY PENINSULA, SUMATRA, BORNEO AND JAVA, INCLUDING THE ADJACENT SMALL ISLANDS

BY

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# New species of fishes from the Malay Peninsula and Borneo

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(Plates I–XX)

We may regard the Malay Peninsula as the central station of the Indo-Pacific biological realm, and therefore a region extraordinarily rich in species of fishes. Nearly all the marine fishes found in the Red Sea and eastward through Polynesia either live along the shores of the Malay Peninsula and its islands, or pass through the Straits of Malacca or the South China Sea during their migrations.

Recent explorations in the region about Singapore have shown that many marine fishes, hitherto known only from a few specimens taken at far distant points in the Philippines or East Indies, have their real centre of distribution about the southern tip of Malaya. This statement is based on a study of the comparative abundance of certain species collected by me about Singapore and in various regions one to two thousand miles eastward and north-eastward from there.

The Malay Peninsula is likewise very rich in fresh water fishes, having very many species of Cyprinidæ, Labyrinth fishes, catfishes, and other strictly fresh water families. Most of those known from Sumatra and Borneo are known to occur in the streams of Malaya, and further exploration will undoubtedly reveal the presence of most of the remainder. The reasons for this similarity date from the time when Sunda Land included Malaya, Borneo, Sumatra, part of the Philippines, a considerable part of the present South China Sea, and other areas, and have been discussed by various authors, including myself. In addition, many of the fresh water fishes of Siam occur in the Malay Peninsula. Every bit of intensive collecting in the streams of central and northern Malaya brings to light more fishes hitherto known only from Siam. A very few fresh water fishes of Burma occur in the Malay States, and there is, of course, a number of fresh water fishes of general distribution from India to Malaya and the East Indies.

The new fishes here presented were collected in British North Borneo, Sarawak, and the Malay Peninsula from early in January to May 14th, 1937. In Borneo I had the invaluable co-operation of Mr. H. G. Keith, conservator of forests of British

North Borneo, and of Mr. E. Banks, curator of the museum at Kuching, Sarawak. The collaboration of Director F. N. Chasen, Curator M. W. F. Tweedie, Mr. De Fontaine, and other members of the staff of the Raffles Museum, enabled me to make large and important collections of fresh water fishes from the island of Singapore to Chenderoh Dam, Perak, and to secure many marine fishes not hitherto collected. Mr. Tweedie not only took me on many collecting trips by automobile, but made valuable collections himself. Director W. Birtwistle and his staff, of the department of fisheries, secured many marine and fresh water fishes not otherwise obtainable. A visit to Penang was made very profitable by the active co-operation and hospitality of Mr. M. R. Henderson, director of the Penang Botanic Garden. My heartiest thanks are hereby extended to all the gentlemen named; without their aid but little could have been accomplished.

In addition to the new species here presented, many rare or little known fishes were obtained, many of them hitherto unknown from the Malay Peninsula. In another paper will be presented these additions to the fish fauna of Malaya. The number of fishes already recorded from the Malay Peninsula is about 930; my tentative list includes about 1,000 species, after making allowance for errors and duplications in the published lists. I have no doubt that at least 1,500 marine and fresh water species occur in the seas and rivers of Malaya.

A vast amount of exploratory work remains to be done before we can have an adequate knowledge of Malay fishes, their distribution, breeding, and food habits. As an illustration of how little we actually know, a wealth of new or rare species was found by Mr. Tweedie and myself as a result of a couple of hours spent in working a brackish water mangrove flat on Singapore Island with water from two to six inches deep. Intensive collecting needs to be done in brackish water creeks and swamps, on coral reefs and rocky shores, in river mouths and estuaries, and in fact everywhere from Singapore to Kelantan and Perak. Some of the common market fishes of inland towns in Perak, Trengganu, and Kelantan are not represented in collections.

The forest cover of the Malay Peninsula is being destroyed or altered at a tremendous rate. The jungle is destroyed and its place taken by rubber estates and pineapple plantations. With them goes the construction of automobile roads and the draining of the roadside ditches and swampy areas that formerly swarmed with a fish fauna of amazing richness, variety, and beauty. Rills, brooks, and the few remaining water holes are sprayed with oil, so that they are uninhabitable for nearly all kinds of fishes. Every alteration in the natural ecological conditions upsets the whole balance of nature. The fishes of jungle streams and swamps are an integral part of the environment, and any







change in the natural cover of the land affects most of them unfavorably. Now and then some species is aided by new conditions and is able to multiply its numbers manyfold, but for most kinds the removal of the native forest means a great reduction in their numbers, or even their total destruction in the affected area. Every effort should be made to study the fishes of Malayan streams while there are still large areas of primitive jungle. It would be the part of wisdom to set aside wild life reserves in the lowlands, as well as in the mountains, so that future generations may see and enjoy the wealth of life, including fishes, characteristic of primitive Malayan forests at various altitudes. At the present rate of destruction a few more years will see the total elimination of lowland jungle, and the world will have lost a feature of extraordinary interest to every naturalist, artist, and lover of the outdoor world.

**Homaloptera tweediei**, new species. Plate I

Dorsal I–8; anal I–5 or 4; pectoral with 10 divided and 4 undivided rays; ventral II–7; scales in lateral line 36, plus one on the caudal base; 4 to 5 above the lateral line, 3 or 3.5 below to ventral base, and 5 below to median row beneath; 18–20 predorsal scales; 16 scales around caudal peduncle.

The depth is 6.6 to 6.8, the head 3.4 to 3.55, the caudal 3.5, the pectoral about 5, the ventral 5.75 to 6 times in the length. The eye is 3.8 to 4, the snout 2.6 times in the head; the interorbital equals the eye, which is a little more or less than 1.5 times in the snout; the least depth of the caudal peduncle is 2.1 to 2.2 times in its own length.

The body is slender, little elevated, the upper profile forming a gentle curve from the dorsal origin to the tip of the snout, the prominent eyes rising above the dorsal outline. The mouth is well arched, with thin lips, the barbels prominent. The maxillary barbel almost equals the eye, the outer rostral barbel nearly as long, the inner one smaller and much shorter.

The origin of the dorsal is opposite the sixteenth, the ventral origin opposite the fourteenth, the anal origin opposite the twenty-seventh scale of the lateral line; the dorsal origin is a little nearer the tip of the snout than the caudal base. The pectoral reaches beyond the ventral origin but the latter does not reach the anus, which is well forward of the anal origin. The lobes of the forked caudal are pointed. The head, and abdomen back to the ventrals, are naked.

In life the color is whitish with a brown stripe from the tip of the snout along the lateral line to the caudal base, 4 broad brown cross-bars over the back and down the sides, and a bar at the caudal base, the top of the head and snout blackish; the caudal and dorsal are more or less dusky.

In alcohol the cross-bands tend to disappear, and the back and sides are seen to be dotted with very minute brown specks; otherwise there is no change.

Described from the type and 3 paratypes, 23 to 26 mm. long. These and 4 other specimens were taken with a dip net from a shallow rapid creek in the Mawai district, Johore, about 40 miles north of Singapore. These little loaches lie on the sandy bottom under grasses and fixed algae growing in mid-stream. The 4 specimens not used in the description are in the collection of the Raffles Museum, Singapore.

**Cobitophis perakensis,** new species. Plate II

Dorsal I–6 or 5; anal I–5 or 6; pectoral I–6.

The depth is 14·3 to 15·75, the head 9·45 to 10, the caudal 10·9 to 11·5 times in the length. The eye is high up, in the anterior half of the head, 9·8 to 11 times in the head, 3 to 3·2 times in the snout, which is 3·3 to 3·4 times in the head. The postorbital is 1·6 to 1·7 times in the head. The fins are all very short, the pectoral 2·4 to 2·7, the ventral 2 to 2·75, the dorsal height 2 to 2·3, the anal height 1·85 to 2 times in the head.

The compressed, elongate body is eel-like, the ventrals, dorsal and anal placed far back. The anal origin is opposite the first divided ray of the dorsal; the dorsal ends opposite the second divided anal ray. The dorsal origin is above or just behind the vent. The preventral portion of the body is about 55·8% of the length, the ventral origin at the beginning of the third fifth of the body. The predorsal portion of the body is 75% of the length. The caudal is truncate or very slightly emarginate. The snout is bluntly rounded; three pairs of barbels, the anterior ones rostral, the third pair at the end of the maxillaries, the remaining pair half-way between the others, the longest barbels about twice the eye, 5 to 5·5 times in the head. The least depth of the elongate caudal peduncle is 4·1 to 4·2 times in its own length. The scales are very minute, scarcely visible with the aid of a compound microscope.

Specimens are brownish clay color, with minute dark brown punctulations over the back and sides; a dark band along the lateral line from near the head to the caudal, faint and narrow at first, broadest and darkest from the middle of the body to the caudal peduncle. The dorsal and caudal are cross-barred by rows of dark dots and in some specimens the anal is also thus marked.

Described from the type, 60 mm. long, and 4 paratypes, 45 to 54 mm. in length, collected from the lake above Chenderoh Dam, Perak. It lives on the bottom in foul places, under masses of water plants and rotting material.

From the closely related species it differs in the position of the dorsal, and in proportions.







**Rasbora dorsimaculata,** new species. Plate III

Dorsal II–7; anal III–5; pectoral I–14; the lateral line has 24 scales, plus 2 on the caudal base; 7 scales between the dorsal and ventral origins, 5 above and one below the lateral line; 10 predorsal scales, 7 between the lateral lines, over the caudal peduncle.

The depth is 4, the head approximately 3·3, the deeply forked caudal 2·95 times in the length. The large eye is 3 times, the snout 4·25 times, the flat interorbital 3·54 times in the head.

The mouth is strongly oblique, its anterior end as high as a line from the upper edge of the pupil, extending posteriorly to a line midway between the nostril and front margin of the eye. The dorsal and ventral origins are opposite a vertical passing over the hind margin of the 11th scale; from the tip of the snout to the dorsal origin is 51·78%, the distance from dorsal origin to caudal base 48·2% of the length. The dorsal height is 3·83, the pectoral length 4·66, the ventral 5·6, the anal height 6.22 times in the length. The ventrals almost reach the anal origin. The least height of the caudal peduncle is ·9 of its length to caudal base, or 1·5 in its length to the last row of scales on caudal base.

The color in alcohol is whitish yellow, each scale on the upper portion covered wholly or in part by a dark brown spot, the top of the head nearly black; a black line extends along the side from the opercular angle to the caudal base, indistinct anteriorly but distinct on the posterior half. The fins are all clear except the dorsal, which a large has black spot at the top of the first 3 rays.

The type and only specimen, 28 mm. long, was taken from a brook 16 miles east of Kuching, Sarawak, Borneo.

**Key to Lissochilus species of Malaya**

A. Dorsal spine strongly toothed behind
  B. 14 scales around caudal peduncle; l.l.28–31, plus 1–3 on caudal base; predorsal scales 10–12; pectoral equals head; V. a little shorter. *L. normani*
  BB. 12 scales around caudal peduncle; l.l.27–28; predorsal 8 (very rarely more); pectoral and V. 1·25 in head. *L. smedleyi*

AA. Dorsal spine smooth behind; 12 scales around caudal peduncle.
  C. Lateral line 21 plus 2 (rarely 20 or 22); predorsal scales 5–6. *L. hendersoni*
  CC. Lateral line 23 or more.
    D. l.l.24–25; predorsal 8; transverse 3·5 above and 3·5 below. *L. tweediei*
    DD. l. l. 26–29; predorsal 8–9; transverse 3·5 above, 4·5 below. *L. dukai*

*L. Dukai* is included because Weber and De Beaufort give it as in the Malay Peninsula but I do not believe it occurs in our territory. Apparently *L. tweediei* replaces *L. sumatranus* in Malaya. *L. smedleyi, normani,* and *hendersoni* are all very different from *L. dukai,* which has a weak dorsal spine.

**Lissochilus hendersoni,** new species. Plate IV

Dorsal IV–9; anal III–5; pectoral I–13; scales in the lateral line 20—22+2, mostly 21; from lateral line to dorsal origin 3·5, and to ventral 2; from lateral line to median line, 3·5; predorsal scales 6, rarely 5; scales around caudal peduncle, 12.

The plump body is moderately compressed, its dorsal profile well elevated and forming an angular arc, the ventral profile broadly curved, the belly wide and more or less protuberant, the caudal peduncle slender. From the dorsal origin to the top of the snout the profile is decidely convex.

The depth is 3·3 to 3·5 times, the head 3·1 to 3·6 times, the caudal about 3 times in the length. The eye is 3·2 to 3·6 times in the head, 1·6 to 1·8 times in the postorbital; the blunt prominent snout is 3·35 to 3·5 times in the head, a little longer than the eye; the interorbital exceeds the eye, 3 to 3·6, the postorbital 2·1 to 2·4 times in the head. The dorsal origin is opposite the sixth scale of the lateral line, much nearer the tip of the snout than the caudal. The dorsal is emarginate, its height 4 to 4·2 times in the length. The ventral equals the height of the anal, 5·3 to 5·5 times, the pectoral 4·5 to 4·7 times in the length. The least depth of the caudal peduncle is 1·3 times in its own length. An axillary ventral scale is about four-fifths of the eye. The barbels are usually of equal length but sometimes the maxillary barbel is a little the longer, their length approximately equal to the eye. Several minute lines of sensory pores radiate downward from the lower margin of the eye. On the preorbital and suborbital are numerous small horny tubercles, arranged in 3 or 4 irregular rows, and covering pores.

The color of preserved specimens is pale yellowish or tan, the top of the head and nape dusky brown, each scale above the belly with a vertical dark brown bar at its base.

Here described from the type, 70 mm. long, and 27 paratypes 59 to 67 mm. long, taken from a fresh-water creek on Penang Island.

I take pleasure in dedicating this species to Mr. M. R. Henderson, director of the Penang Botanical Garden through whose hospitality and co-operation I was enabled to collect the fresh-water fishes of the beautiful isle of Penang.





**Puntius kuchingensis,** new species. Plate V

Dorsal IV-8; anal III-5; pectoral I-14; ventral I-7; lateral line 20–21 plus 2; transverse scales $\frac{4\cdot5}{1}$ ; predorsal scales 7; scales around caudal peduncle 12.

The strongly compressed oblong body has a well arched ventral outline; the dorsal profile is slightly concave above the nape, then is markedly convex with a sharp ridge before the dorsal. The depth is 2·3 to 2·45, the caudal 3·2, the head 3·4 to 3·5 times in the length. The eye is slightly less than or equals the snout, 3·8 in the head and 1·5 times in the interorbital. The oblique mouth is strongly arched, the lower jaw slightly inferior, the maxillary reaching or nearly reaching a vertical from the front edge of the eye. The rostral barbel is slightly longer than the eye, the maxillary barbel 1·7 times the eye and almost reaching the gill opening. The origin of the dorsal is opposite the eighth scale of the lateral line, the ventral origin opposite the ninth scale. The dorsal is slightly concave, the third spine rather finely denticulate behind, the bony portion equal to the length of the pectorals and ventrals, 1·35 in the head; dorsal with a rather high basal sheath; origin of ventral separated by 2 or 2·5 scales from the lateral line, its tip reaching the anus, the caudal deeply incised with round-pointed lobes. The least height of the caudal peduncle more or less equals its own length, about 1·9 in the head. Scales with more or less parallel longitudinal lines.

The color in alcohol is brownish red, with two black cross-bands; the first descends obliquely from behind the head to the pectoral, the second from before the dorsal to above the ventral, both bars more or less windened in the upper part; each scale of the lateral line with a black circular spot; a black spot also more or less evident on each scale of the three rows above the lateral line; and posteriorly on the line below; a small circular spot above the anal origin; the anal tip is black, the fins otherwise clear.

Described from the type, 67 mm. long, a paratype 44 mm. long, and a damaged paratype, 65 mm. long, with missing caudal, obtained 18 miles east of Kuching, Sarawak, Borneo.

**Parakysis** Herre, new genus.

This genus is unlike *Akysis* as it lacks an adipose dorsal fin. Its short broad head and rather stout short body are markedly different from those of *Breitensteinia.* The skin is covered everywhere with very small granules or tubercles. A narrow median longitudinal fontanelle, divided by a bony cross bar, extends on the top of the head from the snout to the basal bone of the dorsal spine. The anterior nostril is tubular; the posterior nostril has a rim from the anterior part of which extends a slender barbel longer than the head. The longer slender maxillary barbels are at the angle of the mouth; the long slender

mandibular and mental barbels are below the mouth; the mandibular barbels each have a small accessory basal barbel, while the mental barbels each have two or three accessory basal barbels. The short dorsal has a stout spine covered by thick skin, and 4 soft rays; its hind end is inserted well in advance of the ventral origin; ventrals 6-rayed, extending to the anal, or not. The pectorals have a stout smooth bony spine covered with thick skin. The caudal is deeply emarginate. The small, upward-looking eyes are covered with skin. The mouth is small, with protruding upper lip; jaws with villiform teeth, none on the palate.

The gill opening extends above the pectoral base a short distance. The isthmus is very wide.

The type is *Parakysis verrucosa* Herre, new species, known only from the streams of Johore and Sarawak.

**Parakysis verrucosa,** new species. Plate VI

Dorsal I–4 or 3; anal I–7 or 8; pectoral I–6.

In the type specimen, 31 mm. long, or 40 mm. including the caudal fin, the depth is 5, the head 4·6 the caudal 3·44 times in the length. The very small eye is 13·4 times in the head, 4·4 times in the snout, 5 times in the interorbital, and 8 times in the postorbital portion of the head. The interorbital is 2·68 times, the snout 3, the postorbital 1·675 times in the head. The least depth of the caudal peduncle equals its depth.

The breadth of the head is a little more than its length, the snout broadly rounded. The mouth is small, much like that usually seen in the *Callionymidae,* the upper lip protruding in a rounded flap. In the type the nasal barbels are only as long as the head, but in the other specimens they extend back nearly to the dorsal, as far as or farther than the maxillary barbels. The mandibulary and mental barbels extend to the posterior end of the head or to the pectoral base, or the mandibulary barbels may extend beyond the pectoral base. Each mandibulary barbel has a short accessory basal barbule, and each mental barbel has two or three such barbules. The dorsal and pectoral spines are smooth. The ventrals are twice the height of the dorsal, and much more than the anal height. Some specimens, especially those from Borneo, have a low ridge or keel on the dorsal side of the caudal peduncle. The caudal is deeply emarginate, the lobes with pointed tips.

In other specimens, from 22 to 29 mm. standard length, the depth varied from 4·6 to 5·1 times in the length, but was very close to 5 in almost all specimens. There is little variation in the other measurements.

The color in alcohol is dark brown, very pale yellowish beneath, the sides mottled with very pale spots like the color of the belly. The basal two-thirds of the dorsal is dusky brown, the





rest clear; the other fins are all more or less transversely barred with brown dots. Many of the granules on the back and sides are black.

Here described from the type, 31 mm. long, and 10 paratypes, 22 to 29 mm. long, from the Mawai District, Johore, and 3 specimens, 20 to 26 mm. in length, taken from a small brook 18 miles east of Kuching, Sarawak, Borneo. The dermal warts or tubercles are much less developed in the Borneo specimens than in those from Johore.

*Verrucosa,* covered with verrucæ, or warts.

**Mystus johorensis,** new species. Plate VII, VIII

Branchiostegals 12; dorsal I–7; anal III–8; pectoral I–9.

The oblong, robust body is but little elevated, the dorsal profile of the flattened head descending in a straight line to the rounded snout which projects beyond the mouth; the depth is 4·95, the head 3·1, the caudal 3·5 times in the length. The depth of the head is seven-ninths of its breadth, the latter 1·5 in the length of the head. The eye is 6·7 times in the head, 2·5 in the snout, which is 2·68 in the head, the postorbital a trifle less than half the head. The top of the head is covered with skin, beneath which a few rugae are poorly visible; a median narrow groove runs from opposite the posterior nostril to the occipital process; it contains 2 fontanels separated by a bone bridge; the first is a little before the eyes; the second begins opposite the middle of the eyes and is about an eye diameter in length. The elongate, nearly linear occipital process reaches almost to the basal dorsal bone, and except at its origin is deeply buried in the thick, fleshy, convex nape; only dissection reveals its presence.

The nasal barbels extend four-fifths of the distance to the eye, and are a trifle longer than the eye. The maxillary barbel reaches to the posterior end of the dorsal base, the mandibulary barbel to the axil of the pectoral; the mental barbel does not reach a vertical from the hind margin of the eye.

The weak dorsal spine is a little longer than the snout, 2·48 times, the longest ray 1·57 in the head; the stout pectoral spine is strongly serrated posteriorly, 1·46 in the head; the dorsal base and adipose fin are approximately equal, about 2·2 in the head, the space between them equal to the snout. The anal base is about thrice in the head; the ventrals equal the adipose fin. The caudal is deeply forked, the upper lobe a little the longer. The villiform teeth are in bands, those of the lower jaw crescentic, those of the palate strongly so, all the bands about the same width. The least depth of the caudal peduncle is 1·55 times in its own length, 3·7 in the head.

The color in alcohol is very deep brown, to blackish brown, the under side of the head and belly whitish yellow, the fins all deep brown to black, the pectorals and ventrals yellow basally.

Described from the type and sole specimen, 208 mm. long, taken from Sungai Kayu, 16 miles north of Kota Tinggi, Johore.

**Mystus pahangensis**, new species. Plate IX

Branchiostegals 9; dorsal II–6; anal II–8; pectoral I–8.

The dorsal profile of the oblong body descends in a strongly sloping straight line from before the dorsal to the rounded snout; behind the dorsal the profile is a very gentle arc to the caudal peduncle. The depth is 5·16, the head 3·25, the caudal 3·16 times in the length. The head is broader than high, its breadth 1·6, its depth 2·14 times in its own length. The top of the head is covered with skin, beneath which corrugations can be seen. A narrow fontanel extends back two thirds of the distance from the snout tip to the base of the narrow, short occipital process, which is separated from the basal process of the dorsal spine by a wide interspace; the thick nape is convex. The eye is 6·66 times in the head, 2·44 in the snout, which is 2·7 times in the head. The nasal barbels almost reach the eye, the maxillary extend to the anal origin, the mandibulary barbels reach to the pectoral base, and the mental fall much short of the gill opening.

The short weak dorsal spine is scarcely serrulate behind, its bony part 2·6 times, its total length twice in the head; the adipose fin is of moderate length, equal to the dorsal base, nearly twice in the head (1·94) the space between the dorsal and adipose fins 2·4 times in the head. The anal base is much shorter than the adipose fin, more than 2·7 in the head. The flattened pectoral spine is of moderate size, with a very few teeth behind its tip, 1·76 in the head, nearly 1·5 times the dorsal spine. The ventrals equal the postorbital, 2·1 in the head. The caudal is deeply forked, the upper lobe with a filiform tip. The villiform teeth are in bands, those on the palate and lower jaw crescent-shaped; the palatal band is narrower in front, but broader posteriorly than the maxillary band. The caudal peduncle is 1.37 times in its own length, 3·75 in the head.

The color in alcohol is uniform dull dusky, the under side of the head and belly white. The dorsal is clear, somewhat clouded with dusky, the adipose fin reddish brown, the other fins clear but the caudal tinged with brown.

Described from the type, 196 mm. long, from the Sungai Garam, near Karak, Pahang.

**Neostethus borneensis**, new species. Plate X, XI

Dorsal II (sometimes I ?) I–4; anal II–13 or 12; pectoral I–8; scales in a lateral series 26 or 25 plus one on the caudal base in males, and 26 to 27 plus one in females; predorsal scales 15 or 16, sometimes 18 in females; preopercle with 3 large scales; transverse scales from second dorsal origin to that of anal, 8 or 7·5; vertebrae 14 plus 18.





The first dorsal is 2 scales before the second dorsal and is over the base of the 12th or 13th anal ray in males; in females it is over the base of the last ray or behind the anal.

The depth is 5·8 in the length in a male 21·5 mm. long, and 5·25 times in a female 24·5 mm. long. In mature males 12 to 18 mm. long the depth is 4 to 4·35, the head 4·4 to 4·9 times in the length. The eye is 2·65 to 2·75 times in the head, the snout 1·85 to 2 times in the eye. The pectoral is 1·2 in the head, 5·8 in the length; the caudal is 2·8 to 2·9 in the length; the anal height is 1·33 in the head, 6·75 to 7 in the length; the second dorsal is lower, 1·5 to 1·8 in the head, 8 to 8·75 in the length; the least depth of the caudal peduncle is 1·6 to 1·75 times in its own length in specimens 13 to 17 mm. long, but in one of 21·5 mm. the depth is 2·5 in its length.

In females 13 to 16 mm. long the depth is 3·75 to 4·3 times in the length, and 5·25 in a female of 24·5 mm. The head is 3·9 to 4·4 in the length. The eye is 3 times in the head, the snout 1·6 to 1·8 in the eye. The pectoral is 4·66 to nearly 6 times in the length, usually about 5; the caudal is 2·3 to 3 times in the length; the anal height is 6 to 7, the second dorsal 7 to 8 times in the length; the least depth of the caudal peduncle is 2 to 2·5 times in its own length.

The dorsal profile of the greatly compressed body is nearly horizontal, the ventral profile moderately arched. The mouth is nearly vertical, with projecting chin, its angle beneath the anterior part of the eye; the teeth are relatively large and strong, curved, and apparently in one row in both jaws. The pectoral is elongate, pointed; the lobes of the forked caudal have very elongate, filamentous tips; all the fins are very delicate and easily broken. As in all Phallostethids, there is a membraneous keel along the belly.

Sexually mature, or nearly mature males are from 12 to 21·5 mm. long, nearly all my specimens between 14 and 17 mm. Immature males are from 11 to 16 mm. One of 11 mm. had the priapium well advanced in development, while in others of 16 mm. the priapium had not started to develop.

The priapium is attached to the left or right of the median line and is folded toward the other side; it is fully extended only when the ctenactinium is used to grasp the female during fertilization. The curved slender ctenactinium springs from the latero-posterior part of the priapium, its anterior portion lying in a groove behind the chin and continuing onward and upward; sometimes the tip of the ctenactinium perforates the tissue below the groove. On the inner side behind the ctenactinium base is a slender, curved, pointed bone, the "priapklaue" of Aurich, like a second ctenactinium; on its outer side a short distance removed is a fleshy tube, the penis; frequently the penis is not yet

developed, and often it is represented by the very slender, ver
fine-pointed bone that supports it internally; when ful
developed it is comparatively thick and fleshy, and as long as th
"priapklaue." Neither of the two structures can be seen unle
the ctenactinium is lifted far back so as to extend the priapium
completely. The pulvinulus is elongate, ovoid, cartilaginous an
slightly concave, its margin free, the tip caudad; it is attached b
a short thick pedicel to the anterior part of the priapium, on it
aproctal side.

Female specimens are more convex ventrally than males, an
of course lack the priapium; the genital opening is rather fa
behind the anus, the rounded abdomen without a groove.

In some of the smallest specimens what appear to b
vestigial ventrals are present. A thickened ring forms about th
anus anteriorly and laterally, then gradually enlarges till it i
encircled. Soon the thick ring divides posteriorly, its free end
lengthening until vestigial rays are present.

In life two tiny spots with a pale golden sheen, th
eyes, are all that is visible of these very slender little fis
Occasionally when one turns on its side a similar minute spot i
visible, the peritoneum having the same lustre.

When placed in alcohol or formalin the eyes become black
and the body whitish. A row of black dashes forms a line fro
the upper angle of the opercle to the middle of the caudal base
the scales above it are more or less distinctly bordered by dar
brown dots and a row of small spots extends along the media
dorsal line; a black line on the under side of the caudal peduncl
extends forward on either side of the anal base; dark specks ar
more or less abundant underneath and on the sides of the hea
and pectoral base; fins colorless.

These fish swim at or very near the surface of salt, brackis
or fresh water in groups of a very few up to schools of severa
score. My first specimens were taken by accident while catchin
cyprinids with a dip net. Close watch for a couple of day
enabled me to recognize their presence, which had never bee
observed by the Dyaks. They are to be found in tidal streams
in swamp pools, in estuaries and bays of salt water, and in fres
water brooks. In streams they swim along the shore, thu
avoiding strong currents when going up stream. When disturbe
they dive to the bottom and hide for a time.

In mangrove swamps which are fresh water or very slightl
saline at low water, they occur in vast numbers, most of them
being immature. In such places it is practically impossible t
catch them. The water is from an inch to several inches i
depth and is filled with erect, finger-like aerial mangrove roo
as well as large lateral roots and all the litter of a dense tropica
forest. Such an environment affords a maximum of protection







and hiding places to these tiny transparent fish. On my last day, as we were going down the river, I discovered that an almost continuous school of mature fish was along the shore, swimming up stream with the flood tide. Had this been found out before, very many larger and more mature specimens could have been secured. As it was, we had to keep our boat away from shore to avoid being grounded and forced to spend the night without protection in the jungle.

From a brook flowing into the Kabili River, British North Borneo, and a nearby swamp I collected 60 males from 12 to 21·5 mm. long, all mature or with the ctenactinium in an advanced stage, and 55 from 11 to 16 mm. long without a priapium, or the ctenactinium only embryonic.

One female specimen of 24·5 mm. and 30 others from 13 to 16 mm. were taken at the same time. 9 other specimens of 11 to 12 mm. and undetermined sex have more or less evident vestigial ventral fins.

From the Segaliud River, British North Borneo, I took a mature male 16 mm. long, a female of 12 mm., and 7 others from 10 to 15 mm. in length, including one of 11 mm. with ventral fins.

This fish is abundant in sheltered inter-island canals and inlets of Sandakan Bay, as well as in all its tributaries and adjacent swamps, up to where the water is fresh part or all of the time.

The discovery of this species fulfills the prediction of Dr. George S. Myers, who stated several years ago that Phallostethids must occur in Borneo. No doubt further exploration will reveal additional species of the family in Bornean waters.

**Vaimosa avicennia**, new species. Plate XII

Dorsal VI–I–7; anal I–7; there are 27 scales in a longitudinal series, plus 2 on the caudal base, and 8 from the second dorsal origin to the anal origin; predorsal scales, 6; opercular scales, 6.

This tiny goby has teeth unlike those of any other member of the genus thus far described. In addition to 2 or 3 rows of very minute teeth as usual in this genus, the lower jaw has a pair of large caniniform symphysial teeth, with enlarged bases, and a similar tooth at each outer angle of the jaw. The upper jaw has an outer row of widely spaced and very small teeth, behind which are rows of microscopic teeth.

The elongate slender body has the upper and lower profiles nearly horizontal and parallel, the depth 5·45 times in length. The broadly rounded caudal equals the head, 3·33 times in the length. The large, dorso-lateral eyes are high up, 4·5 in the head, 2·5 times in the postorbital; the broad, blunt, nearly vertical snout equals the eye; the interorbital is twice in the eye;

the head is very broad, its width 1·4 times, its depth 1·8 times in the head. The first dorsal is damaged, the first spine 2·25 times in the head, the dorsals far apart; the last ray of the second dorsal is longest, extending to the caudal base, 1·28 times in the head; the penultimate anal ray is longest, 1·6 times in the head; the pectoral is 1·5 times, the broad ventrals twice in the head; the wide caudal peduncle is 1·75 times in its own length.

The color in alcohol is brownish gray, the scales everywhere except behind and under the ventrals punctulated with minute specks; there are traces of 5 dusky cross bands over the back and down the side, where they alternate with 4 dark bars along the mid-line; the head is mottled with dusky, with a blackish band running diagonally from the eye across the opercle. The dorsals, anal, and caudal are black, the second dorsal with a white marginal band, the caudal with a wide white band along the top and rear, both bands with a marginal black line.

The type and only specimen, a male 30 mm. long, was caught in a mangrove swamp drained by the Kranji river, Singapore.

*Avicennia,* the name of a genus of mangroves.

**Vaimosa jurongensis,** new species. Plate XIII

Dorsal VI–I–6 or 7; anal I–6; scales in longitudinal series 24 or 25+1 on caudal base; predorsal scales usually 6, sometimes 7, in one specimen 5; scales in transverse series from second dorsal origin to anal origin, 7; four or five large scales on the opercle.

This is a big-headed, stoutly built fish, laterally compressed posteriorly and therefore wedge-shaped seen from above. The depth is 4 to 4·5 times, the head 2·9 to 3 times, the broadly rounded caudal 3·3 to 3·5 times in the length. The breadth of the head equals or exceeds the body depth, 1·35 to 1·4 times in the length of the head, or 4 to 4·1 times in the standard length. The eye is 5 to 5·4 times in the head and 1·3 to 1·5 times in the snout, which is 3·5 to 3·9 times in the head. The postorbital is 1·8 times, the interorbital 5·4 to 5·8 times in the head.

The body is deepest before the first dorsal, descending rapidly to the interorbital, the snout convex and broadly rounded. The mouth is large to very large; in the smallest specimens the maxillary extends to beneath the middle of the eye, and in mature ones it reaches much beyond the eye and is 1·6 to 1·7 times in the head; most of the specimens seem to be males, but the mouth extends at least to the hind margin of the eye in mature females.

The minute teeth are in 2 or 3 rows anteriorly, but reduced to a single row posteriorly. The first dorsal is low, seldom reaching the second dorsal origin when depressed, the third spine 2·2 to 2·5 in the head; the second dorsal and anal do not reach the caudal when depressed, the penultimate ray longest, 1·9 to 2 times in the head. The large, rather pointed pectoral extends to the origin of the anal or a little more, its length 3·25 to 3·5 in the standard length. The large ventrals extend beyond the vent and may reach the anal, 4 to 4·3 times in the length. The opercular scales are deeply embedded and very hard to see. The anal papilla is very small, the sexes not well differentiated as none are in breeding condition.

In life this little fish is a pinkish red, almost flesh color, with a red spot on each scale on the upper half of the body, the caudal and dorsal fins with cross rows of red spots.

In alcohol the color is pale whitish yellow, with 5 or 6 broad blackish cross bands over the back; 4 narrow dusky bars along the side, the first beneath the pectoral tip, the last on the caudal base, where it merges into a vertical black bar; beneath the pectoral is a vertical black stripe or spot; a brown or blackish bar extends from the eye diagonally backward upon the preopercle; the opercle is more or less black spotted; the first dorsal has a clear band across its middle, with a row of black spots above and below it, the lower one ending in a large black spot; the second dorsal has 3 or 4 cross rows of black spots; the caudal is cross barred by 5 or 6 rows of black spots; the other fins are clear; the eyes are green.

Here described from the type, a male 35 mm. long, and 24 paratypes, mostly males, 19 to 34·5 mm. long, taken from a brook at Jurong, Singapore Island, May 8, 1937. A unique species, unlike any other *Vaimosa* thus far described.

**Vaimosa kabilia,** new species. Plate XIV

Dorsal VI–I–7; anal I–7; scales in lateral series 27, plus 2 on caudal base; transverse series 8, predorsal 11–12; opercular scales, 8.

The type, a gravid female 36 mm. long, has the depth 4·66 times, the head 3·25, the caudal 3·6, the pectoral 4, and the ventral 6 times in the length. The eye is 4·8 times, the snout 4 times in the head. The interorbital is 1·25 times in the eye.

The body is robust, the dorsal profile nearly horizontal, the ventral profile slightly arched, the last half of the body laterally compressed; the head is broad, its width 1·37 in its own length, its depth 1·8 times. The blunt snout is convex; the wide, slightly oblique mouth reaches a vertical slightly beyond the middle of the eye; the teeth are minute, typical; the interorbital is wide and flat; the dorso-lateral eyes are in the anterior half of the head and project above the dorsal profile. There are 2 curved rows of sensory papillæ across the cheek.

The fins are all short; the dorsals are far apart, the first not reaching the second by 3 scales when depressed; the second dorsal and anal when depressed are distant from the caudal; the

first dorsal height is 2·75, the second dorsal and anal 2·2 times in the head; the pectoral is broad, the ventrals noticeably short, remote from the anus; the caudal is short and bluntly rounded; the least depth of the caudal peduncle is twice in its own length.

The color in alcohol is whitish, each scale except on the belly with a vertical blackish bar under its middle; above and behind the pectoral base is a diagonal black bar; a blackish brown stripe runs from the lower margin of the eye back upon the pectoral base, becoming a diffuse blotch on the opercle; two dusky stripes from the eye to the margin of the snout. The dorsals are marked by cross rows of black dots; the caudal has two large black spots on its base, and numerous cross-rows of black dots on its upper three-fourths; the other fins are tinged with pale brown, the anal with a dark margin.

A female paratype, 31 mm. long and not in breeding condition, offers no essential differences; of course it is slenderer, its depth 5.16, and the vertical fins are proportionally a little longer. It also agrees with the type in coloration.

Two specimens, from the Kabili river, British North Borneo. A handsome, well-marked species.

**Vaimosa oratai,** new species. Plate XV

Dorsal VI–I–7; anal I–7; there are 23 scales in a lateral series, 7 scales from the dorsal origin to the anal origin, 6 predorsal, and 5 scales on the opercle.

The depth is 4 times, the head about 3, the caudal 3·4 to 3·6 times in the length. The eye is 3·5, the snout 4·6 to 4·9, the postorbital twice in the head; the protuberant dorso-lateral eyes are very close together, the interorbital less than a third of an eye diameter.

The body is oblong, the upper profile very gently convex, the bluntly rounded snout descending obliquely, the lips even; the mouth extends to beneath the front part of the eye in the female, to beneath the hind margin of the eye in the male. In a male specimen the first dorsal spine is excessively long and filamentous, reaching beyond the posterior end of the second dorsal base, 2·2 times in the length; in a female the first dorsal is low, the second spine longest, 2·4 times in the head, or 7·2 in the length. The second dorsal and anal are of equal height, and fall much short of the caudal when depressed, twice in the head, 6 times in the length. The pectoral is 1·7 in the head; the broad ventral reaches the anal papilla, 1·3 in the head, the least depth of the caudal peduncle is 2·14 in its own length; the anal papilla is thick and broadly rounded in the female, more pointed, much thinner and smaller in the male.

The color in alcohol is yellowish to grayish white, with 4 broad cross bands, composed of blackish brown dots, over the back, and 5 short dark bars alternating with them along the





middle of the side; a dusky cross bar on the caudal base in the female, a dark brown patch enclosing a white spot on the caudal base of the male; 3 or 4 black spots on the median line under the anal and caudal peduncle; the female has a short blackish brown band from the eye down and back across the preopercle, and a blackish brown spot covering most of the opercle. The dorsal has a large black spot posteriorly and a similar cross band on the upper third; the second dorsal has a basal and a marginal blackish longitudinal band; the pectoral is clear, the other fins more or less specked.

Described from the type, a gravid female 18 mm. long, and paratype, a male 13 mm. long, taken from a brook at Tawau, British North Borneo.

Named for Captain Orata, head of the Borneo Fishing Company, at Tawau, whose hospitality was a great help during my stay at Tawau.

**Vaimosa perakensis,** new species. Plate XVI

Dorsal VI–I–6; anal I–6 or 5; there are 24 or 25 scales in lateral series, plus 1 or 2 on the caudal base, 7 in transverse series from second dorsal origin to anal origin, 24 or 23 scales from the pectoral base to caudal base; predorsal scales 6 or 7; five scales on opercle, deeply imbedded and difficult to see.

The head is 3 to 3·2 times, the depth 4·7 to 5, the caudal 3·8 to 4, the pectoral 3·6 to 4·1 times in the length. The eyes are very high up, projecting above the dorsal profile, in the anterior half of the head, about 4 times, up to 4·5 times in the head; the broadly rounded snout equals or is less than the eye, usually 4·5, rarely 4·1 times in the head; the eyes are close together, the interorbital 2·85 times in an eye diameter. The oblique mouth is large, becoming very large in mature males; even in the youngest it reaches a vertical from the eye; in females it extends to a vertical from the middle of the eye or the posterior rim, and may exceed the eye; in adult males it always extends beyond the eye, the maxillary 1·6 to 1·8 times in the head.

The body is rather slender and elongate, the head broader than deep, its width 1·3 to 1·4 in its length; the first dorsal is low, but in adult males the first spine may become elongate with a filamentous tip reaching well over the second dorsal, then 1·4 to 1·6 times in the head; the second dorsal is 1·6 to 2 times, the anal 1·8 to 2·3 times in the head. The rounded pectoral is 1.1 to 1.35, the ventral 1·4 to 1·6, the caudal 1·2 to 1·3 times in the head. The least height of the caudal peduncle is 1·9 to 2 times in its length.

The color in life is pale yellowish golden, with 4 or 5 dusky cross bands over the back, 3 narrow elongate dusky bars along the middle of the side, and a black bar at the caudal base; the dorsals and caudal with transverse lines of dusky spots.

Preserved specimens are whitish, with 5 more or less evident dorsal cross bands, and 3 longitudinal bars along the side, the first below the interdorsal space; a fourth bar merges with a vertical bar on the caudal base; the scales on back and sides are margined with dark brown dots; a short dusky diagonal bar from the eye on the preopercle and a large dark spot on the opercle; the dorsals are cross-barred by 2 rows of black dots, the caudal by 4 to 7 rows; a black spot at the rear end of the first dorsal base and 2 black dots under the second dorsal; the pectoral is clear, the ventral and anal clear to dusky.

Described from the type, a male 25 mm. long, and 15 paratypes, 8 to 26 mm. in length, from the lake above Chenderoh Dam, and 16 paratypes 12 to 28 mm. long, from a brook 2 miles north of Sauk, all in Perak. Females are mature when 19 mm. long; the largest egg-bearing female is 25 mm. long. All were taken in March, 1937.

This interesting little species seems to be nearest *Vaimosa siamensis* Fowler from which however it differs in several respects. It affords a fine illustration of the way in which man, the destroyer, sometimes unwittingly gives an animal an opportunity to increase its numbers prodigiously. In the swift hill streams that are the natural habitat of this goby there are few places where it can live, as it demands quiet shallow water, rich in plankton. When Chenderoh Dam was built, a lake 15 miles long and half a mile to a mile and a half wide was created. Along its banks, around the submerged trees and stumps, in grass grown bays, and shallow inlets where the bottom is covered with decaying leaves, are found ideal conditions for this species, so that it now occurs there in great numbers.

**Ctenogobius kranjiensis,** new species. Plate XVII

Dorsal VI–I–10; anal I–9; scales in longitudinal series 26, plus 2 on the caudal base, 7 in transverse series; predorsal 6 or 7. One specimen has 9 rays in the second dorsal, 8 in the anal.

The depth is 4·8 to 5, the head 3·6 to 3·8, the caudal 3 to 3·5, the pectoral 4·5 times in the length. The eye is 3·8 to 3·9, the snout 4 to 4·25 times in the head. The least depth of the caudal peduncle is 1·7 times in its own length.

The fusiform body is deepest at the ventral origin, the broad blunt head as wide as or wider than the depth, the short broad snout boldly convex. The mouth is oblique, the maxillary extending to a vertical from the front margin of the pupil. The minute teeth are in 3 rows in each jaw, an outer row of larger teeth, with two rows of excessively fine teeth; no canines. From the eye 6 rows of sensory papillæ extend downward on the cheek; these are crossed by 2 longitudinal rows, the lower one from the





angle of the mouth to the lower end of the sixth vertical row; there is also a vertical row of papillæ on the opercle; the predorsal scales do not extend to the eyes.

The fins are all low, the first dorsal in males usually reaching the origin of the second dorsal when depressed; the height of the first dorsal is 2·66 times, the last ray of the second dorsal and anal twice in the head. The second dorsal and anal do not reach the caudal by 2 or 3 scales; the caudal is elongate and rather pointed; the short ventral does not reach the anus, 1·6 times in the head.

The color in alcohol is very pale yellowish, with 5 brown spots along the middle of the side, the first under the first dorsal, the second and third under the second dorsal, the fourth on the caudal peduncle and the last on the caudal base; the dorsal portion of the body is marked or mottled by brown spots; a circular brown spot on the middle of the cheek and a spot on the upper part of the pectoral base; a dark bar from the eye across the snout; the opercle is marked with brown. The first dorsal has an elongate black spot between the fifth and sixth spines, or males may have the fin largely dark brown or black; the second dorsal and anal are dusky, the latter with a clear margin; the caudal is light brown, with 2 black spots on its upper margin, near the base; the other fins are colorless. The eyes are more or less green.

Described from the type, a gravid female 29 mm. long, and 13 paratypes, 23 to 29 mm. in length. Several other females are also nearly ready to spawn. The males are smaller than the females. This little goby was collected from a small stream, the Kranji, draining a mangrove swamp on the north side of Singapore Island.

**Ctenogobius paludosus,** new species. Plate XVIII

Dorsal VI–I–8; anal I–7; there are 26 scales in a lateral series, plus 2 on the caudal base, 7 in transverse series; 6 predorsal scales.

The depth is 5·45, the pointed caudal 3·33, the head 3 times in the length; the depth of the head is nearly twice in its length, its breadth 1·4 times; the eye is 5·2, the snout 3·9, the postorbital 1·8 times in the head; the interorbital is 1·9 times in the eye. The dorsal and ventral profiles are nearly parallel, the head broad, with blunt, little rounded, gently sloping snout; the oblique mouth is very large, the maxillary extending beyond the eye nearly to the angle of the preopercle, almost exactly twice (1·98) in the head; the teeth are minute, in 3 rows above and 4 below, with a very small canine at the anterior angle of the lower jaw; the dorso-lateral eyes are in the anterior half of the head.

The vertical fins are low, the first dorsal falling much short of the second dorsal when depressed, 2·8 times in the head; the

second dorsal and anal are of equal height, 2·25 in the head, their tips far from the caudal when depressed; the pectoral is 4, the ventral 4·3 times in the length; the anal papilla is thin, small, round pointed; the least depth of the caudal peduncle is twice in its own length.

The color in alcohol is whitish, with five rather narrow brown dorsal cross bands, alternating with 5 large poorly defined dark brown spots, the one on the caudal base best defined, a blackish spot some distance behind each eye; the top and sides of the head, and pectoral base are thickly sprinkled with dark brown dots and most of the scales are more or less outlined by minute brown dots. The first dorsal is barred by two dark cross-bands, the second dorsal and caudal by numerous rows of dark brown dots; the other fins are clear.

Described from the type and only specimen, 30 mm. long, collected 5 miles north of Kota Tinggi, Johore, Malay Peninsula. This fish has a strong resemblance to *Eugnathogobius macrops* H. M. Smith, which differs in having the first dorsal V, the second dorsal I–7, the anal I–6, in the very small eye, 15 times in the head and covered with skin, and emarginate tongue.

*Paludosus*, swamp dweller.

**Mastacembelus keithi,** new species. Plate XIX

Dorsal XXVI–56–58; anal III 54–60. There are 2 preopercular spines and one preorbital spine. The snout is naked, with a few scales between eye and nostril. The caudal is free from both dorsal and anal, but in very young specimens it is scarcely distinct. The last dorsal and anal spines are very small and more or less concealed in thick skin.

The type specimen is 191 mm. long, without caudal fin or rostral appendage. The greatest depth is 7·34, the head (without appendage) 5 times in the length. The eye is 10·85 times in the head, 3·4 times in the snout, which is 3·166 times in the head; the pectoral equals the snout. A paratype 125 mm. long has the depth 7·35, the head 5 times in the length. The eye is 10 times in the head, 3·2 times in the snout, which is 3·1 times in the head. The mouth does not extend to a vertical from the nostril. The rostral appendage equals the eye. The scales are very small, about 220 in a longitudinal series below the lateral line; there are 22 above and 32 below the lateral line, counted between the origins of the soft dorsal and anal. The vent is nearer the caudal than the head, and equidistant from the caudal base and pectoral axil.

The color in alcohol is dusky brown, with narrow vertical cross bars of very pale reddish brown or whitish, which divide the ground color into 20 or more dusky cross bars, wider than the pale bands, and descending to the abdominal region and anal fin. Scattered over the side and particularly abundant below





the lateral line are white dots or circular spots; a black stripe extends from the rostral tip across the eye to the angle of the opercle, and usually backward on the trunk for a distance nearly equal to the head. The dark bands on the body extend upward to form a row of dusky spots on the dorsal base; on the anal base is a row of white or clear spots. The soft dorsal and caudal are barred with dusky lines; the anal is dark brown, with a white margin. There is a dusky cross bar on the pectoral base.

The type and one paratype 128 mm. long were taken from a brook flowing into the Segaliud River. 7 paratypes, 58 to 125 mm. in length, were collected from the Kabili River. Both streams flow into the upper or southern end of Sandakan Bay, British North Borneo.

Two specimens, 172 and 212 mm. long, from the Gum Gum River, Sandakan district, have the dorsal XXVII–56; anal III–48–50, the second anal spine very large, the third one small and hidden. The head is 5·5 to 6 times in the length.

I take great pleasure in dedicating this fish to my friend H. G. Keith, conservator of forests for British North Borneo. To his hospitality and aid on my trips to Sandakan I am much indebted.

**Petroscirtes kranjiensis,** new species. Plate XX

Dorsal 34 (XII–22); anal II–24.

The depth is 5·33 to 5·5 times, the caudal 5, the head 4 to 4·16, the pectoral and ventral each 5 times in the length.

The eye is 4 to 4·2, the snout 4 to 4·3, the postorbital 1·9, the least depth of the caudal peduncle 2·6 to 2·7 times in the head; the interorbital is 1·8 times in the eye.

The slender, laterally compressed body is deepest at the dorsal origin, which is over the opercle, forward of the gill opening. The dorsal profile is convex from the nape to the tip of the snout, which is nearly vertical; the eye is far forward, flush with the profile; the mouth extends beneath the middle of the eye; the lower canines are moderately large, the upper canines at least half as large; the pectorals and ventrals do not extend to the vent; the dorsal is highest posteriorly 1·75 to 1·9 times in the head, the rays beyond the twenty-eighth shorter; the anal height is 3·2 to 3·5 in the head; no tentacles or dermal flaps.

The color in alcohol is gray, with 16 indistinct cross bands, most distinct along the dorsal base and a short distance below; there is a narrow blue-black bar behind the eye, and a dark spot on the pectoral base. The fins are all densely sprinkled with minute brown specks; there are two dark spots, badly faded, at the caudal base; the smaller specimen has a black spot at the top of the three last dorsal rays.

Described from the type and paratype, 42 and 40 mm. in length, taken from a mangrove swamp drained by the Kranji River, Singapore Island.

The types of the species here described are in the natural history museum of Leland Stanford Junior University, California, U.S.A. Where the material allows, paratypes are in the Raffles Museum, Singapore, and in the British Museum of Natural History. All measurements of length are to the caudal base.

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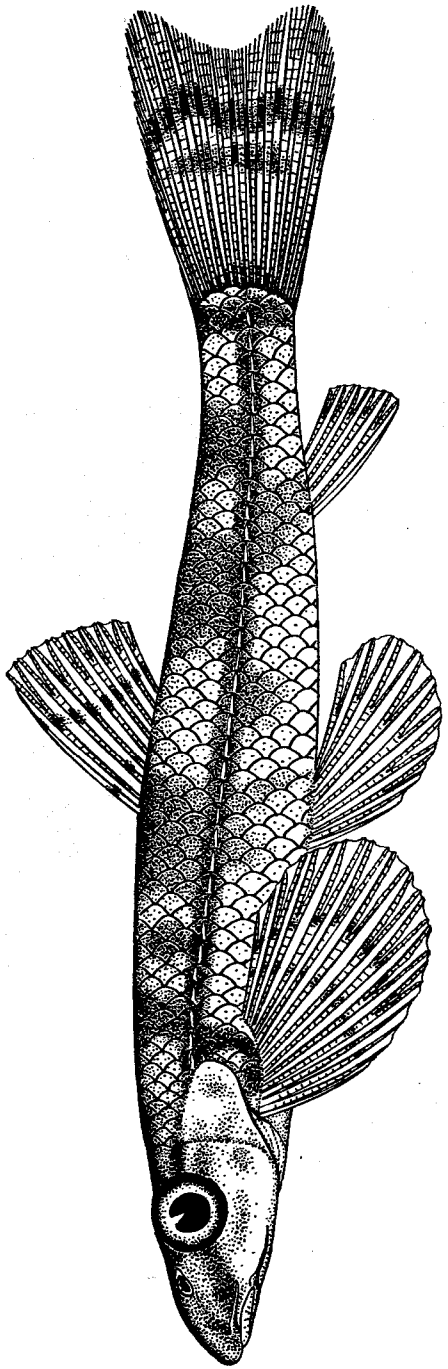
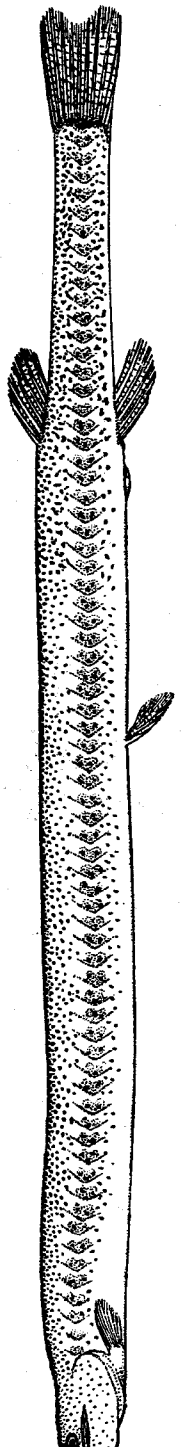
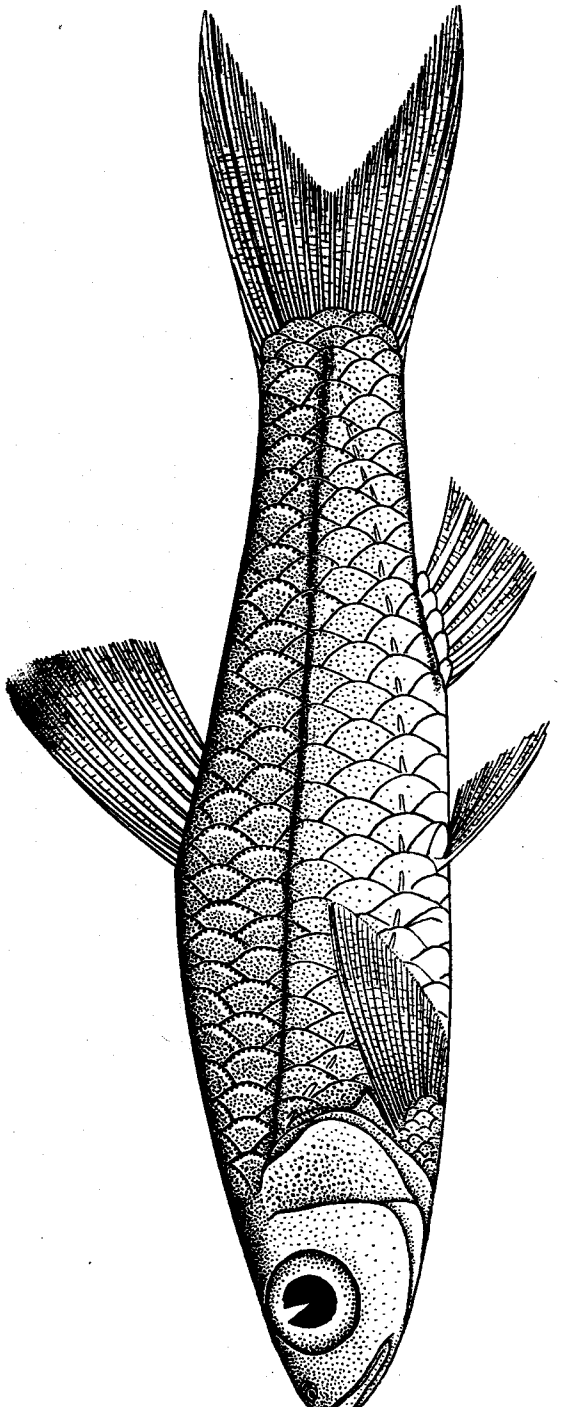


Homaloptera tweediei n.sp. *(Length of type 26 mm.).*

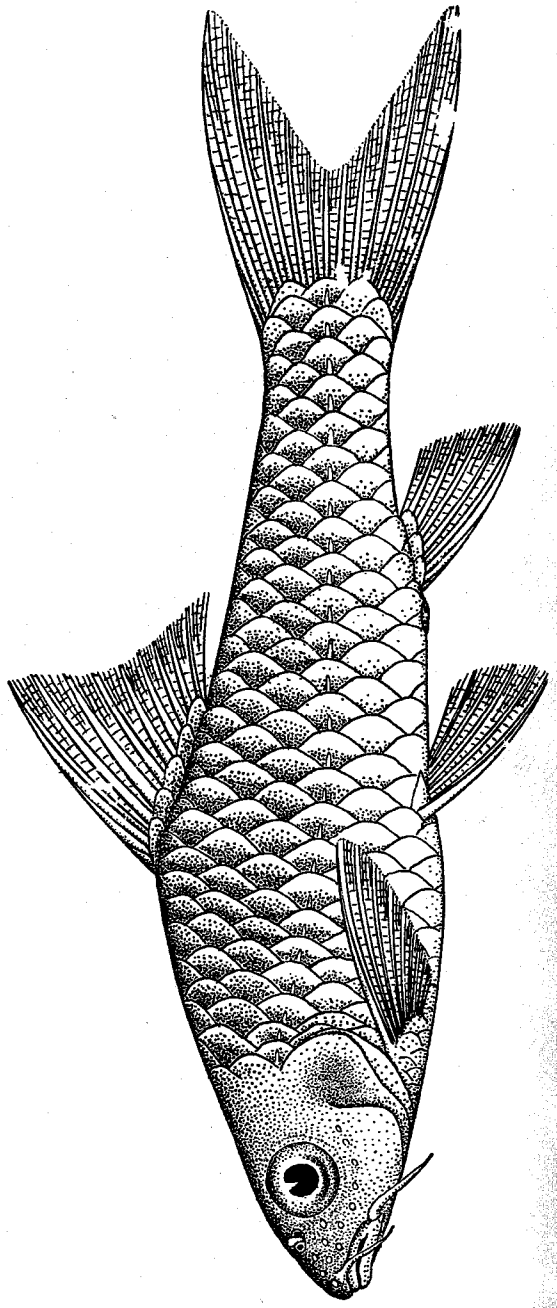


Cobitophis perakensis n.sp. *(Length of type 60 mm.).*



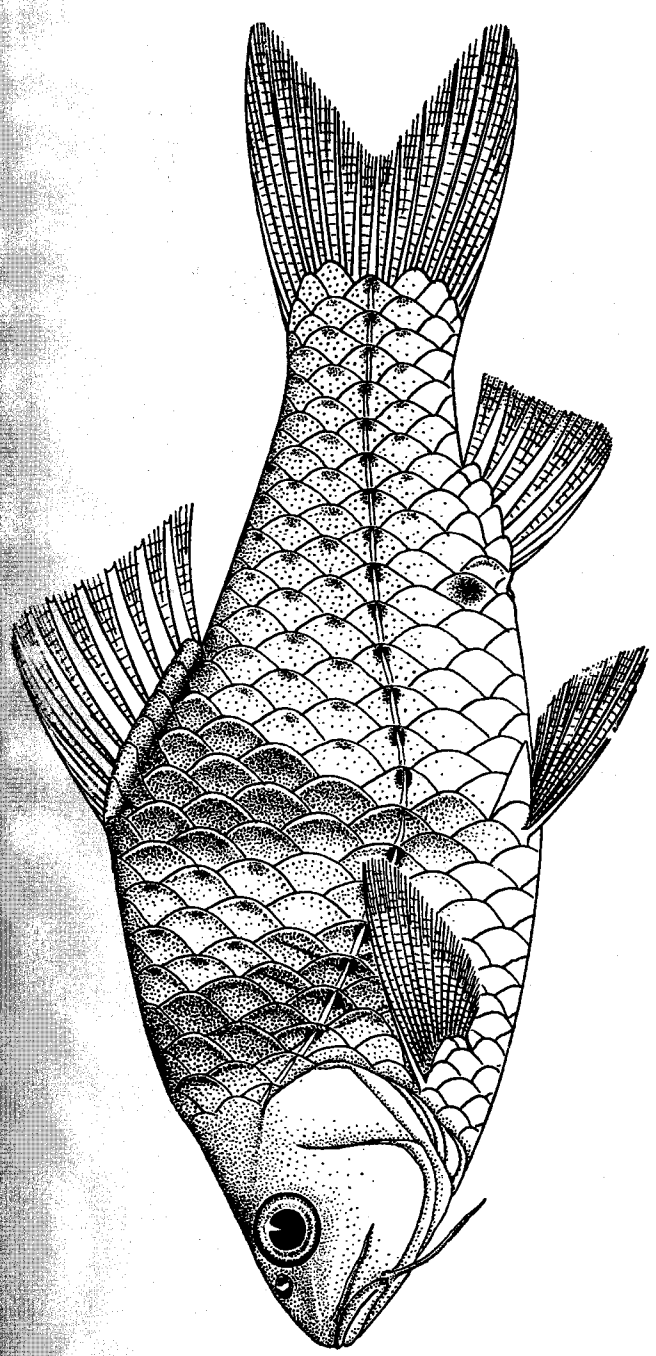


Rasbora dorsimaculata n.sp. *(Length of type 28 mm.).*

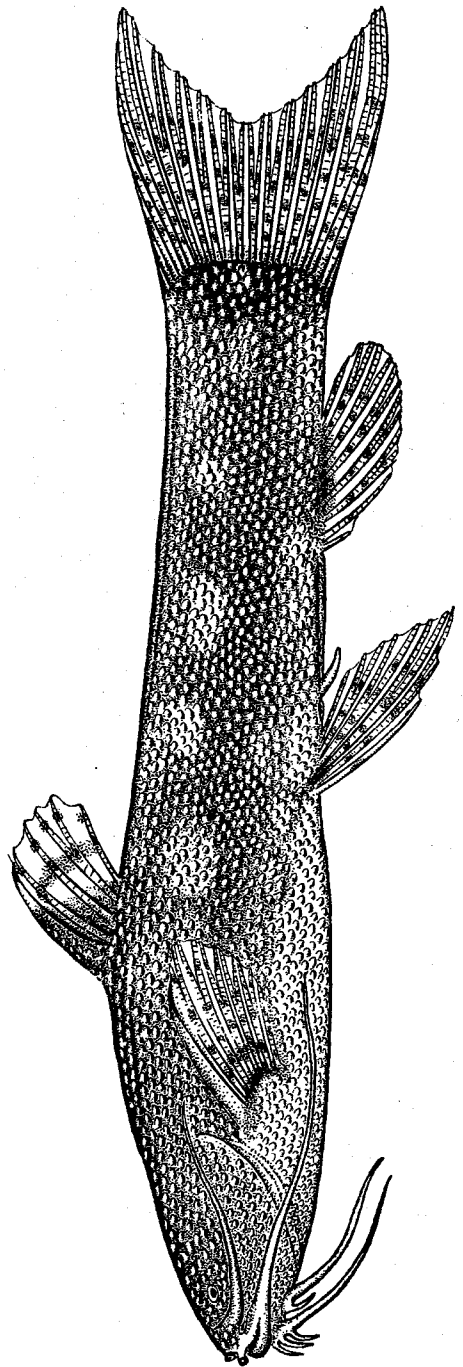


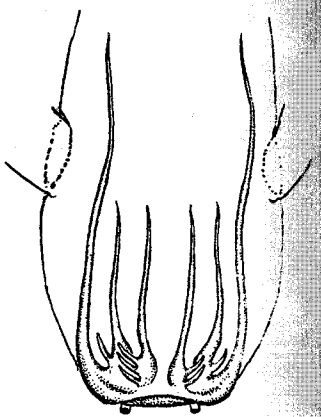
*Lissochilus hendersoni* n.sp. *(Length of type 70 mm.).*



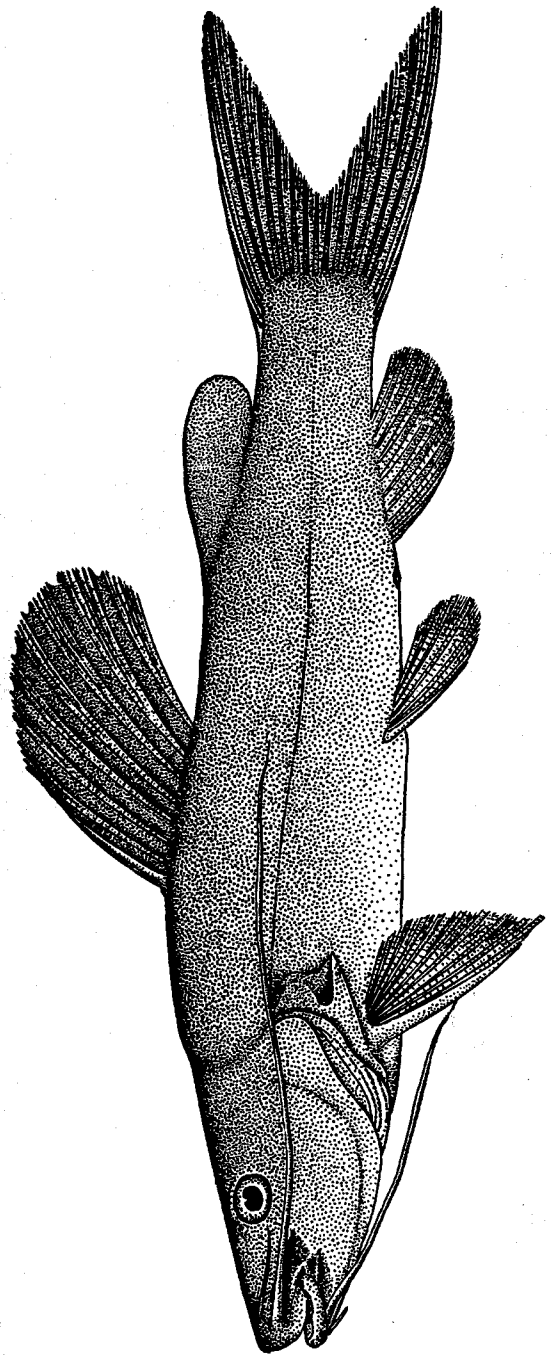


*Puntius kuchingensis* n.sp. *(Length of type 67 mm.).*

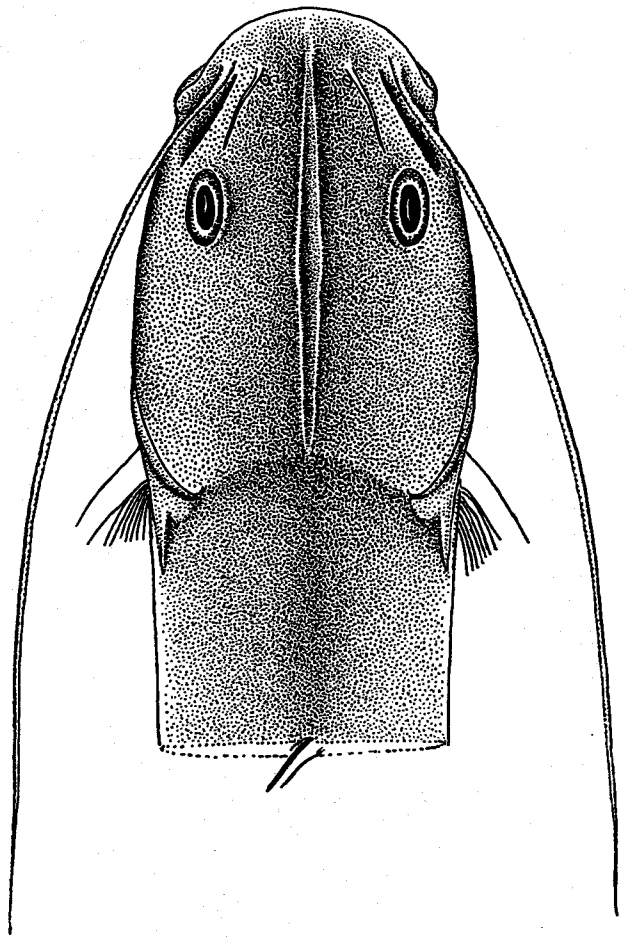






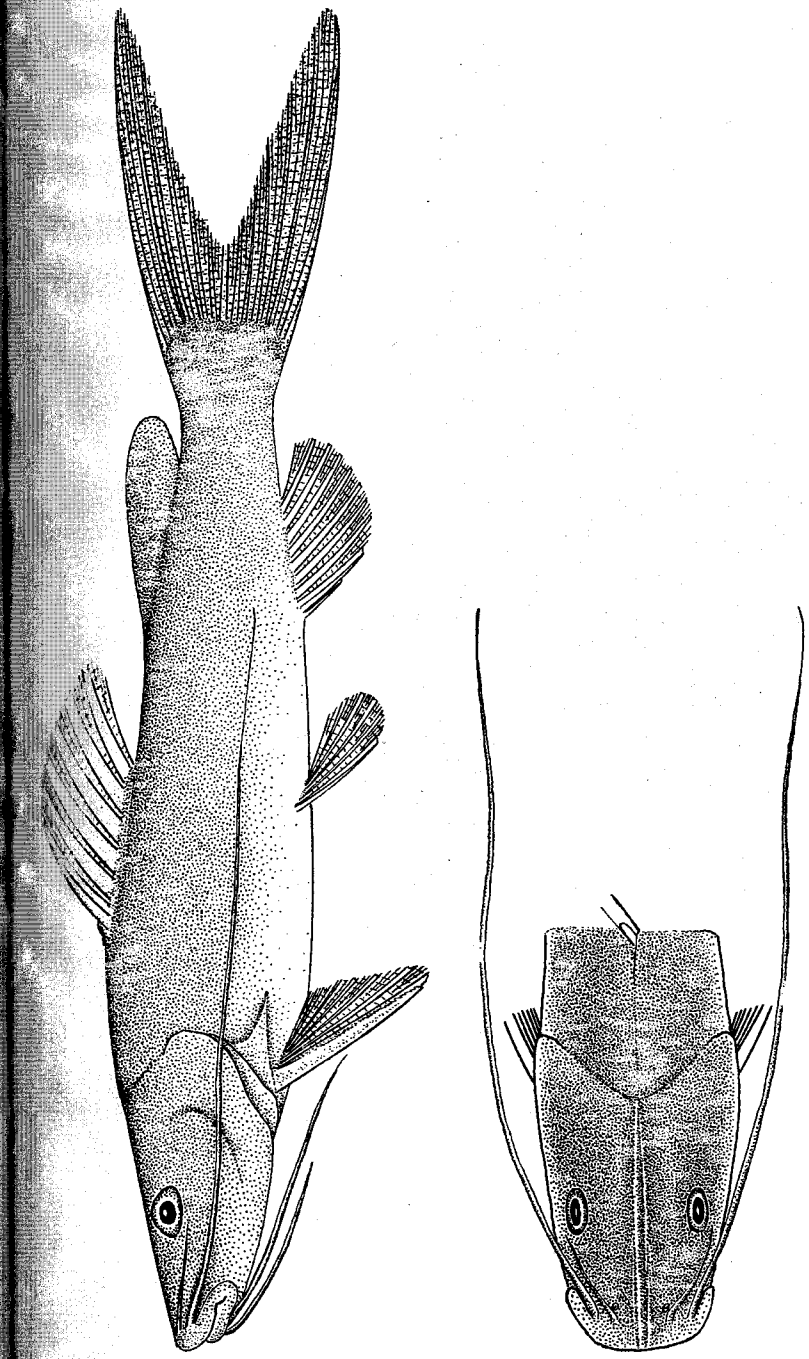


*Mystus johorensis* n.sp. *(Length of type 208 mm.).*

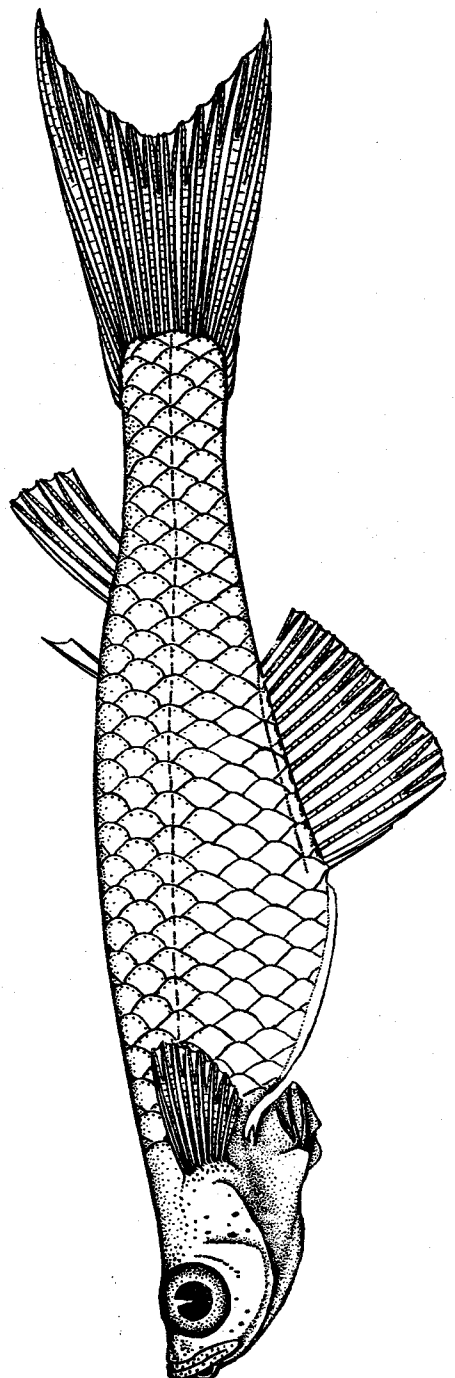


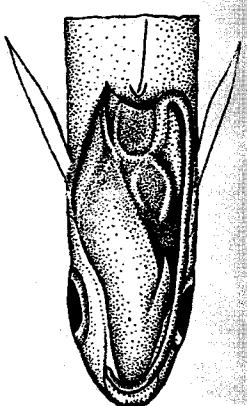
Mystus johorensis n.sp. *(Length of type 208 mm.).*





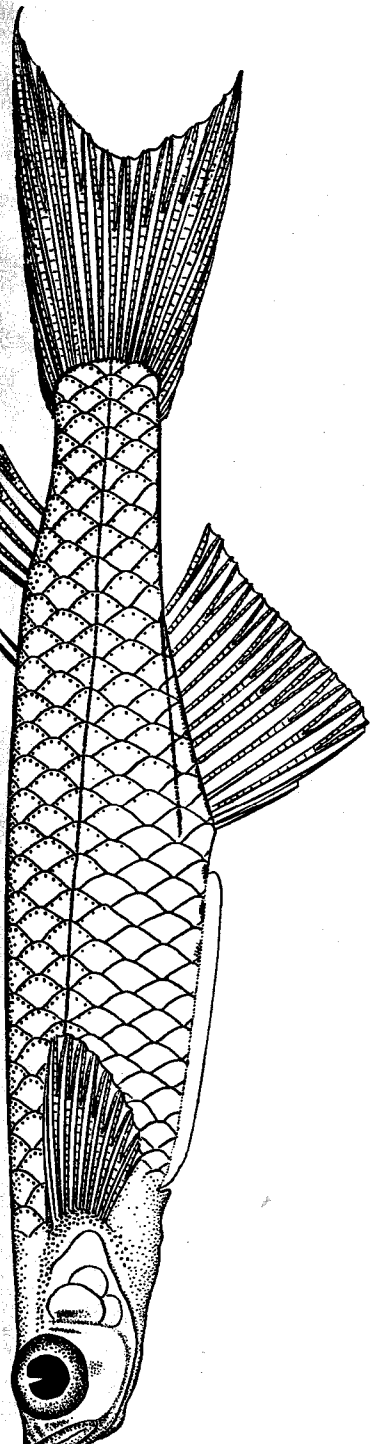
Mystus pahangensis n.sp. *(Length of type 196 mm.).*

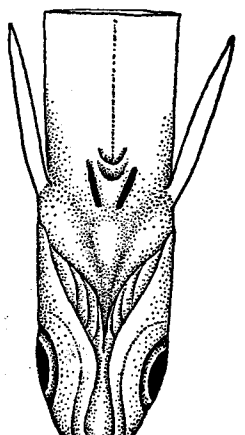




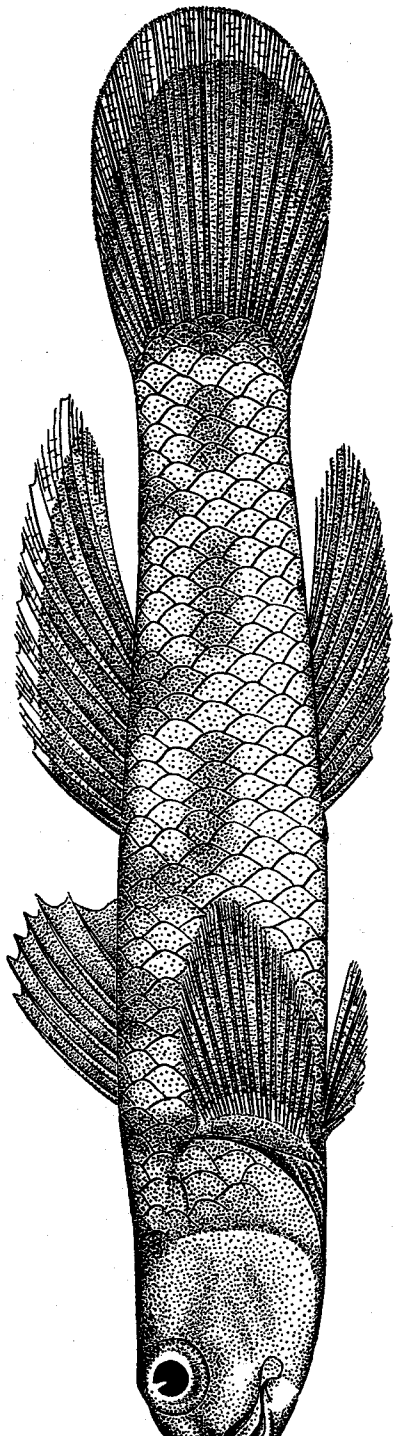
Neostethus borneensis n.sp. male. *(Length of type 21.5 mm.).*





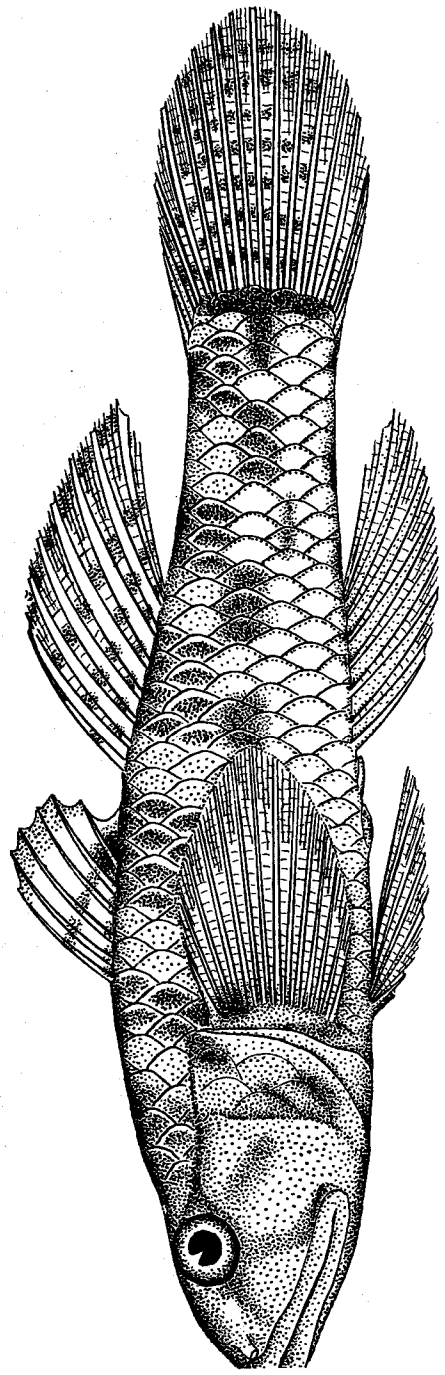


Neostethus borneensis n.sp. female. *(Length of type 24.5 mm.).*

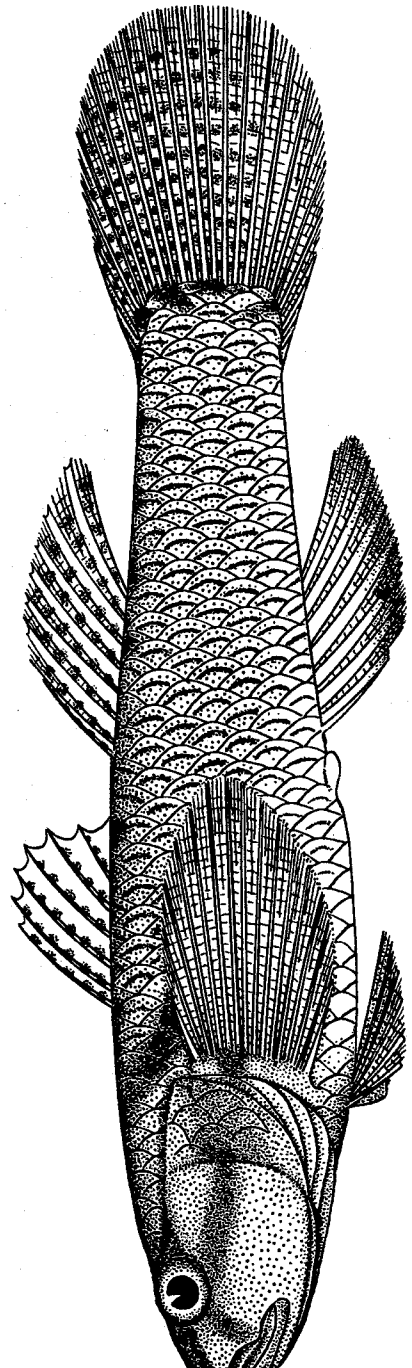


Vaimosa avicennea n.sp. *(Length of type 30 mm.).*



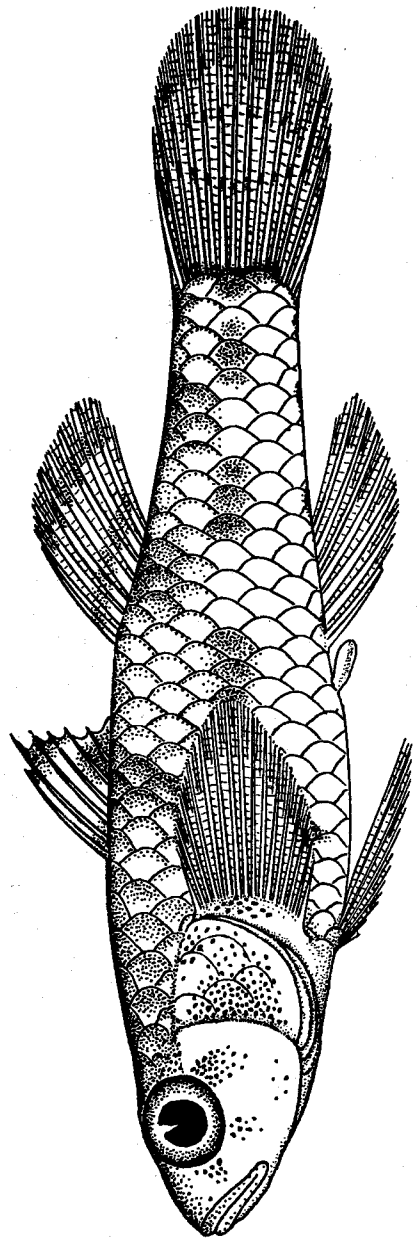


Vaimosa jurongensis n.sp. *(Length of type 35 mm.).*

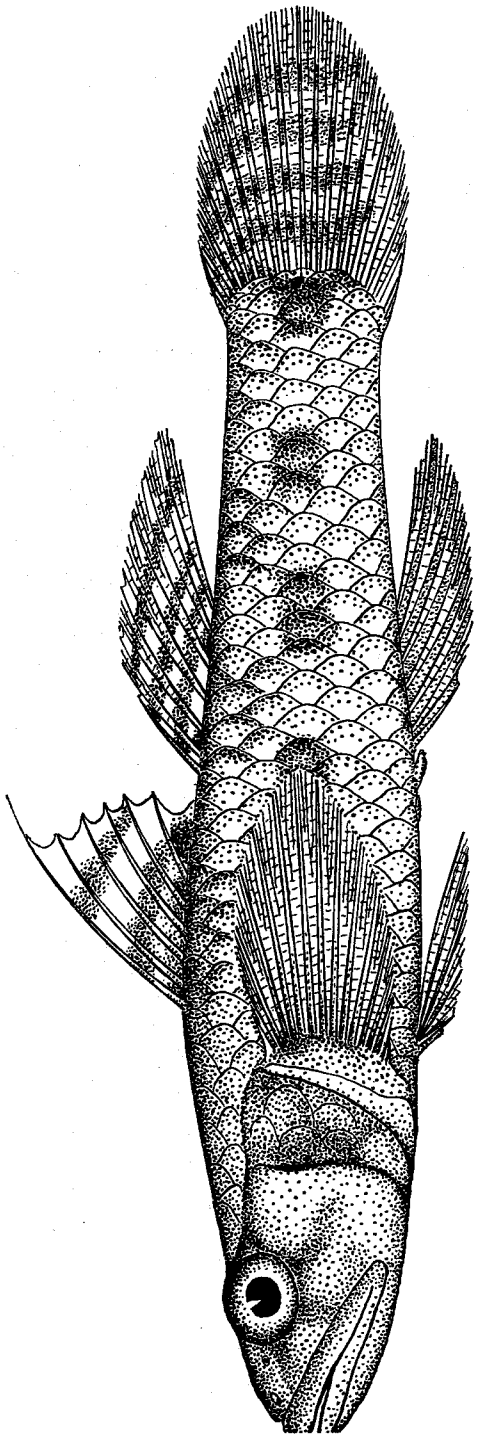


Vaimosa kabilia n.sp. *(Length of type 36 mm.).*



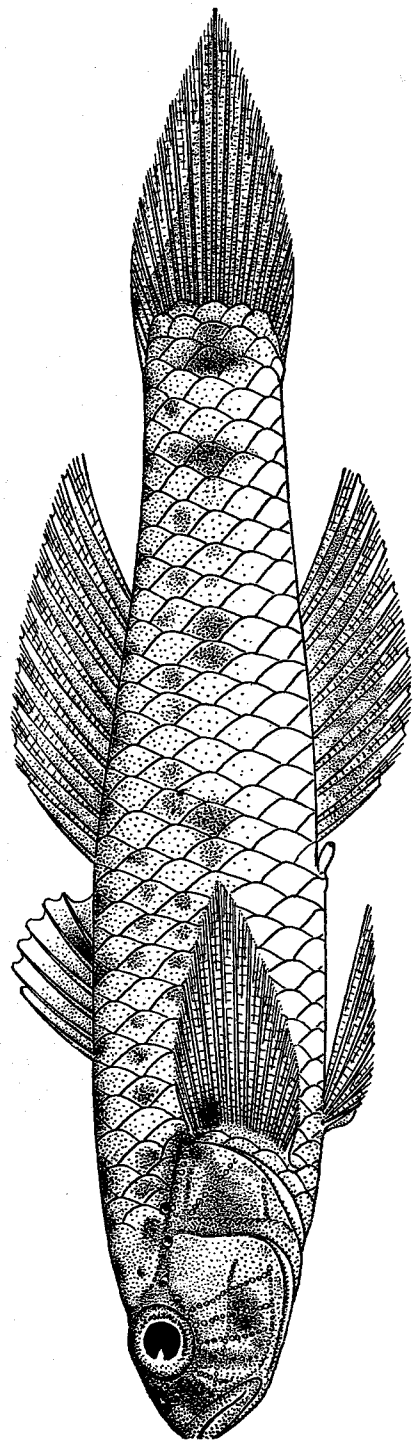


Vaimosa oratai n.sp. *(Length of type 18 mm.).*

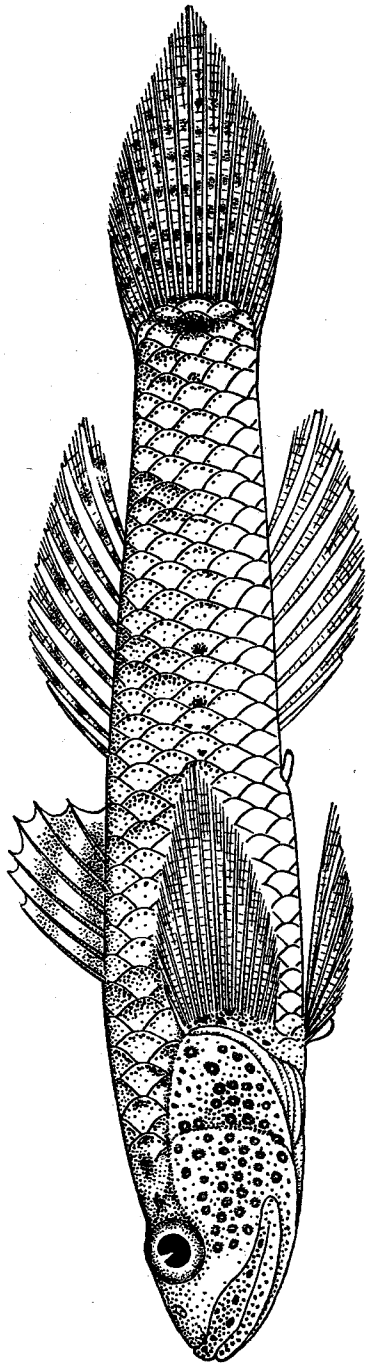


Vaimosa perakensis n.sp. *(Length of type 25 mm.).*



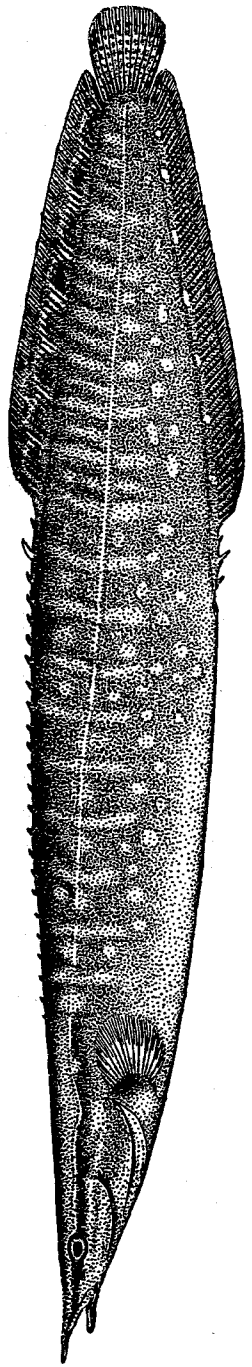


Ctenogobius kranjiensis n.sp. *(Length of type 29 mm.).*

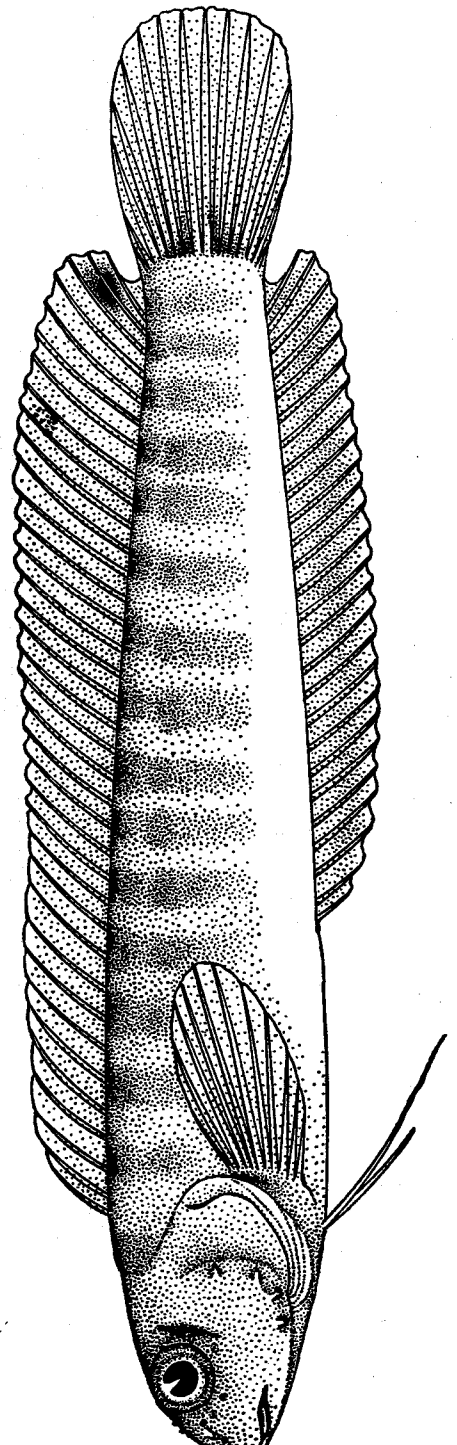


Ctenogobius paludosus n.sp. *(Length of type 30 mm.).*





Mastacembelus keithi n.sp. *(Length of type 191 mm.).*



Petroscirtes kranjiensis n.sp. *(Length of type 42 mm.).*



# Additions to the fish fauna of Malaya and notes on rare or little known Malayan and Bornean fishes

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Recent years have seen a great increase in our knowledge of the fishes of Malaya and their distribution. Extensive collections by the Department of Fisheries, under the guidance of Director W. Birtwistle, by Mr. M. W. F. Tweedie, curator of the Raffles Museum, and by myself have added hundreds of fishes to the known fauna of Malaya, and extended knowledge of their range immensely. The results have been made known in papers by Fowler, Tweedie, Herre, and Herre and Myers. Nevertheless we still lack an adequate knowledge of either the fresh water or brackish water and marine fishes of the Malay Peninsula. Intensive collecting is necessary in all the Malay States and even on Singapore Island before the fresh water fishes are properly known, while the marine forms are very inadequately known as yet. Most of the fresh water fishes of Sumatra and a large proportion of Bornean species will ultimately be discovered in the Malay Peninsula. In addition others known as yet only from the streams of Siam and Burma will be found in Malaya. I do not doubt that a few more years of exploration will show a fish fauna of 1,200, possibly 1,500 species in the fish fauna of Malaya.

The Malayan fishes are an integral part of the Indo-Pacific fauna, and the fresh water fishes cannot be considered apart from the natural biological realm which extends from Cambodia, Siam, and Sumatra eastward to Wallace's Line, and includes Palawan and Mindanao in the Philippines, as well as Borneo and Java.

All measurements of length are from the snout tip to the caudal base, unless otherwise specified. The asterisk indicates species believed to be additions to the fish fauna of Malaya. Nearly all were obtained by Mr. Tweedie and myself in 1937.