

**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.

DASYATIDÆ

\**Dasyatis bleekeri* (Blyth)

There is a cast of a large specimen in the Raffles Museum, taken near Singapore.

CHIROCENTRIDÆ

*Chirocentrus hypselosoma* Bleeker

A specimen 146 mm. long was obtained at Singapore. Gill rakers 5 plus 18. Although originally described from Singapore, all authors since Bleeker have ignored this species until it was investigated by Hardenberg. See his "Remarks on the Genus *Chirocentrus*" in *TREUBIA*, vol. XII, pp. 51-65, May, 1930.

SYNBRANCHIDÆ

*Mactrotrema caligans* (Cantor)

A specimen of this rare eel, 148 mm. long, was obtained from fishermen seining on the beach near Singapore. It has been reported only from Penang and Singapore, but must occur all along the coast in suitable localities. The wide gill openings, extending upward to the lateral line, and its habitat in the sea, serve to distinguish this species and separate it from the other Synbranchid eels.

OPHICHTHYIDÆ

\**Pisoodonophis micropterus* (Bleeker)

A specimen 562 mm. long was collected on a Singapore reef. The depth is 40, the head 12 times in the length; the head is 3.9 times in the trunk. The eye is 14.8 times in the head; the posterior nostril is below the anterior part of the eye.

MURÆNIDÆ

\**Uropterygius concolor* (Rüppell)

A specimen of this finless moray, 270 mm. long, was secured at Singapore. A thick fold of skin along the back resembles a dorsal fin extending from head to tail tip. Dissection shows that it is not a fin, as it does not contain a single fin ray. There is no trace of an anal fin.

CYPRINIDÆ

\**Macrochirichthys macrochirus* (Cuv. and Val.)

Four fine specimens, 235 to 298 mm. in length, from Chenderoh Dam, Perak. A fish of Sumatra, Java, Borneo, and Siam.

*Laubuca johorensis* (Steindachner)

A single specimen, 48 mm. long, from the Mawai District, Johore. Dorsal 9; anal III-28; scales in lateral line 44. A silvery black line runs along the middle of the side, terminating

in a black spot on the caudal base. The opercles are bright silver. First noted by Steindachner in 1870, from Johore, it was reported by Duncker in 1904 from Kuala Lumpur and Negri Sembilan, and apparently has not been seen since until this record.

**\**Rasbora vaillanti* Popta**

Sixty specimens, 30 to 73 mm. in length, were taken from the lake at Chenderoh Dam, Perak. The pectorals are longer than the head. Another specimen, 87 mm. long, from the Rejang River, Sarawak, Borneo. Hitherto known only from Borneo.

***Rasbora maculata* Duncker**

Two examples, each 16 mm. long, were taken by Mr. Tweedie near Kota Tinggi, Johore. As pointed out by Herre and Myers, this beautiful and tiny fish is very distinct from *Rasbora kalochroma*, with which it has been confused by authors and under which it is placed in Fowler's List of Malayan Fishes. Duncker's specimens came from northern Johore, near Muar or Bandar Maharani, while I have previously obtained it from near Jasin, Malacca.

**\**Brachydanio albolineata* (Blyth)**

A specimen 26 mm. long was taken from the brook at the Botanic Garden, Penang, and 46 specimens, 20 to 32 mm. in length, from a brook near Sauk, Perak. This species is lovely sky blue in life, with an orange stripe along the middle of the side, from below the dorsal to the caudal peduncle and middle of the caudal base. Hitherto known only from Burma.

***Danio regina* Fowler**

A specimen 61 mm. long from the Muar River, Negri Sembilan; this is the second record from Malaya of this Siamese fish. Dorsal II-11; anal III-14. Scales in the lateral line 34, plus 3 on the caudal base; the head is 4 times in the length.

**\**Dangila siamensis* Sauvage**

Four specimens 152 to 218 mm. in length were caught at Chenderoh Dam, Perak, where it is a common food fish.

Dorsal III-25 or 26, or IV-25; anal III-5. Scales in lateral line 35 or 36, plus 2 on the caudal base, 6½ or 7 above and 4½ below the lateral line to the ventral origin; 6 scales below to the anus and 7 to the median line on the breast. There is a black blotch at the caudal base and 9 or 10 longitudinal rows of black spots, one on each scale; the dorsal has a submarginal black band, the other fins all clear.

***Osteochilus spilurus* (Bleeker)**

Two specimens, 20 and 25 mm. long, were taken from a brook on Mandai Road, Singapore, the first record from the

island. Fourteen others, from 16 to 61 mm. in length, were caught in the Mawai district, Johore.

Scales 27, plus 2 on caudal base. A large black spot on the caudal base, and a small one below the lateral line and 3 scales behind the head.

\**Tor soro* (Cuv. and Val.)

A fine specimen 149 mm. long was taken from the lily pool in the Penang Botanic Garden. Hitherto known from Sumatra and Java.

*Probarbus jullieni* Sauvage

In 1934 I obtained an example of this very striking looking fish from Chenderoh Dam, Perak. In March, 1937, numerous very large specimens were seen in the market at Kuala Kangsar, Perak, on several occasions, their lengths over all being from half to three-fourths of a meter. They were all too large for any available containers, so none could be taken. This is a highly prized fish of Indo China and Siam.

*Cyclocheilichthys armatus* (Cuv. and Val.)

A specimen 48 mm. long was taken at Chenderoh Dam, Perak, where two large examples were obtained in 1934. A juvenile specimen 24 mm. long was taken in the hills 5 miles north of Kota Tinggi, Johore.

Scales in the lateral line 34, plus 2 on the caudal base. The depth equals the head, 3.2 times in the length; the very deeply forked caudal is 2.4 times in the length. The eye is greater than the interorbital, 2.7 times in the head.

\**Cyclocheilichthys de zwaani* (Weber and De Beaufort)

A specimen 166 mm. long was obtained from the Perak River, below Chenderoh Dam, Perak. The small eye is more than 4 times in the head, and 1.5 or more in the postorbital part of the head; 4 minute barbels; the pectorals do not reach the ventrals; 16 scales around the caudal peduncle.

An example 140 mm. long was also secured at Kuching, Sarawak, Borneo. Hitherto known only from Sumatra.

\**Cyclocheilichthys repasson* (Bleeker)

Seven specimens, 21 to 88 mm. in length, were taken from a brook at Sauk, Perak.

Twenty scales around the caudal peduncle; 4 small barbels; eye 3 to 3.5 times in the head. Previously known from Sumatra, Borneo, and Siam.

\**Puntius dunckeri* (Ahl.)

This species is often confused with *Puntius everetti*. It occurs in great numbers in Gunong Pulai Reservoir, Johore, but the schools remained in deep water, too far off shore to be taken

by any available means. From a creek on the Mandai Road, Singapore, 5 specimens, 52 to 85 mm. in length were taken; 6 from the Gunong Pulai Reservoir, 73 to 115 mm. in length; and 16 from 35 to 85 mm. from a hill stream 8 miles north of Kota Tinggi, Johore.

**\**Puntius sumatranus* (Bleeker)**

One example, 30 mm. long, from Kuala Pilah, Negri Sembilan.

***Puntius binotatus* (Cuv. and Val.)**

This wide spread and highly variable fish was collected in many localities. Weber and De Beaufort give the fins and scales as follows:—Dorsal IV-8; anal III-5; pectoral I-15-17; ventral I-8 or 9; lateral line 23-27; predorsal scales 9 or 10.

My own counts, based entirely on typical Philippine specimens, are Dorsal IV-8; anal III-5; pectoral I-14 or 15; ventral I-8; scales in lateral line 22-25; predorsal scales 8 or 9.

**\**Puntius binotatus banksi*, new subspecies**

Among those collected in Singapore and Johore, and near Kuching, Sarawak, Borneo, are others showing a lower number of scales in the lateral line, and markings different from those recorded in the literature.

Pectoral rays I-12 to 14, mostly I-13, often I-14; scales in lateral line 20 to 22, nearly all specimens 21, plus 1 or 2 on the caudal base.

Twenty-five specimens, 13 to 76 mm. in length, from a pond in the Botanic Garden, Singapore, have a transverse bar from dorsal to abdomen in very young stages, in addition to the typical markings of *P. binotatus*. As they get larger most of the markings disappear, leaving a broad black bar from the dorsal downward for 3 or 4 scales, and a spot at the caudal base. Ten specimens from 46 to 94 mm. in length, from a hill stream 5 miles north of Kota Tinggi, Johore, and 4 specimens 75 to 94 mm., in length, from a stream 16 miles north-east of Kota Tinggi, agree with the above in all respects, except that they lack the typical markings of *Puntius binotatus*.

Twenty-two specimens, 38 to 67 mm. in length, from a brook 18 miles east of Kuching, Sarawak, Borneo, show no trace of the characteristic markings of *Puntius binotatus*, but have an elongate black bar or stripe from the base of the fourth dorsal spine downward over 3 or 4 scales; this bar is usually one scale in width, but may run between scales and extend over half of each scale on each side; there is a small black spot on the caudal peduncle just before the caudal base.

Scales 21 (22 in 2 specimens) plus 1 or 2 on the caudal base; pectoral I-12-14. Dorsal origin opposite the 9th or 10th scale

of the lateral line, instead of the 8th or 9th as in typical *P. binotatus*. The length of the head is 3.2 to 3.3 times in the standard length, instead of 3.4 to 3.8 in my typical *P. binotatus* (or 3.6 to 3.9 according to Weber and De Beaufort). The dorsal is gently curved instead of being truncate.

Named in honor of Mr. E. Banks, Curator of the Sarawak Museum, without whose kindly aid little could have been done during my brief stay in Kuching.

***Puntius birtwistlei*, new species**

Dorsal IV-8; anal III-5; scales in lateral line 24 or 25 plus 2 on caudal base;  $4\frac{1}{2}$  above and 2 below lateral line to ventral origin or 3 below to anus; predorsal scales 8, 9, 10; scales around caudal peduncle 11.

The body is elongate, moderately compressed, elevated at the dorsal, the anterior profile usually a straight line from dorsal origin to snout, or it may have an elevation at the nape; the snout is rather blunt, rounded, with included lower jaw. The depth is 2.85, the head 4 to 4.25, the deeply forked caudal about 3 times in the length. The eye is 4.33 to 4.44 times in the head and much shorter than the snout or interorbital width, 1.45 to 1.5 times in the snout and 1.6 to 1.66 in the interorbital. The snout is about 2.95, the interorbital 2.6 to 2.75 times in the head. The rostral barbels equal or nearly equal the eye; the maxillary barbels are slightly longer. The dorsal origin is about opposite the ventral origin and is distinctly nearer the tip of the snout than the caudal base, above the 9th scale of the lateral line, or sometimes over its hind margin. The fourth dorsal spine is broad, strong, with about 20 (rarely 17) strong teeth along its hind margin, the bony part equalling the head. The third anal spine equals the ventral length and almost equals the head. The pectoral length is distinctly less than that of the head, 4.7 to 5 times in the length, not reaching the ventrals, and the latter not reaching the anal. The least height of the caudal peduncle is 1.2 to 1.33 times in its own length, and 1.75 to 1.9 times in the head. The upper margin of the dorsal is markedly concave.

The color in alcohol is uniform reddish brown, the scales on the upper half with a more or less evident dusky hind margin; 2 specimens have a narrow blackish margin on the caudal and dorsal.

Six examples, 175 to 242 mm. in length, from Chenderoh Dam, Perak. This large carp is much used for food and is close to *P. bramoides*; from which it differs in scalation, smaller eye, longer snout, broader interorbital, dorsal position, lesser depth, etc.

I take pleasure in naming this species after Director of Fisheries W. Birtwistle, who has aided me greatly in studying Malayan fishes.

ADDITIONS TO THE FISH FAUNA OF MALAYA

**Balantiocheilus melanopterus** Bleeker

Eleven specimens, 138 to 174 mm. in length, were obtained from the Perak River, below Chenderoh Dam, Perak. This handsome and boldly marked food fish is caught in considerable quantity in the boiling current below the dam; second record from this locality, but not known as yet elsewhere in the Peninsula.

**Epalzeorhynchus siamensis** H.M. Smith

Three specimens of this rather rare fish were caught in the lake above Chenderoh Dam, Perak, their lengths 43 to 70 mm. First definite record from the Peninsula.

**Epalzeorhynchus kallopterus** Bleeker

Four specimens of this very handsome cyprinid were caught about a float in the lake above Chenderoh Dam, Perak, their lengths 36 to 43 mm. This fish is now reported from Perak, Pahang, Negri Sembilan, and Malacca.

COBITIDÆ

**Acanthopsis choirorhynchus** (Bleeker)

Dorsal II-10 or 11; anal II-5; depth 8 to 8.5, the head 4 or a trifle more than 4 times in the length, the eye is 8 to 8.6 times in the head.

The color in alcohol is uniform pale brown or tan, with a small dark spot at the upper part of the caudal fin.

Two specimens, 163 to 175 mm. in length, from the Muar River in Negri Sembilan.

**Acanthopthalmus kuhli** (Cuv. and Val)

Forty specimens, 24 to 56 mm. in length, from a roadside ditch in the Mawai District, Johore, and 4 from 34 to 47 mm. in length, from a stream 5 miles north of Kota Tinggi, Johore.

This species is subject to a good deal of variation in depth, and preserved specimens are apt to be a good deal thicker than in life. Their pinkish color is conspicuous in active living specimens, contrasting with their dark transverse bars. They occur in great abundance in ditches containing only a few inches of water and entirely filled with a dense mat of filamentous green algæ. In such places they have plenty of food and are amply protected from enemies and the direct heat of the sun.

\***Lepidocephalus hasselti** (Cuv. and Val.)

Two specimens, 20 and 34 mm. in length, were collected in the Mawai District, Johore. Common in Sumatra and Java.

\***Nemacheilus fasciatus** (Cuv. and Val.)

A specimen 29 mm. long was taken from a stream 5 miles north of Kota Tinggi, Johore. Common in Sumatra, Java, and Borneo.

**Nemacheilus selangoricus** Duncker

Mittel. Naturhist. Museum, Hamburg, XXI, p. 175, 1904.

Dorsal II or III-9; anal I-5; pectoral I-10 or 11; scales minute, about 160 in longitudinal series, the lateral line with about 112 tubules; predorsal scales 60 to 65; scales from dorsal origin to lateral line 18 or 20, and 16 from lateral line to ventral origin.

The depth is 5.4 to 5.8, the head 4, the caudal 3, the pectoral 4 to 4.66, the ventral 5.7 to 6, the dorsal height 4.4 to 4.8, the anal height 6 to 6.15 times in the length. The eye is 4.75 to 4.95 times in the head, 1.66 to 1.9 times in the snout, and 1.4 to 1.5 times in the interorbital. The snout is 2.5 to 2.9 times in the head, the interorbital 3 and a third times. The dorsal height is about nine-tenths as long as the head, the anal height about 1.5 times in the head. The ventral origin is beneath the second dorsal spine or first divided ray. The anal origin is much nearer the caudal base than to the ventral origin. The ventrals fall far short of the anal fin; the caudal is deeply forked, with pointed lobes. Most specimens have a conspicuous hook extending backward from the preorbital at the lower end of the front margin of the eye, as has been recorded for several other species of *Nemacheilus*.

The elongate body is little compressed anteriorly but markedly so posteriorly, its greatest depth midway between pectorals and dorsal, the head somewhat depressed with round-pointed snout. The small lunate mouth equals the eye, its lips papillate-striate, the lower lip with a median groove. The outer rostral barbels are longest, 1.25 to 1.33 times in the head, the maxillary barbels twice in the head; the inner rostral barbels extend to the middle of the eye.

In preserved specimens there are 11 to 13 broad dark brown cross bands over the back and down the sides, some of which may be irregular or divided, separated by narrow pale yellow stripes like the color of the belly. Three more or less distinct cross bands on the head, the first on the snout, the second over the eyes and down the cheek to the under side of the head, the third behind the eyes; the first and third bands usually are only blackish patches on top of the head. The caudal has black spots or a black band at its base, with 2 or 3 cross bars of dusky spots. The dorsal has a black spot at the base of the first two rays, and 2, rarely 3, stripes formed of black spots on the rays, across its middle and upper portion. The other fins are colorless.

Described from 15 specimens, 19 to 42 mm. in length, from the Balung River, 45 miles from Tawau, British North Borneo. Four specimens from a brook beside Mandai Road, Singapore Island, are 32 to 48 mm. in length; they have larger eyes, 3.75 to 4.3 times in the head, which is 4 to 4.5 times in the length.



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Mr. Tweedie also obtained 4 near Kota Tinggi, Johore, their lengths 19 to 38 mm.

Previously known from Selangor, Singapore, and Perak, but very imperfectly described and not well separated, therefore, from other loaches of the same genus.

CHACIDÆ

**Chaca chaca** (Buch. Ham.)

A fine example of this peculiar catfish, 126 mm. long, was caught with a dip net in a small and rather rapid creek in the Mawai District, Johore.

CLARIIDÆ

\***Clarias nieuhoi** Cuv. and Val.

A specimen 132 mm. long was taken from a hill stream 8 miles north of Kota Tinggi, Johore.

SILURIDÆ

**Kryptopterus macrocephalus** Bleeker

Four specimens, 44 to 59 mm. in length, were collected by Mr. Tweedie near Kota Tinggi, Johore, Second record from Malaya, the first being from Bukit Merah, Perak.

\***Ompok leiacanthus** (Bleeker)

A specimen 88 mm. long, from a stream on the Mandai Road, Singapore.

\***Silurichthys indragiriensis** Volz

Three specimens, 94 to 102 mm. in length, were collected in the Jurong District, Singapore Island, and 2 examples 74 and 93 mm. in length from a hill stream 5 miles north of Kota Tinggi, Johore.

Anal rays 48 or 49; the ventrals are behind the dorsal fin.

PANGASIIDÆ

**Pangasius micronema** Bleeker

Five specimens, 193 to 220 mm. in length, were obtained at Chenderoh Dam, Perak; previously reported from Bukit Merah, Perak.

This excellent food fish is common in the swift currents of the Perak River below the dam. It is much dreaded by fishermen, as the spines inflict very painful stinging wounds.

SISORIDÆ

\***Glyptothorax majus** (Boulenger)

Dorsal I-6; anal III-9; pectoral I-8. The depth is 4.5 times in the length; the breadth of the occipital process is 2.5 times in its own length, and the least depth of the caudal peduncle

is 1.6 times in its own length. The dorsal and anal heights are equal, 5.33 times in the standard length. The following specimens were collected and studied:—1 of 39 mm. from Singapore Island; 4 from 25 to 54 mm. in length from a hill stream 5 miles north of Kota Tinggi, Johore; 1 of 48 mm. from a mountain brook 18 miles north-east of Kuala Lumpur, Selangor; and one of 47 mm. from the Benus River, Pahang. A Bornean species.

**\*Glyptothorax platypogonoides (Bleeker)**

A specimen 46 mm. long from a mountain brook 14 and  $\frac{3}{4}$  miles north-east of Kuala Lumpur, Selangor, and one of 94 mm. from a stream at an altitude of nearly 3,000 feet, 18 miles north-east of Kuala Lumpur. A Sumatran fish.

ARIIDÆ

**\*Arius microcephalus Bleeker**

Two specimens, each 185 mm. long, were obtained from the market at Kuala Kangsar, Perak, where large numbers of this and other catfishes are kept alive. Previously known only from Borneo.

**Arius truncatus Cuv. and Val.**

Three examples, 214 and 242 mm. in length, were purchased with the above at Kuala Kangsar. Previously reported from Penang.

BAGRIDÆ

**\*Leiocassis bicolor Fowler**

Dorsal I-5 or 6; depth 6 times in the length; dorsal spine 3.33 times in the head. Two specimens, 24 and 38 mm. in length were taken by Mr. Tweedie in the Mawai District of Johore. Previously known only from Siam. Our specimens agree with Fowler's description and figure.

**\*Mystus wycki (Bleeker)**

Two fine typical specimens, 275 and 350 mm. in length, were obtained at Chenderoh Dam, where so many rare food fishes are caught. The very broad flat head, prominent rounded snout, and smooth upper surface of the head make this fish easily recognizable. Previously known only from Java and Sumatra.

SYNODONTIDÆ

**\*Synodus variegatus (Lacepede)**

A specimen 136 mm. long was secured at Penang.

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CYPRINODONTIDÆ

\**Lebistes reticulatus* (Peters)

Two males and a female of this West Indian fresh water fish were taken from a stream on Singapore Island, their lengths 15 to 35 mm. This fish has been carried all over the world by aquarists, so it is not surprising that this lovely creature should be naturalized in a region so similar to its native habitat in Trinidad and Venezuela. Dorsal 7 or 6; anal II-5; scales in longitudinal series 28; predorsal 12.

BELONIDÆ

\**Busuanga philippina* Herre

A specimen of this peculiar Philippine species was taken at Singapore, its length 338 mm.

\**Hemiramphus marginatus* (Forsk.)

Two examples were taken at Penang, their lengths 155 and 167 mm.

*Zenarchopterus brevirostris* Günther

(*Zenarchopterus dispar* Peters).

A specimen 82 mm. long was taken at Singapore.

The genus *Zenarchopterus* is one of much difficulty, and as Fowler's list has omitted reference to the important papers by Erna Mohr, and her new species from Malaya, a key is here presented to help distinguish the species thus far recorded. This key is based on the characters of adult males.

Key to the species of *Zenarchopterus* known from Malaya

- A.—Two dark brown circular spots on each side of middle of body, above the silver stripe from pectoral to caudal . . . *Z. quadrimaculatus* Mohr  
Only known from the Muar River, Selangor.
- AA.—Not spotted as above.
- B.—Dorsal not modified.
- C.—Anal with 8 or 9 rays, in 2 parts; 5 rays in first part, the third ray longest; the slender first ray of the second part longest . . . *Z. beauforti* Mohr  
From the Muar River, Selangor.
- CC.—Anal with 11 or 12 rays.
- D.—Anal not forked or divided, the 6th and 7th rays enlarged and

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thickened, but not reaching caudal base; occurring generally from Singapore to Penang .. ..

*Z. buffoni* (Cuv. & Val.)

DD.—Anal forked, the 6th ray broadest, longest, and forked; the 7th and 8th also elongate, the others normal; a sheath of skin forms a pocket at base of 8th ray and veils base of last rays. Known only from Bangkok and Penang ..

*Z. pappenheimi*  
Mohr

BB.—Some of the dorsal rays more or less modified; anal rays 11 to 13.

E.—Triangular part of upper jaw nearly twice as long as broad; 3rd to 6th dorsal rays strongly elongate but not much thickened; 5th, 6th, and 7th anal rays much thickened and elongated Muar River, Selangor, and Singapore; also widely distributed elsewhere ..

*Z. amblyurus*  
Bleeker

EE.—Triangular part of upper jaw broader than long; 5th dorsal ray thickened and elongate; anal in 3 parts, the first 5 rays normal; 6th ray very wide and thick, feathered behind and covered with thick skin, extending far upon the caudal; 7th ray long and thick, with a basal pocket covering also the bases of the 8th and 9th rays. Singapore; from the Carolines and Fiji to Madagascar and Mozambique ..

*Z. brevirostris*  
Günther

MUGILIDÆ

\**Mugil longimanus* Gunther

Fifteen specimens, 55 to 11 mm. in length, were collected at Penang.

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\**Liza caeruleo-maculatus* (Lacepede)

Three specimens, 123 to 126 mm. in length, from Singapore, and one of 160 mm. from Sandakan, British North Borneo.

SYNGNATHIDÆ

\**Corythoichthys fasciatus* (Gray)

Two examples, 85 to 99 mm. in length, from a brook on Singapore Island.

\**Doryichthys martensi* (Peters)

Common in streams of rolling country of southern Johore. Fourteen specimens 52 to 96 mm. in length, were taken in the Mawai District, Johore, and 4 from 75 to 95 mm. from a brook 5 miles north of Kota Tinggi.

The snout is shorter than the rest of the head; dorsal 31-36; trunk rings 15 or 16; caudal rings 33 to 36; 1 or 2 trunk rings under the dorsal and 5 to 7 tail rings. There is a black spot on the hind margin of each ring along the median line of each side, from the fourth to the next to the last trunk ring. Males have a black band from the tip of the snout through the eye to the pectoral base, and a black stripe from the tip of the chin on the under side of the head to below the hind margin of the eye. The lower half of the opercle is barred or spotted with black.

\**Syngnathus fasciolatus* Dumeril

A specimen 82 mm. long from Singapore. Previously known only from Java.

*Trachyrhamphus serratus* (Schelegel)

A specimen 135 mm. long, from a Singapore reef, is the second record from there.

SCOMBRIDÆ

\**Neothunnus rarus* (Kishinouye)

A specimen 400 mm. long was found in the Singapore market. Dorsal XIII-14-VIII; anal XIII-VIII. Gill rakers 6 plus 17; scales about 215. The pectoral reaches to the last dorsal spine.

CARANGIDÆ

*Selaroides leptolepis* (Cuv. and Val.)

Six specimens, 86 to 130 mm. in length, from the market at Johore Bahru. The color in life is silvery, with a golden stripe from the snout to the caudal base, and a large black spot on the shoulder; the dorsal is largely golden, its upper portion black.

\**Elagatis bipinnulatus* (Quoy and Gaimard)

A specimen 295 mm. long, from Singapore.

ANABANTIDÆ

The Genus *Betta*

Various species of this genus have become widely distributed by aquarists, and names have been very loosely applied by aquarists. The nomenclature is in a sad state of confusion, and old records made before Regan's revision are scarcely to be relied upon. Many later records are also dubious. For example, *Betta pugnax* Cantor has been reported from numerous localities in Borneo, Sumatra, and the Malay Peninsula, but the only locality where it is definitely known to occur is at Penang. I have thus far failed to find *B. pugnax* anywhere except on Penang island.

Weber and De Beaufort call attention to the variability of the characters, which seem scarcely fixed as yet, and vary widely according to sex, age, and locality. A number of species are known only from a single specimen; no doubt some of these are valid, but observance of large number of living specimens in their native habitat, and comparisons of them after two or more years in preservative, have shown that few markings are serviceable in distinguishing species. Some very diverse kinds appear almost identical after a year or more in alcohol, losing their brilliant markings and developing one or two longitudinal black stripes on a brown background, so that they all seem mere variants of a single species. It is altogether probable that a revision based upon a very large amount of material from all over Malaya, Borneo, Sumatra, and Siam, would show that several of the species now accepted should be relegated to synonymy.

Key to the species of *Betta*

- A.—All dorsal and anal rays articulated,  
without spines
  - B.—Maxillary extending beyond middle of  
eye; a large black ocellus on dorsal
    - 1. *B. macrostoma*
  - BB.—Maxillary not going beyond front  
margin of eye; no ocellus on  
dorsal; a blackish spot at caudal  
base .. .. . 2. *B. unimaculata*
- AA.—Anal with 1 to 4 spines
  - C.—Dorsal rays flexible and articulated,  
without spines .. .. .
    - D.—Maxillary reaching below  
nostrils or front margin of  
eye; dorsal origin halfway  
between head and caudal, or  
nearer the latter.

ADDITIONS TO THE FISH FAUNA OF MALAYA

- E.—Anal II-20-24; dorsal over 14th to 16th scale; predorsal scales 20-26; interorbital 2.4-2.9 in head; uniform brown .. 3. *B. fusca*
- EE.—Anal I or II-25 to 30.
- F.—Anal I-27; dorsal origin over 16th or 17th scale; predorsal scales about 30; interorbital more than 3 in head; brownish with a dark stripe along each row of scales .. 4. *B. akarensis*
- FF.—Anal II-25-30; dorsal origin over 17th or 18th scale; predorsal scales 26-30; interorbital about 2.5 in head; brown with dark lines on transverse rows of scales .. 5. *B. anabatoides*
- DD.—Maxillary reaching beyond front margin of eye.
- G.—Caudal base with distinct ocellus; maxillary to below front part of pupil .. 6. *B. ocellata*
- GG.—No ocellus on caudal base; maxillary to front border of eye or a little more .. 7. *B. patoti*
- CC.—Dorsal with 1 or 2 small sharp spines
- H.—Dorsal with 2 spines
- I.—Dorsal II-8 or 9, the spines stout; anal II-23-25; lateral scales 29-30; predorsal 23-25; transverse 11 .. 8. *B. brederi*
- II.—Dorsal II-7, spines very slender, weak; anal III-26; lateral scales 31, predorsal 27, transverse 10 9. *B. balunga*
- HH.—Dorsal with but 1 more or less pungent spine
- J.—Predorsal scales 20-24; anal I or II-19-23; lateral scales 28-30; Dorsal I-6-8; 3 black longitudinal bands .. 10. *B. picta*

- JJ.—Predorsal scales 25 or more  
K.—Sides with vertical cross bars  
L.—Anal III-21; dorsal 1-7; lateral scales 30, predorsal 28; 5 or 6 dark vertical cross bars on pale ground color; dorsal origin above 16th scale . . . 11. *B. rubra*  
LL.—Anal II-28-30; Dorsal I-9-10; lateral scales 34-36, predorsal 28-30; dorsal origin above 18th or 19th scale; 6 to 10 dark brown cross bars on brown ground color . . . 13. *B. fasciata*  
KK.—No vertical cross bars  
M.—Anal II-IV-21 to 24; dorsal I-8-9; lateral scales 30-32, predorsal 27; anal very deep and elongate posteriorly; life colors brilliant red, blue, green, black . . . 14. *B. splendens*  
MM.—Anal spines I or II  
N.—28-32 scales in lateral series; depth 3.3 to 4  
O.—Longitudinal band from snout over eye and one below pectoral, uniting at caudal base, usually in a circular spot; lateral scales 28-31; predorsal 25-26; anal II-20 to 25 . . . 15. *B. taeniata*  
OO.—Without 2 bands as above; no longitudinal lines on scale rows; a dark stripe from snout over eye across head; anal II-25-26; lateral



ADDITIONS TO THE FISH FAUNA OF MALAYA

- scales 30-32, pre-dorsal 26 or 25; dorsal I-7 or 8 . . . 16. *B. pugnax*  
NN.—35 scales in lateral series; predorsal about 30; anal II-30-34; dorsal I-10; depth 4.2 in length . . . 17. *B. bellica*

**Betta ocellata** de Beaufort, Bull. Raffles Museum, No. 8, p. 35, December, 1933.

Dorsal 8 or 9, without spines, the first ray very short; anal II-29 or 30, or I-30; scales in longitudinal series 33 to 35, plus 4 very small ones on caudal base; predorsal scales 26 to 29; transverse series 9½. Dorsal origin opposite 19th or 20th scale.

Depth 4 to 4.3, head 2.8 to 3, caudal 3 times in the length; the eye is 4.4 to 4.6 times in the head, 2.5 in the post-ocular portion, and 1.6 in the interorbital; snout 4.2 interorbital 2.75 to 2.85, and least depth of caudal peduncle 1.8 to 2.1 times in the head. The head is broad, the posterior half of the trunk greatly compressed, the caudal fin very broad and rounded, with the central rays sometimes prolonged a little. The ventrals are long, with filiform tip, usually as long as the head without the snout, rarely as long as the entire head.

The color is pale to dark brown, with a black ocellated spot a little below the centre of the caudal base; in young or medium sized specimens there may be a black stripe from the tip of the snout to the caudal peduncle, stopping before reaching the ocellus; young specimens may show a second stripe from beneath the pectoral and along the upper side of the abdomen, curving upward to join the upper band before the ocellus; the opercles, top of the head, snout, and lower jaw may be very dark or nearly black. The caudal is cross barred by numerous alternating rows of dark brown and very pale brown spots, or sometimes is uniform brown; the pectorals are nearly colorless, with a pale or whitish bar across the base in larger specimens; the other fins are all brown; sometimes the dorsal and anal may have a few darker spots.

Dr. de Beaufort had but one specimen, 91 mm. long, from Bettotan, British North Borneo. I have seen none so large. I collected 2 specimens, 35 and 70 mm. in length, from the Balung River, about 45 miles north of Tawau, British North Borneo; 3 examples, 21 to 26 mm. long, from the Kinabutan River, near Tawau; 9 specimens 20 to 65 mm. in length from the Kabili River, a tributary of Sandakan Bay, British North Borneo. Through the co-operation of H. G. Keith, conservator of forests of British North Borneo, the following were received:—3 from

28 to 60 mm. long, from the Gum Gum River; 3 from 62 to 77 mm. long from the Mapat River, near Semporna; and 2 specimens, 55 and 65 mm. in length, from the type locality, the Bettotan River, near the head of Sandakan Bay.

**Betta balunga** Herre, new species

Dorsal II-7, the pungent spines delicate; anal III-26; pectoral 12; caudal 13; 31 scales in a longitudinal series, plus 2 on the caudal base, and many very small ones running far out on the caudal rays; predorsal scales 27; transverse series 10.

The dorsal profile is convex, the arc broken under the dorsal, and greatly flattened to the caudal; the ventral profile is gently and uniformly arched. Depth 3.4, head 2.8, caudal 2.55 times in the length; the eye and snout are equal, 3.6 times in the head and twice in the postorbital; the interorbital is 3 times in the head; least depth of caudal peduncle 5.35 times in the length, about 1.9 in the head; the maxillary does not quite reach a vertical from the front margin of the pupil. The dorsal origin is opposite the 17th scale of the lateral series, and midway between the head and the caudal base; the fifth dorsal ray is twice in the head; the twenty-third anal ray is longer than the head, 2.3 in the length; the pectoral is 1.5 in the head, 4.25 in the length; the thread-like first ventral ray is 1.2 in the head, 3.4 times in the length; the anal has a low basal sheath of one series of scales, the second and third penultimate rays elongate and reaching more than half the caudal length.

The color in alcohol is pale brown, with a darker band from the eye to the caudal base, and a second indistinct band from under the pectoral to above the posterior end of the anal; a faint stripe extends from the upper part of the caudal base to the angle of the opercle, where it becomes a blackish band extending to the eye and crosses behind the eye to join its fellow; a blackish band descends from the eye diagonally forward to the under side of the head; the unmarked fins are brownish.

The type and sole specimen, 51 mm. was taken from a tiny brook tributary to the Balung River, 45 miles from Tawau, British North Borneo. From *Betta taeniata* Regan, to which it is most closely related, it differs in having 2 dorsal spines, instead of one, in the position of the dorsal, and in having 3 anal spines.

**Betta picta** (Cuv. and Val.)

Dorsal I-8 or II-7 or 8; anal II-23 or I-II-III-22-24; scales 28-29; predorsal scales 22-24; transverse scales  $9\frac{1}{2}$ - $10\frac{1}{2}$ .

Specimens were collected as follows:—5 from 51 to 55 mm. in length, from a creek on the Mandai Road, Singapore Island; 105 from 15 to 70 mm. in length from a mountain stream flowing into Gunong Pulai Reservoir, Johore; 15 from 34 to 57 mm. from a mountain brook  $14\frac{3}{4}$  miles north-east of Kuala Lumpur,

and 7 from 31 to 59 mm. from another mountain brook on the west side of Ginting Sempak, Selangor; 1 of 35 mm. from a brook 16 miles east of Kuching, Sarawak, Borneo.

The color is paler to darker brown, with 3 dark longitudinal stripes, the middle one from the snout over the eye to the caudal base; the upper one begins on the opercle and runs to the caudal peduncle; the lower one starts under the pectorals and continues back to the caudal peduncle or caudal base; often a black band runs from eye to eye under the head. In some of our specimens, particularly those from mountain streams, melanism is very marked on the head and sides to the level of the pectoral.

**Betta taeniata** Regan

Dorsal I-7-8; anal II-22-26; scales 28-31; predorsal scales 23-24, to 25 or 26; transverse series 10.

Specimens were collected as follows:—From the Botanic Garden, Singapore, 12 from 34 to 56 mm. in length; 50 from 25 to 56 mm., from the Mandai Road, Singapore. From Johore 33 taken in the Mawai District, 34 from a stream 5 miles north of Kota Tinggi and 12 from one 8 miles north of Kota Tinggi, and 4 from Gunong Pulai, their lengths 20 to 62 mm.; One from Ulu Jelai, Pahang, 48 mm. long; 13 from 23 to 49 mm. from a brook 2 miles north of Sauk, Perak; and 5 from a stream 16 or 18 miles east of Kuching, Sarawak, Borneo, their lengths 17 to 31 mm.

Some of the specimens from hill streams were very brilliant in life and for a long time were labelled as a new species but were finally placed here. Each scale is marked by an emerald spot and there is a large emerald spot on the opercle, with a green stripe along the lower margin of the opercle. There is a black stripe from the tip of the snout across the eye to the hind end of the head. In alcohol the green on the head becomes black, while that on the scales disappears very quickly. These specimens are intermediate between *Betta picta* and *Betta taeniata*, and do not really fit very well anywhere.

**\*Betta rubra** Perugia

I refer here a small specimen, 32 mm. long, collected on Singapore Island. The depth is 3.2, the head 3.5 times in the length. The least depth of the caudal peduncle is a little greater than the postorbital part of the head, and is 1.5 times in the head. Dorsal I-7; anal II-21; scales in longitudinal series 30; predorsal scales 28. The dorsal origin is opposite the 16th lateral scale, and a little nearer to the caudal base than to the head. The anal fin has a basal sheath of one row of scales anteriorly, and with some small additional scales above posteriorly. The color is reddish brown, with 5 or 6 dark vertical cross bars.

This Sumatran species may be native, but is possibly an escape from cultivation.

**\**Betta splendens* Regan**

Two examples, 33 and 37 mm. in length, were taken from a brook on the Mandai Road, Singapore Island. This lovely Siamese fish has been kept in captivity at Singapore for at least a century, having been seen there by Cantor more than 90 years ago. It is not surprising that it should have become established in Singapore streams in that time.

***Betta anabatoides* Bleeker**

Seven specimens, 32 to 72 mm. in length, from Singapore, and 2 examples 43 and 48 mm. in length from a stream 5 miles north of Kota Tinggi, Johore.

Dorsal 8 to 10, without spines; anal II-25-30; scales 30 to 34. Color in life brown, with green opercles and green points on the scales, the green disappearing or turning black in alcohol. With age the middle caudal rays are prolonged, and the dorsal and anal become elongated, the latter even reaching almost to the end of the caudal. Body marked with transverse dark lines; under side of head more or less black.

***Betta fusca* Regan**

Dorsal 6 or 7 (8 or 9 according to Regan and Weber & de Beaufort); anal II-20-24; scales in longitudinal series 29-32 (in one specimen only 26); some examples have a well defined lateral line, with a pit on each scale; predorsal scales 24-27 (22-26 in Weber and de Beaufort).

The depth is 3.5, the head 3 times in the length; the eye is 4, the snout 5.1, the interorbital 2.5, the postorbital 1.8, the least depth of the caudal peduncle 1.9 times in the head. The eye is 1.5 times in the interorbital and 2.22 in the postorbital. The maxillary extends to below the posterior nostril. The dorsal origin is opposite the 16th scale.

Specimens were collected as follows:—1 of 46 mm. from the Mandai Road, Singapore; 1 of 42 mm. 5 miles north of Kota Tinggi and 6 from 33 to 56 mm. from the Mawai District, Johore; one of 48 mm. from 18 miles east of Kuching, Sarawak, Borneo.

SERRANIDÆ

**\**Epinephelus flavocaeruleus* (Lacepede)**

A fine specimen 410 mm. long was taken at Singapore.

PLESIOPIDÆ

**\**Plesiops melas* Bleeker**

Two specimens from Pulau Tioman are 48 and 50 mm. in length.

ADDITIONS TO THE FISH FAUNA OF MALAYA

PEMPHERIDÆ

\**Pempheris itoi* Fowler

A specimen of this rare East Indian fish was taken at Singapore, its length 125 mm. There are 67 or 68 scales in the lateral line, plus 20 or 21 on the caudal; 9 or  $8\frac{1}{2}$  scales above the lateral line; 6+18 gill rakers on the first gill arch.

POMADASYIDÆ

\**Cæsiopsis pisang* Bleeker

A specimen 90 mm. long was secured at Singapore.

\**Cæsiopsis xanthonotus* Bleeker

Four specimens, 115 to 153 mm. in length, were purchased at the Singapore market.

*Scolopsis tæniopterus* Cuv. and Val.

A specimen 250 mm. long, from Singapore. Omitted from Fowler's list, but recorded by Weber and de Beaufort from Singapore and the East Coast of Malaya, in *Fishes Indo-Australian Archipelago*, vol. VII, p. 325, 1936.

*Haplogenyx mucronatus* (Schlegel)

A specimen 196 mm. long, from Sandakan, British North Borneo; new to Borneo.

Dorsal XI-16; anal III-9.

LETHRINIDÆ

\**Lethrinus hypselopterus* Bleeker

A specimen 110 mm. long, from the Singapore market.

\**Lethrinus leutjanus* Bleeker

A specimen 183 mm. long, from Singapore.

MULLIDÆ

\**Parupeneus malabaricus* (Cuv. and Val.)

One example, 244 mm. long, from Singapore.

SCIÆNIDÆ

*Johnius coibor* (Buch. Ham.)

Two specimens, 169 and 184 mm. in length, were taken at Tawau, British North Borneo. Dorsal X-I-28; anal II-7; scales in lateral line 51; gill rakers 5+9 on first gill arch.

The depth is 3.1 to 3.2, the head 3.2 to 3.45 times in the length; the eye is 4.85 to 5 times in the head. The anal origin is opposite the 12th dorsal ray, its base 4.4 to 4.5 times in the base of the soft dorsal. The opercle has two flat weak spines. The first anal spine is short and stout, not minute. A large black diffuse blotch on the opercle. The first dorsal is black, the soft with a black margin, its lower half white, with a black spot at the base of each ray.

\**Johnius goldmanni* (Bleeker)

Two specimens, 114 and 118 mm. in length, from Singapore. Dorsal X-I-27; anal II-8; lateral line scales 50 or 51; gill rakers 6+11. The depth is 3.1 to 3.2, the head 2.8 times in the length; the eye is 3.85 to 4.1 in the head and 1.2 to 1.3 times in the length of the anal spine; the upper lip has a median pore.

CHÆTODONTIDÆ

\**Chætodon fasciatus* Forskal

A specimen 175 mm. in length was taken at Singapore.

ACANTHURIDÆ

\**Acanthurus olivaceus* (Bl. and Schn.)

A Singapore specimen measures 225 mm.

\**Naso lituratus* (Forster)

Two specimens, 206 and 216 mm. in length, were collected on Singapore reefs.

SIGANIDÆ

\**Lo vulpinus* (Schlegel and Müller)

Two specimens, 158 and 162 mm. in length, from the Singapore market.

\**Teuthis striolata* Gunther

A specimen 122 mm. long, from the Singapore market.

SCORPÆNIDÆ

\**Trichopleura mollis* (Richardson)

(*Stethopus mollis* Richardson, Voy. Samarang, Fishes, p. 10, plate 2, figs. 6 and 7, 1848).

A specimen of this rare little fish, 42 mm. long, was taken on a Singapore reef. Dorsal III-I-VIII-8; anal III-6; ventral I-2. The head and body are sparsely sprinkled with minute filaments. The first 3 dorsal spines form a separate division of the dorsal fin; the next spine is intermediate in distance between the first group and the main group of dorsal spines.

\**Vespicula trachinoides* (Cuv. and Val.)

A specimen 26 mm. long was secured in the brackish water of the mangrove mud flat drained by the Kranji River, Singapore Island.

\**Vespicula leucogaster* (Richardson)

Five examples, 32 to 67 mm. in length, were taken from a reef in the outer harbor of Singapore.

ADDITIONS TO THE FISH FAUNA OF MALAYA

PLATYCEPHALIDÆ

**Platycephalus malayanus** Bleeker

Four specimens, 103 to 131 mm. in length, were collected at Sandakan, British North Borneo. Dorsal I-VII-10 or 11; anal 11 or 12; the first ray of both dorsal and anal is simple.

\***Sorsogona serrulata** Herre, Fishes of the Herre 1931 Philippine Expedition, p. 67, 1934.

A specimen of this rare species was taken on a Singapore reef, its length 64 mm. Previously known only from the type, 70 mm. long, taken on the coast of Sorsogon Province, Luzon, P.I. Dorsal I-VIII-11; anal 11. This specimen agrees in detail with the type, except that it is broader and deeper, with a larger head. The head is 2.7, the depth 5.8 times in the length. The eye is 4, the snout 3 and a third times in the head.

**Elates ransonnetti** (Steindachner)

*Platycephalus ransonnetti* Steindachner, Akad. Wiss. Wien. Sitzungsbs, vol. 74, part 1, p. 209, 1876.

*Elates thompsoni* Jordan and Seale, Fishes of the Islands of Luzon and Panay, Bull. Bur. Fisheries, vol. 26, p. 39, Jan. 11, 1907.

A specimen 136 mm. long was taken from a reef in the outer harbor of Singapore, apparently the first taken in Malaya since Baron Ransonneti collected it for Steindachner. It is not very rare in Manila Bay, where it is taken by the trawl fishermen.

POMACENTRIDÆ

\***Chromis dimidiatus** (Klunzinger)

Three examples, 38 to 44 mm. in length, from a Singapore reef.

\***Abudefduf aureus** (Cuv. and Val.)

A specimen 97 mm. long was collected at Singapore.

LABRIDÆ

\***Cheilinus oxycephalus** Bleeker

A specimen 124 mm. long was taken from a Singapore reef.

SCARIDÆ

\***Scarus forsteri** Cuv. and Val.

A specimen 222 mm. long was bought in the Johore fish market, and one of 230 mm. in the Singapore market.

ELEOTRIDÆ

\***Odonteleotris canina** Bleeker

Dorsal VI-1-9; anal I-8; scales in longitudinal series 69 plus 6 on the caudal base; if counted in a straight line from opercular angle to caudal base there are 77; transverse scales 22, predorsal 42.

Bleeker evidently included the caudal in his measurements. The depth in the standard length is 4.5, with caudal 5.5 times; the head is 3.4 times or about 4 with the caudal. The snout is 4 times in the head, the eyes dorsal in position, 5 times, and 1.5 times in the flat interorbital; the large mouth is nearly vertical, reaching a vertical from the anterior part of the eye; two conspicuous canines at the front of the upper jaw and 4 in the lower jaw. The snout and interorbital are criss-crossed by numerous transverse and longitudinal sensory ridges; 6 ridges radiate from the eye upon the cheek, which also has 2 longitudinal and several transverse ridges; additional ridges are above and on the opercle; large pores on the interorbital, behind the eye, on the margin of the preopercle and in the supra-opercular groove. The short rounded caudal equals the depth; the vertical fins are low, the first dorsal 2.5, the second dorsal and anal 2.3 times in the head, the two last much short of the caudal when depressed; the pectoral is 1.4 times in the head, the ventrals 1.5, the latter not reaching the anus; the anal papilla is thin, flat, triangular.

The color in alcohol is uniform dusky brown, paler on the throat and belly; the caudal is brown, the anal a paler brown, the second dorsal pale brown with 3 or 4 transverse rows of dusky dots; the other fins are nearly colorless, but tinged with brown.

A male specimen, 72 mm. long, collected at Singapore.

A rare fish, apparently only known from 3 specimens, 45 to 63 mm. long, obtained by Bleeker from Java and the west coast of Madura.

### *Oxyleotris marmorata* (Bleeker)

Three specimens from streams on Singapore Island, 131 to 187 mm. in length, and 22 from streams flowing into the lake at Chenderoh Dam, Perak, their lengths 13 to 67 mm.

Dorsal VI-I-10; anal I-7; the largest specimen had the depth 4, the head 2.55, the broadly rounded caudal 3.5 times in the length. The small eye 9.1 times in the head, 2.5 in the interorbital; the postorbital portion of the head equals the depth; least depth of the caudal peduncle about twice in the head. The outer row of teeth in the lower jaw are enlarged, recurved, conical and pointed; behind are 2 or 3 rows which are reduced to a single row along the sides; the teeth of the outer row above are half the size of those in the outer row below; behind are 6 rows of minute teeth. Gill rakers 4+7 or 8 on the first arch.

Young specimens are attractive aquarium fish. Previous Malayan records are Kuala Semantan and Lake Chin Chin.



**Oxyeleotris urophthalmus** Bleeker

A specimen 99 mm. long was taken from the Kranji River, Singapore. Dorsal VI-I-9; anal I-8; scales in longitudinal series 85, in transverse series 25; predorsal scales 56. Previously recorded by Mr. Tweedie from Bukit Merah, Perak.

Six living examples of this little known eleotrid were bought in the market at Kuching, Sarawak, Borneo, their lengths 102 to 142 mm. A juvenile specimen, 29 mm. long was taken from a ditch 15 miles east of Kuching. Dorsal VI-I-8; anal I-8; scales 64. Evidently the number of scales increases markedly as the fish increases in size.

GOBIIDÆ

**Creisson validus** Jordan and Seale

Six specimens, 44 to 76 mm. in length, were taken from the Kranji River, Singapore. Previously collected by me in 1934 on a reef in Singapore harbor.

\***Ctenogobius decoratus** Herre

A specimen 30 mm. long from Singapore. Originally described from Leyte, Philippine Islands; since then I have taken it at Culion, P.I., and Fiji.

\***Cryptocentrus fontanesii** (Bleeker)

Five typical examples, 74 to 138 mm. in length, from a reef near Singapore.

\***Gobiodon fulvus** Herre

Three specimens, 28 to 30 mm. in length, from a Singapore reef.

**Ctenotrypauchen microcephalus** (Bleeker)

Two examples of this rare fish, 72 to 92 mm. in length, were taken from brackish water in the Kranji River, Singapore. Obtained once before at Singapore, in 1881.

CALLIONYMIDÆ

\***Synchiropus ocellatus** (Pallas)

Two specimens, each 50 mm. long, were taken from a Singapore reef.

SALARIIDÆ

\***Trypterigium fasciatus** M. Weber

Three specimens, 23 to 24 mm. in length, from a Singapore reef.

Dorsal III-XII-11; anal 18; pectoral with 7 unbranched and 8 or 9 branched rays; scales 30 to 32, plus 1 on the caudal base; 14 to 16 scales in the lateral line; 2 rows below the last scales of the lateral line begins a row of 16 to 18 scales, each with a

small semicircular pit on its posterior margin, extending back to the caudal base; the number of scales with tubules and pits may be different on the two sides of the same fish.

**\**Petroscirtes grammistes* (Cuv. and Val.)**

A specimen 54 mm. long from a reef in Singapore harbor.

Dorsal 30; anal 18.

**\**Petroscirtes heyligeri* Bleeker**

A specimen 29 mm. long was caught on a reef in the outer harbor of Singapore.

Dorsal 28; anal I-19; the depth is 5.8 the head 4.3, the caudal 6 times in the length; the eye is 3.4 times in the head, the eyes close together, the interorbital width half an eye diameter. The blunt snout is nearly vertical. The canines in the lower jaw are small, those of the upper jaw still smaller. The low dorsal begins above the gill opening and ends before the caudal.

The color in alcohol is brown, with 7 dark brown double cross-bars over the back and down the sides, and extending upon the lower half of the dorsal and anal; behind the eye is a black circular dot; the head is barred with paler below the eye and on its under side; a white line runs from eye to eye; on the caudal base are 2 dark brown spots.

**\**Salarias dussumieri* Cuv. and Val.**

Three specimens, 72 to 115 mm. in length, and 2 juvenile examples, 45 and 54 mm. in length, from Singapore.

Dorsal XIII-20 or 21; anal 22, or I-21 or 22. Males with a well developed crest; the fringed orbital tentacle equals the eye; the fringed nasal tentacle is short; no canines; the dorsal extends upon the caudal.

The first dorsal is horizontally banded or spotted; the first 3 or 4 rays of the second dorsal are horizontally banded, the rest obliquely, or all are obliquely banded alternately light and dark; the anal has a broad black margin, the tips of its rays black; the caudal is spotted or barred posteriorly and above.

**\**Salarias guttatus* Cuv. and Val.**

Two specimens, 40 and 62 mm. in length, from Singapore.

Dorsal XII-17; anal 19; the eye, nape, and nostril each with a small simple tentacle.

On either side of the throat is a dark purplish ring; the sides of the head, the pectoral base, and the lower half of the side are covered with white spots; the sides are sparingly sprinkled with black dots.

ADDITIONS TO THE FISH FAUNA OF MALAYA

BOTHIDÆ

\**Pseudorhombus dupliciocellatus* Regan

Three specimens, 178 to 198 mm. in length, from the east coast of Johore.

SOLEIDÆ

\**Solea heterorhina* Bleeker

Six specimens, 61 to 79 mm. in length, were purchased in the Penang market.

CYNOGLOSSIDÆ

*Cynoglossus borneensis* (Bleeker)

Three specimens, 196 to 229 mm. in length, from the Penang market.

Two lateral lines on the colored and 1 on the blind side; 19 or 20 scales between the lines on the colored side. Dorsal 116-118; anal 88; lateral line scales 108. Previously reported by me from Singapore and the coasts of Selangor and Perak.

\**Cynoglossus monopus* (Bleeker)

Twenty-eight specimens, 93 to 130 mm. in length, from Penang.

*Cynoglossus puncticeps* (Richardson)

Abundant at Penang, where 42 examples, 80 to 141 mm. in length, were secured.

*Cynoglossus sumatranus* (Bleeker)

Five specimens, 70 to 110 mm. in length, from Penang.

BATRACHOIDIDÆ

*Coryzichthys gangene* (Buch. Ham.)

Two specimens from a Singapore reef are 84 and 158 mm. long, and 2 from Kuching, Sarawak, Borneo, are 127 and 138 mm. in length. Previously reported from Malaya but without definite locality.

There are 2 rows of blunt, round-tipped or bluntly conical teeth, almost molariform in shape, on the vomer and palatines.

URANOSCOPIDÆ

\**Ichthyoscopus inermis* (Cuv. and Val.)

A very bulky specimen, 280 mm. long, was taken at Singapore.

MASTACEMBELIDÆ

Elongate, eel-like fishes of uncertain affinities; their appearance is very peculiar, with pointed, attenuate head and elongate snout having an appendage or prolongation at its tip. The dorsal spines are numerous, small, and sharp. When seized the fish wriggles backward, inflicting painful wounds with its

spines. The family is probably of Indian origin, now spread from south China to Malaya and the great islands contiguous, Sumatra, Java, and Borneo and westward to tropical Africa. Genera two. Some of the species reach medium to large size and are common market fish, much esteemed by the natives as food.

Key to the <sup>Malayan</sup> genera of Mastacembelidae

- A.—A concave appendage on the snout tip, with transverse striations on its under side .. .. . *Macrognathus*  
 One species, *Macrognathus aculeatus* from India through Malaya.
- AA.—Appendage on snout slender, pointed, without transverse striations beneath *Mastacembelus*

Key to Malayan species of Mastacembelus

- A.—Snout naked, or only scaled on the sides
- B.—Snout entirely naked no preorbital or preopercular spines .. .. . *M. perakensis*
- BB.—Either a preorbital spine or preopercular spines, or both are present.
- C.—A preorbital spine but no preopercular spines; caudal separated from dorsal and anal by a notch *M. unicolor*
- CC.—Preopercular spines present. Dorsal and anal completely united with caudal.
- D.—A preorbital spine; Dorsal XXXIV to XXXIX—80 to 90; anal III—80 to 90 .. .. . *M. armatus*
- DD.—No preorbital spine; Dorsal XXXII to XXXVII—70 to 80; anal III—70 to 80 .. .. . *M. erythrotaenia*
- AA.—Snout covered with scales—a preorbital spine.
- E.—Two preopercular spines; mouth not extending below nostril .. .. . *M. guentheri*
- EE.—No preopercular spines; mouth extending below nostril .. .. . *M. maculatus*

*Mastacembelus armatus* (Lacepede)

Three specimens, 54 to 76 mm. long, from the Mawai district, Johore, have the dorsal XXXVIII—74; anal III—74; 3 opercular spines and 1 preorbital spine. A specimen 214 mm.

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long, from Pahang, has the dorsal XXXVII-82; anal III-68; 2 opercular spines and 1 preorbital spine. The mouth extends to below the nostril, the maxillary to below the eye.

**Mastacembelus erythrotania** Bleeker

A very large and bulky specimen from Chenderoh Dam, Perak, is 670 mm. long. Two examples from Kuching, Sarawak, Borneo, are 285 and 335 mm. in length.

This species is very easily recognized by the red stripes running back from the head and by the red margins to the vertical fins. The posterior half or two-thirds of the body is likewise handsomely mottled and spotted with black or reticulated with a dark network.

**Mastacembelus guentheri** Day

Two specimens, 47 and 59 mm. long, from the Mandai Road, Singapore, one of 131 mm. from Klang, Selangor, and one of 117 mm. from Patani, Siam.

Dorsal XXVI-58-60-68; anal III-56-58-62. A preorbital spine and 2 preopercular spines, the snout naked. The head is 5.45 times in the length, but in the little specimens is 4.6 times.

**Mastacembelus maculatus** Cuv. and Val.

Five specimens, 63 to 168 mm. in length, from the Mandai Road, Singapore; 2 from a hill stream 5 miles north of Kota Tinggi, Johore, their lengths 61 and 93 mm.; 5 from Pahang, 49 to 153 mm. in length; 1 of 57 mm. from Selangor; and 2 from Sarawak, Borneo, their lengths 99 and 221 mm.

Dorsal XXVII-56; anal III-60; no preopercular spine; head 6.1 in the length. Another specimen had the dorsal XXXVIII-62; anal III-60.

**Mastacembelus perakensis** Herre and Myers

Another example, 156 mm. in length, larger than the type, was collected in the Mawai District of Johore.

Dorsal XXXVII-60; anal II-60. There is no trace of spines, either preorbital or preopercular.

MONACANTHIDÆ

\***Paramonacanthus cryptodon** Bleeker

Two examples, each 88 mm. long, from Singapore.

TETRAODONTIDÆ

**Chonerhinus modestus** Bleeker

Thirteen specimens, 30 to 52 mm. in length, from the Segaliud River, and 2 of 60 and 62 mm. from the Sibugal River, British North Borneo. One of 34 mm. was also taken 16 miles east of Kuching, Sarawak, Borneo.

Dorsal III-20 to 23; anal III-16 or 17.

## A Bibliography of papers on Malayan fresh-water fishes

The following list includes not only papers written solely upon Malayan fresh water fishes, but many others also. An attempt has been made to include all papers describing any fresh water fishes that have thus far been collected in Malaya. This necessitates reference to most of the papers on the fresh water fishes of Sumatra, Banka, Java, Borneo, and also some of those dealing with the fishes of Indo-China, Siam, Burma, and India.

It has been impossible to obtain all of Bleeker's papers containing descriptions of Indo-Malayan fresh water fishes, so that his citations are probably incomplete, while papers by some other authors may have been overlooked. Mere lists of species have not been included. It is believed all papers of importance have been included, so that any fish not described in them may reasonably be called new.

### AHL, ERNEST

1. Einige neue Süßwasserfische des Indo-Malayischen Archipels, Sitzs. Gesells. Natur. Freunde, pp. 30-36, 1922.
2. Über zwei neue Rasbora-Arten des Indo-Malayischen Archipels, Blätter für Aquarien und Terrakunde, Vol. 33, No. 17, pp. 1-2, 1922.
3. *Barbus dunckeri* was described in an article in the Zoologisches Anzeiger, but I have been unable to get hold of the paper or to learn its exact title, 1922.
4. Ichthyologische Mitteilungen, Zool. Anzeiger, Band LVI, May 8, 1923.
5. Ichthyologische Mitteilungen, IV, Eine Revision der *Cyprinden*, Gattung *Esomus*, Mitteil. Zool. Mus. Berlin, Band 11, pp. 38-43, 1923.
6. Übersicht über lebend einge-führten Asiatischen Arten der Gattung *Barbus*, Teil 3, Das Aquarium, October, 1929.

### BEAUFORT, L. F. DE

1. Über eine neue *Rasbora*-art, Das Aquarium, June, 1921.
2. Bull. Raffles Mus. Singapore, No. 8, pp. 31-36, Dec., 1933.

ADDITIONS TO THE FISH FAUNA OF MALAYA

BLEEKER, PIETER

1. Overzicht der Siluroïden welke te Batavia voorkomen, Nat. & Geneesk. Arch. Ned. Ind. Vol. III, pp. 135-184, 1846.
2. Nieuwe bijdr. Siluroïden Java, Verh. Bat. Gen., Vol. XXI, No. I, pp. 1-12, 1847.
3. Bijdrage kennis der ichthy. fauna Midden en Oost Java, Verh. Bat. Gen. XXIII, pp. 1-23, 1850.
4. Bijdrage kennis ichthy. fauna Borneo, Nat. Tijds. Ned. Ind., Vol. I, pp. 1-16, 1851.
5. Nieuwe bijdr. kennis ichthy. fauna Borneo, Nat. Tijdsch. Ned. Ind. I, pp. 259-275, 1851.
6. Derde Bijdr. Ichth. Fauna Borneo, Nat. Tijds. Ned. Ind. II, pp. 57-70, 1851.
7. Vierde Bijdr. Ichth. Fauna Borneo, Nat. Tijds. Ned. Ind. II, pp. 193-208, 1851.
8. Vijfde Bijdr. Ichth. Fauna Borneo, Nat. Tijds. Ned. Ind. II, pp. 415-442, 1851.
9. Bijdr. kennis Ichth. Fauna Blitong, Nat. Tijds. Ned. Ind. III, pp. 87-100, 1852.
10. Nieuwe bijdr. ichthy. fauna Banka, Nat. Tijds. Ned. Ind. III, pp. 715-738, 1852.
11. Diagnost. Beschrijv. nieuwe of weinig bek. vischs. Sumatra. Tiental I-IV, Nat. Tijds. Ned. Ind. III, pp. 569-608, 1852.
12. Diagnost. Beschrijv. nieuwe of weinig bek. vischs. Sumatra. Tiental V-X, Nat. Tijds. Ned. Ind. IV, pp. 243-302, 1853.
13. Nalezingen op de Ichth. Fauna van Banka, Nat. Tijds. Ned. Ind. V, pp. 175-194, 1853.
14. Sevende bijdr. kennis ichthyolog. fauna Borneo, Nat. Tijds. Ned. Ind. V, pp. 427-262, 1853.
15. Nieuwe tientallen diag. beschr. nieuwe . . . vischsoorten van Sumatra, Nat. Tijds. Ned. Ind. V, pp. 495-534, 1853.
16. Overzicht ichthy. fauna Sumatra, Nat. Tijds. Ned. Ind. VII, pp. 49-108, 1854.
17. Ichthy. waernem. gedaan op verschill. reizen in Bantam, Nat. Tijds. Ned. Ind. VII, pp. 309-326, 1854.
18. Achste bijdr. ichthyol. fauna Borneo, Nat. Tijds. Ned. Ind. VIII, pp. 151-168, 1855.
19. Nalezingen op vischf. Sumatra, Nat. Tijds. Ned. Ind. IX, pp. 257-280, 1855.
20. Verslag eenige vischverzam. Oost Java, Nat. Tijds. Ned. Ind. IX, pp. 391-414, 1855.

21. Negende bijdr. kennis ichthy. Borneo, Nat. Tijds. Ned. Ind. IX, pp. 415-430, 1855.
22. Tiende bijdr. Ichthy. fauna Borneo, Act. Soc. Sci. Indo-Neerl. II, pp. 1-21, 1857.
23. Descript. Spec. Piscium Javanensium, Nat. Tijds. Ned. Ind. XIII, pp. 323-368, 1857.
24. Zesde bijdr. vischfauna Sumatra, Act. Soc. Sci. Indo-Neerl. III, pp. 1-50, 1858.
25. De visschen van den Indischen Archipel. Siluri, Act. Soc. Sci. Indo-Neerl. vol. IV, 1858.
26. Negende bijdr. vischfauna Banka, Nat. Tijdsch. Ned. Ind. XVIII, pp. 359-378, 1859.
27. Ordo Cyprini, Karpers, Act. Soc. Sci. Indo-Neerl. VII, pp. 1-492, 1860.
28. Zoetwatervisschen van Singapoera, Nat. Tijds. Ned. Ind. Vol. XXI, p. 334, 1861.
29. Atlas ichthy. Indes Orientales Neerland. IX vols. 1862-1877, Vol. II-III-IV-VII-IX contain descriptions and plates of fresh water fishes.
30. Revision especes insulind. Eleotriiformes, Versl. Akad. Amst. ser. 2, vol. XI, pp. 13-110, 1877.

No doubt a number of the later papers on the fishes of Borneo and Sumatra contain the original descriptions of fresh water fishes also occurring in Malaya, but I have not been able to examine them.

BLOCH, MARC ELIESAR

Ichthyologie. 12 vols. 1785-1797.

BLOCH AND SCHNEIDER

System. Ichthy. 1801.

BLYTH, EDWARD

On some fishes from the Sitang river. Journ. Asiat. Soc. Bengal, vol. 29, pp. 138-174, 1860.

BOULENGER, GEORGE, A.

1. Descriptions of new fresh water fishes from Borneo, Ann. & Mag. Nat. Hist. Ser. 6, vol. VIII, pp. 245-251, March 6, 1894.
2. List of Freshwater Fishes, in Fasciculi Malay., Zool., part 2, p. 303, 1903.
3. A Synopsis of the fishes of the Genus *Mastacembelus*, Journ. Acad. Nat. Sci. Phila. 2nd. series, vol. 15, pp. 197-203, 1912.

CANESTRINI, GIOVANNI

Zur systematik und charakteristik der Anabatinen, Verh. Zool. Bot. Gesell. Wien, vol. 10, pp. 697-712, 1860.



ADDITIONS TO THE FISH FAUNA OF MALAYA

CANTOR, THEODORE

Catalog of Malayan Fishes, Journal Royal Asiat. Soc. Bengal, vol. 18, pp. 983-1042, 1849.

CUVIER AND VALENCIENNES

Histoire naturelle des Poissons, 22 vols., 1828-1849.

DAY, FRANCIS

Fishes of India, 1878-1888.

DUNCKER, GEORG

Die Fische der Malayischen Halbinsel, Mitteil Naturhist. Museum Vol. XXI, pp. 135-207, 1904.

FOWLER, HENRY W.

1. Zoological Results Third De Schauensee Siamese Exped. Part I-Fishes, Proc. Acad. Nat. Sci. Phila. Vol. LXXXVI, pp. 67-163, April 30, 1934.
2. Same, Part V, Additional Fishes, Proc. Acad. Nat. Sci. Phila. Vol. LXXXVI, pp. 335-352, June 25, 1934.
3. Same, Part VI, Fishes obtained in 1934, Proc. Acad. Nat. Sci. Phila. Vol. LXXXVII, pp. 89-163, June 24, 1935.
4. Same, Part VIII, Fishes obtained in 1936, Proc. Acad. Nat. Sci. Phila. Vol. LXXXIX, pp. 125-264, May 19, 1937.

GIANFERRARI, LUISA

Pesci Raccolti . . . . Kuala Muda (Malacca), Atti Soc. Ital. Sci. Nat. Mus. Civ. Milano vol. 49, pp. 149-168, June 1930.

GRAY, J. E.

Illustrations Indian Zoology, vol. I, 1830-32.

GÜNTHER, ALBERT C. L. G.

Cat. Fishes Brit. Mus. 8 vols. 1859-1870.

HAMILTON, FRANCIS BUCHANAN

Fishes of the Ganges, 1822.

HECKEL, J. J.

Ichthyologie in Russegger's Reisen, vol. 1, part 2, 1843.

HERRE, ALBERT W. C. T.

1. Eleven New Fishes Malay Penin., Bull. Raffles Mus. Singapore, No. 12, pp. 5-16, May, 1936.
2. Contrib. Ichthy. Malay Penin. Part I, Marine Fishes, Bull. Raffles Mus. Singapore, No. 13, pp. 5-53, August, 1937.

- HERRE, ALBERT W. C. T. AND MYERS, GEORGE S.  
Contrib. Ichthy. Malay Penin. Part II, Fresh-water  
Fishes, Bull. Raffles Mus. Singapore, No. 13,  
pp. 53-75, Aug., 1937.
- LACEPEDE, B. G. E.  
Histoire Naturelle des poissons, 12 vols. 1798-1803.
- LINNÆUS, CARL  
Systema Naturæ, Ed. X, vol. I, pp. 824, 1758.
- MOHR, ERNA  
1. Die Gattung *Zenarchopterus* Gill, Zool. Jahrb. Band  
52, pp. 231-266, 1926.  
2. Das ♂ von *Zenarchopterus clarus* Mohr, Zoolog.  
Anzeiger, Band LXVIII, 1 page, Sept. 20, 1926.  
3. Hemirhamphiden-Studien IV-VI, Mitt. Zoolog. Mus.  
Berlin, Band 21, pp. 34-64, 1936.
- MYERS, GEORGE S.  
1. The Osteoglossid Fish (*Scleropages formosus*) in  
the Malay Peninsula, Copeia, No. 1, p. 30, April  
12, 1932.  
2. A New Anabantid Fish of the Genus *Betta* from  
Johore, Proc. Biol. Soc. Washington, 48, pp.  
25-26, 1935.
- PALLAS, P. S.  
Spicilegia Zoologica, 2 vols. 1767-1780.
- PERUGIA, ALBERTO  
Di Alcuni Pesci Sumatra, Ann. Mus. Civ. Storia  
Nat. Genova, 2nd. ser., vol. XIII, pp. 241-257,  
May 6, 1893.
- POPTA, C. M. L.  
Notes Leyden Museum, vol. 27, pp. 1-304, 1905.
- REGAN, C. T.  
1. Asiatic Fishes of the family Anabantidæ, Proc. Zool.  
Soc. London, pp. 767-787, 1909.  
2. Description of a new cyprinid fish from Singapore,  
Ann. Mag. Nat. Hist., 8th. Ser., vol. 11, p. 394,  
1913.
- SAUVAGE, HENRY EMILE  
1. Notice sur poiss. l'île Campbell et l'Indo-Chine, Bull.  
Soc. Philomat. Paris, 1880, 7, ser. 4, pp. 228-233,  
1880.  
2. Note sur collect. poiss. a Perak, Bull. Soc. Zool.  
France, vol. 9, pp. 216-220, 1884.

ADDITIONS TO THE FISH FAUNA OF MALAYA

SMEDLEY, NORMAN

An Osteoglossid Fish (*Scleropages formosus*) in the Malay Peninsula, Bull. Raffles Mus., vol. 5, pp. 67-68.

SMITH, HUGH M.

1. Descriptions of new genera and species of Siamese Fishes, Proc. U. S. Nat. Mus., vol. 79, pp. 1-48, 1931.
2. Contrib. Ichthy. Siam, Journ. Siam Soc., Nat. Hist. Suppl., vol. IX, No. 1, pp. 53-87, May 31, 1933.
3. Status of the Oriental Fish Genera *Aplocheilus* and *Panchax* Proc. Biolog. Soc. Washington, vol. 51, pp. 165-166, Aug. 23, 1938.

STEINDACHNER, FRANZ

1. Bericht über eine Sammlung von Fischen aus Singapore, Sitzber, Akad. Wiss. Wien, vol. 60, pp. 557-571, 1870.
2. Ichthyolog. Notizen, X-Sitzungsb. Akad. Wiss. Wien. Abth. 1, vol. 61, pp. 623-642, 1870.

VOLZ, WALTER

1. Fische von Sumatra, Zoolog. Jahrb. vol. 19, pp. 347-419, 1903.
2. Fische von Sumatra, Revue Suisse de Zoologie, vol. 12, pp. 451-493, 1904.

WEBER, MAX AND DE BEAUFORT, L. F.

Fishes Indo-Australian Archip., vols. 1-7 (all published to date) 1911-1936.