Notes on a collection of fresh-water fishes from Penang

By Eric R. Alfred

Singapore National Museum

(Received September, 1962)

INTRODUCTION

A number of publications exist which include records of fresh-water fishes from Penang. However, no single account has as yet been published which deals exclusively with the fresh-water fish fauna of the island. The earliest published records were given by Cantor (1849) who described 12 species. The subsequent publications of Duncker (1904), Regan (1910), Borodin (1932), Herre (1940a & 1940b), and Alfred (1961a) brought the total number of recorded species to 22.

This account deals mainly with a collection of some 1,060 specimens, representing 25 species, that I made, during a field-trip to Penang in October–November, 1961. The various collecting localities are shown in the map on Plate 3. Most of the specimens were taken from the lowland areas, especially, in the rice-fields (Plate 4). The numerous hill-streams (Plate 4) of the north and central part of the island are inhabited by very few species. Typical torrent forms, such as Homalopteridae, Akysidae and Sisoridae, appear to be absent.

A list of the fresh-water fishes now known from Penang, compiled from various sources, is given at the end of this paper.

ACKNOWLEDGEMENTS

I am grateful to the following for assistance in the field and for many personal kindnesses:—Mr. Soong Min Kong, Director of Fisheries, Federation of Malaya; Mr. D. Pathansali and Mr. A. B. O. Merican of the Fisheries Laboratory, Glugor, Penang; and Mr. H. T. Pagden and Mr. Quah Tjeng Kwi. Thanks are also due to Dr. G. S. Myers and Mr. H. H. DeWitt of Stanford University for having kindly re-examined some of the type specimens of *Acrossocheilus hendersoni* (Herre, 1940a) and the specimen of *Tor soro* (Val.) reported by Herre (1940b, p. 30). The details in the accompanying map are reproduced by the permission of the Surveyor General, Federation of Malaya.

SYSTEMATICS

Mystus vittatus (Bloch).

Silurus vittatus Bloch, 1794, Ausland. Fische, vol. 8, p. 50, pl. 371, fig. 2—Tranquebar.
Mystus vittatus Smith, 1945, Bull. U.S. Nat. Mus., no. 188, p. 385, fig. 85; Jayaram, 1954, Rec. Indian Mus., vol. 51, pt. 4, p. 534, fig. 3.
Mystus gulio (not Hamilton) Alfred, 1961a, Bull. Raffles Mus., no. 26, p. 185.

Original from and digitized by National University of Singapore Libraries

Smith (1945) has commented on variation in the dark longitudinal bands and on the size of the adipose fin. In my series (Fig. 1) the dorsum is dark and the ventrum white. There are two dusky bands, one along the lateral line and the second below this extending only as far as opposite the ventral fin. In most of the specimens the lateral line is white. The adipose fin is smaller than the anal.

I now believe that the Cantor specimens which I previously listed as *M. gulio* (Hamilton), should be referred to the present species.

The specimens were taken from rice-field ditches. The species is new to Malaya.

Localities.—Kampong Sungei Kluang (seventeen); Sungei Burong (five).

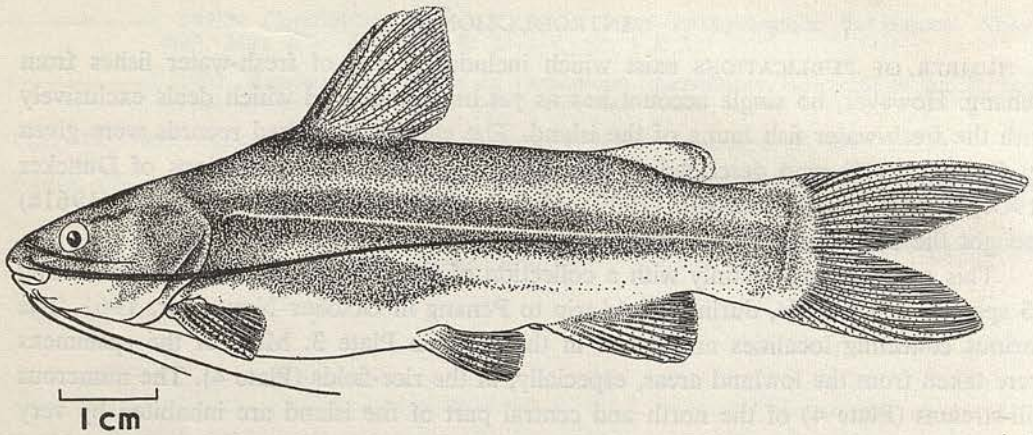


Figure 1. *Mystus vittatus* (Bloch), Kampong Sungei Kluang, 17 October, 1961.

Clarias batrachus (Linnaeus).

Silurus Batrachus Linnaeus, 1758, Systema Naturae, p. 305—Asia, Africa.
Clarias batrachus Weber and de Beaufort, 1913, Fishes Indo-Aust. Archipel., vol. 2, p. 190, fig. 74.

Specimens were taken from rice-field ditches, irrigation canals and forest streams. The species is previously reported from Penang by Cantor (1849, p. 1245) as *C. punctatus*.

Localities.—Kampong Sungei Nibong (seven); Kampong Sungei Kluang (four); Bayan Lepas (ten); Sungei Telok Bahang (one); 1 mile south-west of Batu Maung (six).

Lepidocephalus furcatus de Beaufort.

Lepidocephalus furcatus de Beaufort, 1933, Bull. Raffles Mus., no. 8, p. 32—Bukit Merah Reservoir, Perak, Malay Peninsula.
Lepidocephalus furcatus Hora, 1941, Bull. Raffles Mus., no. 17, p. 54, fig. 5.

The species is previously known from only six specimens (the types), collected from the Bukit Merah Reservoir on 18th July, 1925 and its rediscovery after more than 35 years is of particular interest.

The present collection was made from a weedy, fast-flowing, lowland stream.

Localities.—Kampong Trang (twenty-two).

Original from and digitized by National University of Singapore Libraries

Danio tweediei Brittan.

Danio (Brachydanio) tweediei Brittan, 1956, Bull. Raffles Mus., no. 27, p. 41, pl. 3—Sungei Patani, Kedah, Malaya.

The larger of the two series that I collected was taken together with *Lebistes* from polluted ditches close to human habitation.

Herre's record (1940b, p. 29) of the single specimen of *Brachydanio albolineata* (Blyth) from the Botanic Garden, Penang, could probably refer to the present species.

Localities.—Roadside ditches between Kampong Perlis and Kongsi Sepuloh (sixty-five); 1 mile south-west of Batu Maung (twenty-three).

Danio regina Fowler.

Danio regina Fowler, 1934, Proc. Acad. Nat. Sci. Philadelphia, vol. 86, p. 342, fig. 6—Nakon Sritamarat, peninsular Siam.

The present collection lends further support to Tweedie's claim (1952, p. 78) that the species is confined to the north-western part of Malaya. The species is also herein reported for the first time from Penang. Specimens were taken from a fast-flowing forest stream.

Localities.—Sungei Telok Bahang (two).

Rasbora sumatrana (Bleeker).

Leuciscus sumatranus Bleeker, 1852, Nat. Tijd. Ned. Indie, vol. 3, p. 601—Solok, Sumatra.
Rasbora sumatrana Brittan, 1954, Monogr. Inst. Sci. Tech. Manila, no. 3, p. 54.

The species abounds in the lowland streams and also occurs at the foothills. It is absent from the rice-field areas.

Specimens have been previously reported from Penang by Cantor (1849, p. 1250) as *Leuciscus rasbora* and by Brittan (1954, p. 54). The record of *R. daniconius* (Hamilton) given by Borodin (1932, p. 72) from Georgetown, very likely refers to the present species.

Localities.—Bayan Lepas (forty-seven); Sungei Telok Bahang (one); 1 mile south-west of Batu Maung (ten); Kampong Trang (sixteen); Bagan Ayer Itam (thirty-eight); Balik Pulau (one); Sungei Burong (fourteen).

Puntius binotatus (Valenciennes).

Barbus binotatus Valenciennes, in: Cuvier and Valenciennes, 1842, Hist. Nat. Poissons, vol. 16, p. 168—Java.
Puntius binotatus Weber and de Beaufort, 1916, Fishes Indo-Aust. Archipel., vol. 3, p. 186, fig. 74.

This is another common species of the lowland streams but unlike *R. sumatrana* it does not occur at the foothills. It is also absent from the rice-field areas. The species is herein reported for the first time from Penang.

Original from and digitized by National University of Singapore Libraries

Localities.—Bayan Lepas (nine); Sungei Telok Bahang (six); Kampong Sungei Pinang (three); 1 mile south-west of Batu Maung (ten); Kampong Trang (twenty-four); Balik Pulau (eleven); Georgetown (twenty-two); Sungei Dondang, Ayer Itam (twenty); Sungei Burong (eight).

Acrossocheilus hendersoni (Herre).

Lissochilus hendersoni Herre, 1940a, Bull. Raffles Mus., no. 16, p. 10, pl. 4—Creek on Penang Island.

In their keys to the genera of Cyprininae, Weber & de Beaufort (1916, p. 92) and Smith (1945, p. 117) have separated *Acrossocheilus,* among other genera, on the basis of an interrupted postlabial goove. In my present series of 48 specimens, this characteristic is not consistent and I have some doubts about the true generic identity of this species. Thus, some of my specimens with an uninterrupted posterior groove, would key down in Smith (l.c.) to the Genus *Tor* Gray. The pectoral rays are 15–16 and not 1.13 as originally described. Mr. DeWitt who examined 5 paratypes confirmed this.

While *P. binotatus* and *R. sumatrana* are the common Cyprinids of the lowland streams, this species is characteristic at the foothills and in the torrent streams.

The nomenclature of *Lissochilus* and *Acrossocheilus* has been discussed by Myers (1941, p. 42).

Localities.—Sungei Batu Feringgi, catchment area (fifteen); Sungei Telok Bahang (fifteen); Sungei Balik Pulau (seven); Kampong Sungei Pinang (eleven).

Channa striata (Bloch).

Ophicephalus striatus Bloch, 1793, Ausland. Fische, vol. 7, p. 141, pl. 359—Malabar.

Specimens were taken from rice-fields and rice-field ditches. An adult with a brood of conspicuous, bright-orange coloured young were observed in the field on 17th October. Of these, 3 young specimens measuring 27.1–37.5 mm. total length, were collected. Cantor (1849, p. 1074), has previously recorded the species from Penang.

Localities.—Kampong Sungei Nibong (three); Kampong Sungei Kluang (one); Bayan Lepas (three); Kampong Trang (two).

Anabas testudineus (Bloch).

Anthias testudineus Bloch, 1792, Ausland. Fische, vol. 6, p. 121, pl. 322—Japan.
Anabas testudineus Weber and de Beaufort, 1922, Fishes Indo-Aust. Archipel., vol. 4, p. 334, fig. 86.

The species occurs in rice-fields, ponds and lowland streams but it does not appear to be anywhere common. Specimens have been previously reported from Penang by Cantor (1849, p. 1064), and Borodin (1932, p. 76).

Localities.—Kampong Sungei Kluang (two); Bayan Lepas (eight); Kampong Trang (two).

Original from and digitized by National University of Singapore Libraries

Betta splendens Regan.

Betta splendens Regan, 1910, Proc. Zool. Soc. Lond., 1909, p. 782—Bangkok, Menam River, Siam and Pinang, Malay Peninsula.

I am able to confirm Tweedie's observation (1952, pp. 72–73) on the distinct habitat preferences of the two species of *Betta* in Penang. The present species is restricted to the rice-fields and rice-field ditches (Plate 4). It is still much sought after for its fighting prowess.

Localities.—Kampong Sungei Kluang (two); Kampong Sungei Nibong (fifteen); Kampong Trang (two).

Betta pugnax (Cantor).

Macropodus pugnax Cantor, 1849, Journ. Asia Soc. Bengal, vol. 18, pt. 2, p. 1066, pl. 2, figs. 1–3—Fresh water, Pinang, Malayan Peninsular.

Betta pugnax Gunther, 1861, Cat. Fish. British Mus., vol. 3, p. 389; Regan, 1910, Proc. Zool. Soc. Lond., 1909, p. 779; (in part) Tweedie, Bull. Raffles Mus., no. 24, p. 73; Alfred, 1961a, Bull. Raffles Mus., no. 26, p. 183.

Betta pictum (in part, not Valenciennes) Bleeker, 1879, Verh. Akad. Amsterdam, vol. 19, p. 26.

The following description has been drawn up from the 3 syntypes in the British Museum (Alfred, 1961a, p. 183), the 7 topotypes listed by Tweedie (1952, p. 74), and the 65 other topotypes listed below. The type specimen No. 1860.3.19.930 is herein designated as the lectotype and the other two No. 1860.3.19..317–318, as paratypes.

Total length 25.4–89.2 mm. Standard length 17.5–61.1 mm. Depth at origin of anal fin 3.4–4.1. Head 2.8–3.2. Eye 2.7–4.1. Snout 3.0–3.5. Interorbital width 2.5–3.0. Predorsal length 1.5–1.6. Dorsal rays (last 2 rays counted separately) I.7–I.9. First 2 soft rays of dorsal fin articulated but always unbranched; other soft rays unbranched in juvenile specimens and branched in adults. Origin of dorsal opposite 15th–16th scale of mid-lateral scale row. Anal rays (last 2 counted separately) II.24–II.27. All soft rays of anal fin articulated and unbranched. Pectorals 13–14. Ventrals I.5. First soft ray of ventral fin articulated, unbranched and filamentous; other 4 rays branched. Mid-lateral scales, counted from upper corner of opercle to hypural, 28–30, excluding 2–4 on caudal base. Transverse scale rows between dorsal origin and base of anal 10–12, excluding 1–2 scale rows forming a sheath along the base of the anal rays. Predorsals 25–29. Maxillary not reaching behind front margin of orbit.

In small and almost full-sized specimens preserved in formalin (Fig. 2a), the dorsum is brown and the sides and undersurface light-brown. Generally there is a dark-brown stripe delineating the edge of the brown of the dorsum, running from the eye to the caudal base. This stripe may be quite pronounced or entirely absent. Laterally, there is a second stripe running from the snout, through the eye, to the caudal base. This is generally joined posteriorly with a third stripe running from the base of the pectoral fin. Behind the confluence of the two stripes is a dark brown spot on the caudal base.

Original from and digitized by National University of Singapore Libraries

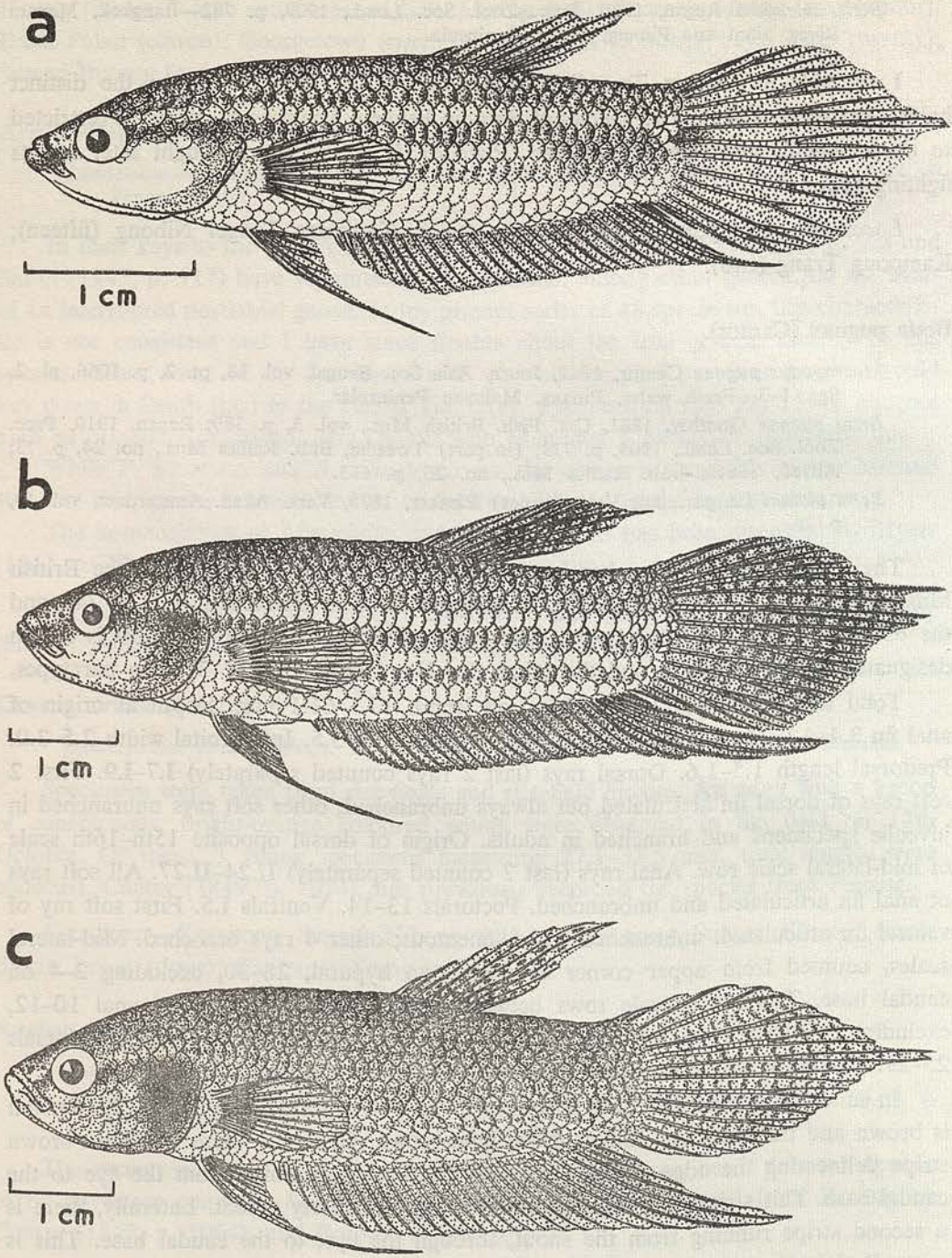


Figure 2. *Betta pugnax* (Cantor), colour patterns in (a) juvenile and (b) & (c) adult. Sungei Batu Feringgi, Catchment area, 18 October, 1961.

Original from and digitized by National University of Singapore Libraries

In the largest preserved specimens the pattern of markings is highly variable. Most have two lateral stripes (Fig. 2b). In some the space between the two stripes is completely filled with dark-brown so that there is a single broad band. In others, these markings are absent and each lateral scale has a dark spot giving an impression of many lateral stripes (Fig. 2c). There are also specimens which show intermediate markings between the broad band and two stripes and between the pattern of two stripes and many stripes. A few specimens appear to be devoid of body markings. Observations on individual live specimens show that they change freely from one pattern of markings to another in the following sequence:— broad band <———> two stripes <———> many stripes. The dorsal and anal fins are marked with dark-brown spots and lunules. The pectoral fins have a black transverse stripe near the base. None of the largest specimens show the dark spot on the caudal base.

In life, the colouration is as described except that the body has an olive-green tinge which is brightest in the largest specimens. The anal fin is reddish.

Besides *A. hendersoni,* this is apparently the only other fish that is common in the hill-streams (Plate 4). Unlike the former however, it does not enter the torrents but occurs in pools and slow-flowing stretches, especially under the overhang of the banks.

Localities.—Sungei Batu Feringgi, catchment area, (twenty-one); Bayan Lepas (twelve); Sungei Telok Bahang (twelve); Kampong Trang (eight); 1 mile north-east of Bulik Pulau (one); Sungei Dondang, Ayer Itam (eleven).

Trichopsis vittatus (Cuvier).

Osphromenus vittatus Cuvier, in: Cuvier and Valenciennes, 1831, Hist. Nat. Poissons, vol. 7, p. 387—Java.
Ctenops vittatus Weber and de Beaufort, 1922, Fishes Indo-Aust. Archipel., vol. 4, p. 351.
Trichopsis vittatus Herre and Myers, 1937, Bull. Raffles Mus., no. 13, p. 72.

The species occurs in fast-flowing ditches, usually among weeds. It has not been previously reported from Penang.

Localities.—Kampong Sungei Kluang (twenty-eight); Sungei Bayan Lepas (thirty); Kampong Trang (sixteen).

Trichogaster pectoralis (Regan).

Trichopodus pectoralis Regan, 1910, Proc. Zool. Soc. Lond., 1909, p. 784, pl. 79, fig. 1—Siam and Singapore.
Trichogaster pectoralis Smith, 1945, Bull. U.S. Nat. Mus., no. 188, p. 464.

Although this fish is common in the rice-fields and rice-field ditches and in ponds, it has not been previously recorded from Penang. The date of introduction is not known. It is much sought for as a food fish.

Localities.—Kampong Relau (four); Kampong Sungei Kluang (thirteen); Bayan Lepas (eight); Kampong Trang (three); Sungei Burong (five).

Trichogaster trichopterus (Pallas).

Labrus trichopterus Pallas, 1770, Spic. Zool., pt. 8, p. 45—East Indies.
Trichopodus trichopterus Weber and de Beaufort, 1922, Fishes Indo-Aust. Archipel., vol. 4, p. 366, fig. 93.
Trichogaster trichopterus Smith, 1945, Bull. U.S. Nat. Mus., no. 188, p. 463, fig. 98.

This is the most common species of the rice-field areas. It is also collected as a food fish. Cantor (1849, p. 1071, pl. 2, fig. 5), has previously reported specimens from Penang.

Original from and digitized by National University of Singapore Libraries

Localities.—Kampong Sungei Nibong (six); Kampong Relau (five); Kampong Sungei Kluang (twelve); Bayan Lepas (ten); Kampong Trang (seven); Sungei Burong (five).

Hemiramphodon pogonognathus (Bleeker).

Hemiramphus pogonognathus Bleeker, 1853, Nat Tijd. Ned. Indie, vol. 5, p. 193—Marawang Banka.
Hemiramphodon pogonognathus Mohr, 1936, Mitt. Zool. Mus. Berlin, vol. 21, pp. 59–63, figs. 12–14.

Specimens were collected from only a single locality, a fast-flowing forest stream. The species has not been previously reported from Penang.

Localities.—Sungei Telok Bahang (thirteen).

Dermogenys pusillus Kuhl and van Hasselt.

Dermogenys pusillus Kuhl and van Hasselt, in: van Hasselt, 1823, Algem. Konst. Letter-Bode, 1823, pt. 2, p. 131—Java.
Dermogenys pusillus Mohr, 1936, Mitt. Zool. Mus. Berlin, vol. 21, pp. 39–50, figs. 4–7.

Specimens were taken from fresh water in the rice-field areas and from brackish, tidal streams. The species is not previously reported from Penang.

Different authors have accredited the original description of the species and the genus to either both Kuhl and van Hasselt or to van Hasselt alone. My transalation (1961b, p. 85) of the original description makes it clear that they were both responsible for the diagnosis.

Localities.—Kampong Sungei Burong (ten); Bagan Ayer Itam (seven); Sungei Burong (six).

Oryzias javanicus (Bleeker).

Aplocheilus javanicus Bleeker, 1854, Nat. Tijd. Ned. Indie, vol. 7, p. 323—Perdana, Penimbang River, Java.
Aplocheilus javanicus Weber and de Beaufort, 1922, Fishes Indo-Aust. Archipel., vol. 4, p. 372.

Specimens were taken from fresh as well as from brackish water. The species has been previously reported from Penang by Alfred (1961a, p. 185).

Localities.—Batu Maung (twenty-two); Bagan Ayer Itam (fourteen); Sungei Burong (twenty).

Aplocheilus panchax (Hamilton).

Esox panchax Hamilton, 1822, Fishes of Ganges, pp. 211 and 350, pl. 3, fig. 69—Bengal.
Panchax panchax Weber and de Beaufort, 1922, Fishes Indo-Aust. Archipel., vol. 4, p. 374, figs. 96 and 97.
Aplocheilus panchax Smith, 1945, Bull. U.S. Nat. Mus., no. 188, p. 422, fig. 94.

This fish is characteristic of the rice-field ditches and the irrigation canals. Cantor (1849, p. 1234), has previously reported it from Penang.

Localities.—Kampong Sungei Nibong (forty-one); Kampong Sungei Kluang (eighteen); Bayan Lepas (five); 1 mile south-west of Batu Maung (six); Kampong Sungei Burong (nineteen); Kampong Trang (four); Bagan Ayer Itam (three); Sungei Burong (thirteen).

Lebistes reticulatus (Peters).

Poecilia reticulata Peters, 1859, Monatsb. Akad. Berlin, 1859, p. 412—Guiara River, Caracas.
Lebistes reticulatus Regan, 1913, Proc. Zool. Soc. London, 1913, p. 1008, fig. 173D.

Original from and digitized by National University of Singapore Libraries

The Guppy appears to thrive best in turbid and polluted waters which are undoubtedly highly toxic to other species. It occurs in vast numbers in the drains, canals and streams in the heart of Georgetown. The species has not been previously reported from Penang. I have not been able to ascertain when it was introduced.

Localities.—Bayan Lepas (forty-six); Roadside ditches between Kampong Perlis and Kongsi Sepuloh (twelve); Sungei Dondang, Ayer Itam (twenty-nine); Georgetown (forty-nine).

Mastacembelus maculatus Cuvier.

Mastacembelus maculatus Cuvier, in: Cuvier and Valenciennes, 1831, Hist. Nat. Poissons, vol. 8, p. 461—Moluccas.
Mastacembelus maculatus Sufi, 1956, Bull. Raffles Mus., no. 27, p. 113, pl. 20, fig. 15, pl. 21, fig. 16.

The markings on my largest specimen (total length 142 mm.), agrees well with Sufi's figure (1956, pl. 21, fig. 16). In my two smaller specimens (total length 55 mm. and 61 mm.) there are five dark brown, irregular, longitudinal stripes on each side, anastamosing posteriorly and forming rows of white spots from approximately behind the anus (Fig. 3).

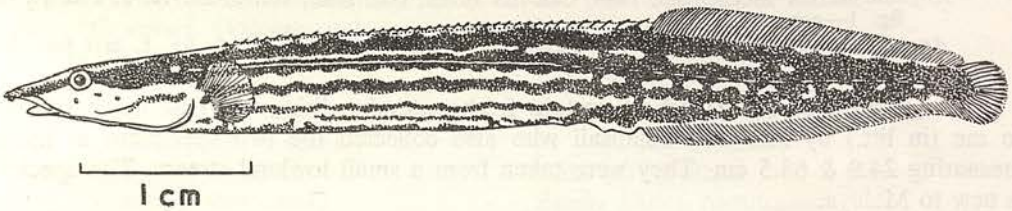


Figure 3. *Mastacembelus maculatus* Cuvier, juvenile. Sungei Balik Pulau, 30 October, 1961.

Specimens were taken from a leaf bed in a forest stream and from among rocks in a riffle. The species is new to Penang.

Localities.—Sungei Telok Bahang (one); Sungei Balik Pulau (two).

Glossogobius giurus (Hamilton).

Gobius giurus Hamilton, 1822, Fishes of Ganges, p. 51, pl. 33, fig. 15—Gangetic provinces.
Glossogobius giurus Koumans, in: Weber and de Beaufort, 1953, Fishes Indo-Aust. Archipel., vol. 10, p. 165.

This fish occurs in the turbid waters of rice-field ditches and irrigation canals. Koumans (1953), has given Cantor's *Gobius kokius* (1849, p. 1162) as a synonym of the present species.

Localities.—Kampong Sungei Kluang (seven); Sungei Burong (one).

Stigmatogobius isognathus Bleeker.

Stigmatogobius isognathus Bleeker, 1878, Versl. Akad. Amsterdam, vol. 12, p. 203—Singapore.
Stigmatogobius isognathus Koumans, in: Weber and de Beaufort, 1953, Fishes Indo-Aust. Archipel., vol. 10, p. 115.

Besides *G. giurus*, this is apparently the only other gobioid fish which occurs far enough inland to merit inclusion as a fresh-water form. The species is new to Penang.

Original from and digitized by National University of Singapore Libraries

Of particular interest was the fact that the specimens were taken in a rock-strewn riffle, in a habitat very similar to that where I have usually collected torrent-adapted forms such as Akysids and Homalopterids from elsewhere in Malaya. In Penang, the species apparently occupies an ecological position which is defined by Myers (1949) as "complementary".

Localities.—Sungei Telok Bahang (seven).

Tilapia mossambica Peters.

Chromis (Tilapia) mossambicus Peters, 1852, Monatsb. Akad. Berlin, 1852, p. 681—Tette, Sena, Quellimane, Lumbo, Inhambe and Querimba, Mossambique.

Tilapia mossambica Boulenger, 1915, Cat. Fresh-Water Fishes Africa, vol. 3, p. 154, fig. 101.

From the records available in the Fisheries Laboratory, Penang, it appears that the first introduction of the species was made into fish-ponds at Bayan Lepas in December 1949. It has since then been introduced into other localities. It has not been previously reported from Penang.

Localities.—Sungei Telok Bahang (four).

Anguilla bicolor bicolor McClelland.

Anguilla bicolor McClelland, 1844, Calcutta Journ. Nat. Hist., vol. 5, no. 18, p. 178, pl. 6, fig. 1—not seen.

Anguilla bicolor bicolor Ege, 1939, Dana Rep., no. 16, p. 151, pl. 2, fig. 8, text figs. 35 and 39.

The occurrence of the fish in certain fresh-water localities was first made known to me (in litt.) by Mr. D. Pathansali who also collected the two specimens in hand measuring 24.9 & 68.5 cm. They were taken from a small lowland stream. The species is new to Malaya.

Localities.—1 mile south-west of Batu Maung (two).

CHECKLIST

The species which are not represented in the present collection are indicated with an asterisk. Of these, the following 4 species require verification as I have not been able to re-examine the material on which the published records are given:—*Channa orientalis* (Bloch & Schneider), *C. punctata* (Bloch), *Cyclocheilichthys apogon* (Valenciennes) and *Mastacembelus erythrotaenia* (Bleeker). The previous records of *Betta picta* (Valenciennes), *Brachydanio albolineata* (Blyth), *Mystus gulio* (Hamilton) and *Rasbora daniconius* (Hamilton) are omitted from the list since they are now considered as synonyms or probable synonyms of other species represented in my collection.

Order (A) LABYRINTHICI
Family (I) ANABANTIDAE
Genus (1) *Anabas* Cuvier, 1817
1. *A. testudineus* (Bloch)
Genus (2) *Betta* Bleeker, 1850
2. *B. pugnax* (Cantor)
3. *B. splendens* Regan
Genus (3) *Osphronemus* Lacepede, 1802
4. **O. goramy* Lacepede
Genus (4) *Trichogaster* Bloch, 1801
5. **T. leeri* (Bleeker)
6. *T. pectoralis* (Regan)
21. *M. vittatus* Bloch
Family (VI) CLARIIDAE
Genus (16) *Clarias* Scopoli, 1777
22. *C. batrachus* (Linnaeus)
Order (D) PERCOMORPHI
Family (VII) CICHLIDAE
Genus (17) *Tilapia* A. Smith, 1840
23. *T. mossambica* Peters
Order (E) GOBIOIDEA
Family (VIII) GOBIIDAE
Genus (18) *Glossogobius* Gill, 1859
24. *G. giurus* (Hamilton)

Original from and digitized by National University of Singapore Libraries

7. *T. trichopterus* (Pallas)
Genus (5) *Trichopsis* Kner, 1860
8. *T. vittatus* Cuvier
Family (II) CHANNIDAE
Genus (6) *Channa* Scopoli, 1777
9. **C. orientalis* Bloch & Schneider
10. **C. punctata* (Bloch)
11. *C. striata* (Bloch)
Order (B) EVANTOGNATHI
Family (III) COBITIDAE
Genus (7) *Lepidocephalus* Bleeker, 1858–59
12. *L. furcatus* de Beaufort
Family (IV) CYPRINIDAE
Genus (8) *Danio* Hamilton, 1822
13. *D. tweediei* Brittan
14. *D. regina* Fowler
Genus (9) *Rasbora* Bleeker, 1859–60
15. *R. sumatrana* (Bleeker)
Genus (10) *Acrossocheilus* Oshima, 1919
16. *A. hendersoni* (Herre)
Genus (11) *Cyclocheilichthys* Bleeker, 1859–60
17. **C. apogon* (Valenciennes)
Genus (12) *Hampala* Bleeker, 1859–60
18. **H. macrolepidota* (Valenciennes)
Genus (13) *Puntius* Hamilton, 1822
19. *P. binotatus* (Valenciennes)
Genus (14) *Tor* Gray, 1833
20. **T. soro* (Valenciennes)
Order (C) NEMATOGNATHI
Family (V) BAGRIDAE
Genus (15) *Mystus* Scopoli, 1777
Genus (19) *Stigmatogobius* Bleeker, 1874
25. *S. isognathus* Bleeker
Order (F) CYPRINODONTES
Family (IX) CYPRINODONTIDAE
Genus (20) *Aplocheilus* McClelland, 1839
26. *A. panchax* (Hamilton)
Genus (21) *Oryzias* Jordan & Snyder, 1906
27. *O. javanicus* Bleeker
Family (X) POECILLIDAE
Genus (22) *Lebistes* de Fillipi, 1862
28. *L. reticulatus* Peters
Order (G) SYNENTOGNATHI
Family (XI) HEMIRAMPHIDAE
Genus (23) *Dermogenys* Kuhl & v. Hasselt, 1823
29. *D. pusillus* Kuhl & v. Hasselt
Genus (24) *Hemiramphodon* Bleeker, 1866
30. *H. pogonognathus* (Bleeker)
Order (H) OPISTHOMI
Family (XII) MASTACEMBELIDAE
Genus (25) *Mastacembelus* Scopoli, 1777
31. **M. erythrotaenia* Bleeker
32. *M. maculatus* Cuvier
Order (I) SYNBRANCHIA
Family (XIII) FLUTIDAE
Genus (26) *Fluta* Bloch & Schneider, 1801
33. **F. alba* (Zuiew)
Order (J) APODES
Family (XIV) ANGUILLIDAE
Genus (27) *Anguilla* Shaw, 1803
34. *A. bicolor bicolor* McClelland

REFERENCES

ALFRED, E. R., 1961a. The Cantor Collection of Malayan fresh-water fishes. *Bull. Raffles Mus.*, **26:** 183–186.

————, 1961b. The Javanese Fishes described by Kuhl and van Hasselt. *Bull. Singapore Nat. Mus.*, **30:** 80–88, pls. 3–8.

BEAUFORT, L. F. DE, 1933. On some New or Rare Species of Ostariophysi from the Malay Peninsula and a New Species of *Betta* from Borneo. *Bull. Raffles Mus.*, **8:** 31–36.

BLEEKER, P., 1851. Visschen van Straat Malakka, Prince of Wales Island en Singapore. *Nat. Tijdschr. Ned. Indie*, 1850, **1:** 480–481.

————, 1859. Enumeratio specierum piscium hucusque in Archipelago Indico observatarum. *Act. Soc. Sc. Indo-Neerl.*, **6:** xxxvi, 276 pp.

————, 1879. Memoire sur les Poissons a Pharyngiens labyrinthiformes de l'Indie archipelagique. *Verh. Akad. Amsterdam*, **19:** 1–56.

BORODIN, N. A., 1932. Scientific results of the Yacht "Alva" World Cruise, July, 1931 to March, 1932 in Command of William K. Vanderbilt. *Bull. Vanderbilt Mar. Mus.*, **1** (3): 65–101, pls. 1 & 2.

BOULENGER, G. A., 1915. *Catalogue of the Fresh-Water Fishes of Africa in the British Museum*, **3:** xii, 526 pp., 351 figs. London: Taylor & Francis.

BRITTAN, M. R., 1954. A revision of the Indo-Malayan fresh-water fish genus *Rasbora*. *Monogr. Inst. Sci. Tech. Manila*, **3:** 224 pp., 52 figs., 3 maps.

————, 1956. A New Species of the Fish Genus *Danio* (Cyprinidae) from Kedah, Malaya. *Bull. Raffles Mus.*, **27:** 41–44, pl. 3.

Original from and digitized by National University of Singapore Libraries

CANTOR, T., 1849. Catalogue of Malayan Fishes. *Journ. Asia Soc. Bengal.*, **18** (2): i–xii, 983–1426, pls. 1–14.

DUNCKER, G., 1904. Die Fische der malayischen Halbinsel. *Mitt. Naturh. Mus. Hamburg*, 1903, **21:** 133–207, 1 map, 1 fig., pls. 1 & 2.

EGE, V., 1939. A revision of the genus *Anguilla* Shaw. *Dana Report*, **16:** 256 pp., 53 figs., 6 pls.

FOWLER, H. W., 1934. Zoological Results of the Third De Schauensee Siamese Expedition, Part V. Additional Fishes. *Proc. Acad. Nat. Sci. Philadelphia*, **86:** 335–352, figs. 1–13.

————, 1938. A List of the Fishes known from Malaya. *Fish. Bull.*, **1:** 268, lvi pp.

HERRE, A. W. C. T., 1940a. New species of fishes from the Malay Peninsula and Borneo. *Bull. Raffles Mus.*, **16:** 5–26, pls. 1–20.

————, 1940b. Additions to the fish fauna of Malaya and notes on rare or little known Malayan and Bornean fishes. *Op. cit.*, **16:** 27–61.

————, and MYERS, G. S., 1937. A Contribution to the Ichthyology of the Malay Peninsula. Part II. Fresh-water Fishes. *Op. cit.*, **13:** 53–74, pls. 5–7.

HORA, S. L., 1941. Notes on Malayan fishes in the Collection of the Raffles Museum, Singapore. Parts 2 and 3. *Op. cit.*, **17:** 44–64, pls. 5 & 6.

JAYARAM, K. C., 1954. Siluroid fishes of India, Burma and Ceylon. XIV.—Fishes of the Genus *Mystus* Scopoli. *Rec. Indian Mus.*, **51** (4): 527–558, figs. 1–11, pl. 19.

MOHR, E., 1936. Hemiramphiden Studien IV.–VI. *Mitt. Zool. Mus. Berlin*, **21** (1): 34–64, figs. 1–14.

MYERS, G. S., 1941. Suppression of *Lissochilus* in favor of *Acrossocheilus* for a genus of Asiatic cyprinid fishes, with notes on its classification. *Copeia*, **1941** (1): 42–44.

————, 1949. Salt-tolerance of fresh-water fish groups in relation to zoogeographical problems. *Bijdr. tot de Dierk.*, **28:** 315–322.

————, and SHAPOVALOV, L., 1931. On the identity of *Ophicephalus* and *Channa*, two genera of labyrinth fishes. *Peking Nat. Hist. Bull.*, **6:** 33–37.

REGAN, C. T., 1910. The Asiatic fishes of the family Anabantidae. *Proc. Zool. Soc. London*, **1909:** 767–787, pls. 77–79.

————, 1913. A Revision of the Cyprinodont Fishes of the Sub-family Poecilinae. *Op. cit.*, **1913:** 977–1018, figs. 168–173, pls. 99–101.

SMITH, H. M., 1938. Status of the Oriental fish genera *Aplocheilus* and *Panchax*. *Proc. Biol. Soc. Washington*, **51:** 165–166.

————, 1945. The fresh-water fishes of Siam, or Thailand. *Bull. U.S. Nat. Mus.*, **188:** xi, 622 pp., 107 figs., 9 pls.

SUFI, S. M. K., 1956. Revision of the Oriental fishes of the Family Mastacembelidae. *Bull. Raffles Mus.*, **27:** 93–146, pls. 13–26.

TWEEDIE, M. W. F., 1952. Notes on Malayan fresh-water fishes. No. 3–5. *Op. cit.*, **24:** 63–95, figs. 1–4.

WEBER, M. and BEAUFORT, L. F. DE, 1913. *The Fishes of the Indo-Australian Archipelago*, **2:** xx, 404 pp., 151 figs. Leiden: Brill.

————, and ————, 1916. *Op. cit.*, **3:** xv, 455 pp., 214 figs. Leiden: Brill.

————, and ————, 1922. *Op. cit.*, **4:** xiii, 410 pp., 103 figs. Leiden: Brill.

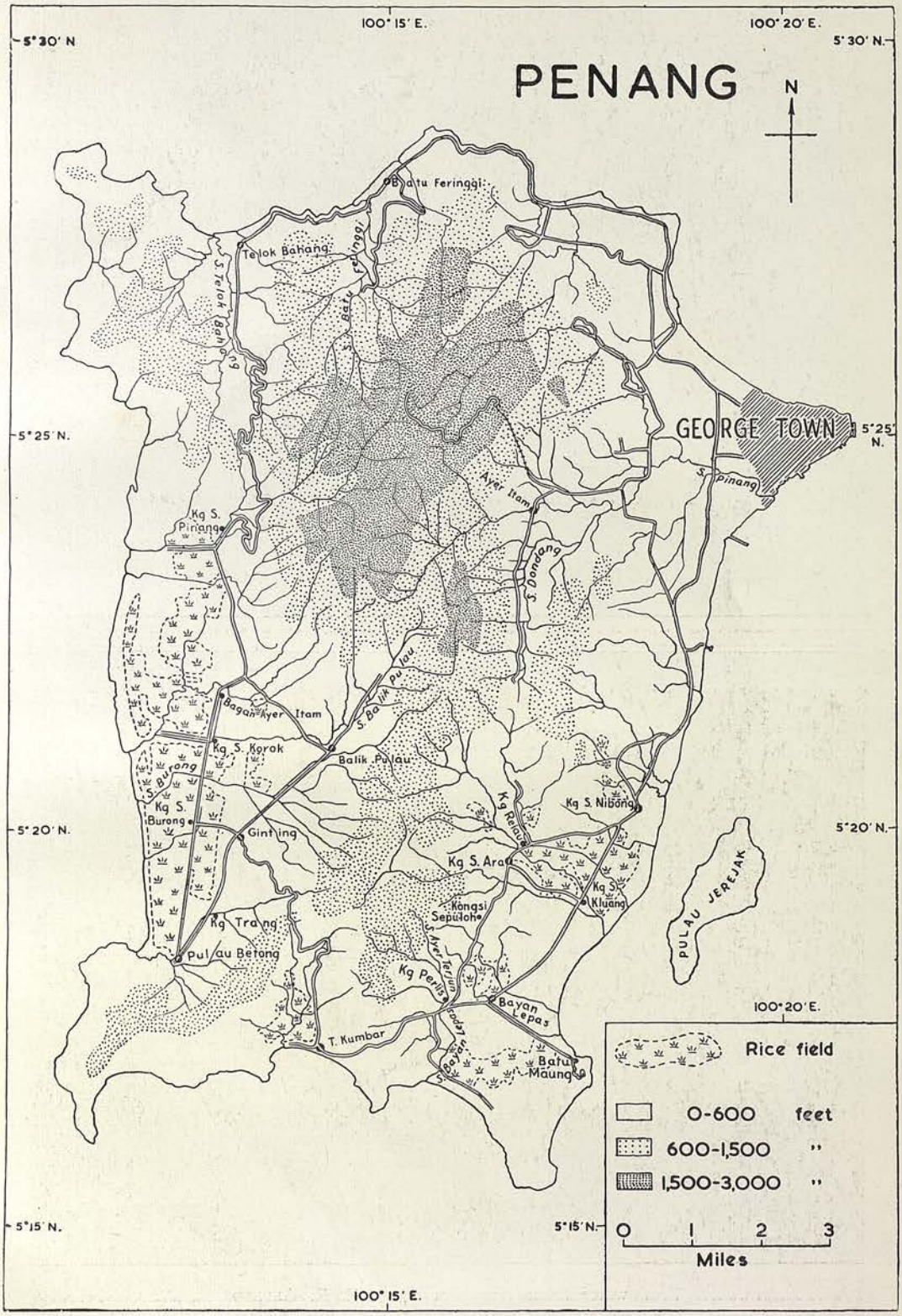
————, and ————, 1953. *Op. cit.*, **10:** xiii, 423 pp., 95 figs. Leiden: Brill.

EXPLANATION OF PLATES

PLATE 3. Map of the Island of Penang, with localities where fresh-water fishes were collected.

PLATE 4. *Above:* Rice-fields and a rice-field ditch near Kampong Sungei Kluang. *Below:* A hill-stream in the upper reaches of the Sungei Batu Feringgi.

Original from and digitized by National University of Singapore Libraries



Fresh-water fishes from Penang E. R. ALFRED

Original from and digitized by National University of Singapore Libraries





Fresh-water fishes from Penang E. R. ALFRED

Original from and digitized by National University of Singapore Libraries