

Notes on Malayan fishes in the Collection of the Raffles Museum, Singapore. Parts 2 and 3.

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2. Loaches of the family Cobitidae

The following 11 species of the Cobitidae have so far been known to occur in the fauna of the Malay Peninsula:—

1. *Acanthopthalmus kuhli* (Cuv. & Val.).
2. *Acanthopthalmus muraeniformis* de Beaufort.
3. *Acanthopthalmus perakensis* (Herre).
4. *Acanthopthalmus pahangensis* de Beaufort.
5. *Acanthopthalmus semicinctus* Fraser-Brunner.
6. *Acanthopsis choirorhynchus* (Bleeker).
7. *Botia hymenophysa* (Bleeker).
8. *Lepidocephalus furcatus* de Beaufort.
9. *Lepidocephalus hasselti* (Cuv. & Val.).
10. *Nemachilus fasciatus* (Cuv. & Val.).
11. *Nemachilus selangoricus* Duncker.

I have examined specimens of all these species except of *A. kuhli*, the doubtful occurrence of which in the Malay Peninsula is discussed under *A. semicinctus*. It has been found that Herre's *Acanthopthalmus perakensis* is synonymous with *A. anguillaris* Vaillant and that *A. pahangensis* de Beaufort is synonymous with *Lepidocephalus macrochir* (Bleeker). Besides the species enumerated above, I have found representatives of the following other species in the collection:—

1. *Acanthopthalmus pangia* (Ham.).
2. *Acanthopthalmus vermicularis* Weber & de Beaufort.
3. *Botia modesta* Bleeker.
4. *Nemachilus masyæ* Smith.

Of the 15 species of the Cobitidae now known from the Malay Peninsula, *Acanthopthalmus kuhli*, *Acanthopsis choirorhynchus*, *Botia hymenophysa*, *Lepidocephalus hasselti* and *Nemachilus fasciatus* are found both to the north and south of the Malay Peninsula. *Acanthopthalmus anguillaris* and *A. pangia* had hitherto been known from the north and south of the Malay Peninsula, but are recorded here from this region for the first time. *Botia modesta* and *Nemachilus masyæ* were so far known from Siam and are recorded here from the Malay Peninsula for the first time. *Acanthopthalmus vermicularis*

and *Lepidocephalus macrochir* were hitherto known from Sumatra and Java and their range is now extended to the Malay Peninsula. The remaining three species, *Acanthopthalmus muraeniformis*, *Lepidocephalus furcatus* and *Nemachilus selangoricus* are so far endemic to the Malay Peninsula.

The distribution of the various species enumerated above shows the great importance of the study of the freshwater fish-fauna of the Malay Peninsula for a proper elucidation of the zoogeographical relations of the various countries included in the Oriental Region. From a large number of new records of distribution of the species discussed in this article, it seems probable that a proper search in suitable localities will bring to light many more interesting forms. Even now, so far as the Cobitidae are concerned, the Malayan fauna seems to be fairly rich in these loaches.

The Malayan species of the Cobitidae can be distinguished by the following key:—

Key to the Malayan species of Cobitidae

- I. A moveable pre- or suborbital spine—
 - A. Origin of dorsal before that of ventrals—
 1. Spine below eye; eyes with a free orbital margin .. *Botia*.
 - a. Length of head equals depth of body; suborbital spine extending to below posterior margin of eye; a broad black bar at base of skull .. *B. modesta*.
 - b. Length of head greater than depth of body; suborbital spine extending to below middle of eye; body marked with transverse bands with black edges .. *B. hymenophysa*.
 2. Spine before eye; eyes subcutaneous .. *Acanthopsis choirorhynchus*.
 - B. Origin of dorsal opposite to or behind that of ventrals—
 1. Head without scales .. *Acanthopthalmus*.
 - a. Eight barbels—
 - i. An extra pair of nasal barbels present; end of dorsal above commencement of anal .. *A. vermicularis*.
 - ii. An extra pair of labial barbels present; end of dorsal somewhat before origin of anal .. *A. muraeniformis*.
 - b. Six barbels—
 - i. Height 8-11 in total length with caudal—
 - α. Dorsal its own length or more before anal; colour uniform .. *A. pangia*.

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- β. Dorsal much less than its own length before anal; 12 to 15 transverse bands on head and body—
- *. Head $6\frac{1}{2}$ in length. Ventral fins in middle of length of fish (including caudal fin). Dorsal fin 2/6 .. *A. semicinctus.* ✓
 - **. Head about 8 in length. Ventral fins well behind middle of length of fish. Dorsal fin 2/7-8 .. *A. kuhli.* ✓
 - ii. Height 15 or more in total length .. *A. anguillaris.* ✓
 - 2. Scales below and behind eyes and on opercles .. *Lepidocephalus.*
 - a. Caudal distinctly emarginate .. *L. furcatus.*
 - b. Caudal truncate—
 - i. Origin of dorsal behind base of ventrals; pectorals falcate .. *L. macrochir.*
 - ii. Origin of dorsal opposite to base of ventrals; pectorals rounded .. *L. hasselti.* *L. octodon*
 - II. Without pre- or suborbital spine .. *Nemachilus.* *(Van Hasselt)*
 - A. Body marked with continuous transverse bands—
 - 1. Bands separated by very narrow interspaces edged with black; outer rostral and maxillary barbels almost extending to gill-opening .. *N. selangoricus.*
 - 2. Bands separated by relatively wider interspaces without black edges; barbels not extending to gill-openings .. *N. fasciatus.*
 - B. Body marked with saddle-shaped spots along the back and similar series of spots along the middle of the sides .. *N. masyax.*

Acanthophtalmus (Acanthophtalmus) kuhli (Cuvier & Valenciennes)

- 1916. *Acanthophtalmus kuhli*, Weber and de Beaufort, *Fish. Indo-Austral. Archipel.*, III, p. 33.
- 1937. *Acanthophtalmus kuhlii*, Herre and Myers, *Bull. Raffles Mus. Singapore*, No. 13, p. 65.
- 1938. *Acanthophtalmus kuhlii*, Fowler, *Fisheries Bull. Singapore*, No. 1, p. 53.

1940. *Acanthopthalmus kuhli*, Herre, *Bull. Raffles Mus. Singapore*, No. 16, p. 33.

I have not examined any typical specimen of *Acanthopthalmus kuhli*, though it has been recorded from several localities in the Malay Peninsula and Siam. Recently, Fraser-Brunner¹ restricted the distribution of this species to "Sumatra; Java; ? Borneo", and proposed a new species, *A. semicinctus*, for certain specimens from the Mawai District, Johore, referred by Herre (*loc. cit.*) to *A. kuhli*. In view of these findings it is difficult to comment on the earlier records of the species from the Malay Peninsula without examining the series of specimens on which they are based. The above synonymy is, therefore, intended only to set forth the earlier records of *A. kuhli* from this region. For further details, however, reference may be made to the account of *A. semicinctus* (*vide infra*, p. 47).

Acanthopthalmus (*Acanthopthalmus*) *pangia* (Hamilton)

1916. *Acanthopthalmus pangia*, Weber and de Beaufort, *Fish. Indo-Austral. Archipel.*, III, p. 31, fig. 13.

Acanthopthalmus pangia is represented in the collection by 16 specimens ranging in length from 39 mm. to 47 mm. They were collected at Kuala Tahan, Pahang (King George V National Park) and are of a uniformly brownish colour which is somewhat lighter on the ventral surface. This species has been known to occur in Java and Sumatra on the one hand and in Burma and north-eastern Bengal on the other. It is recorded here from the Malay Peninsula for the first time.

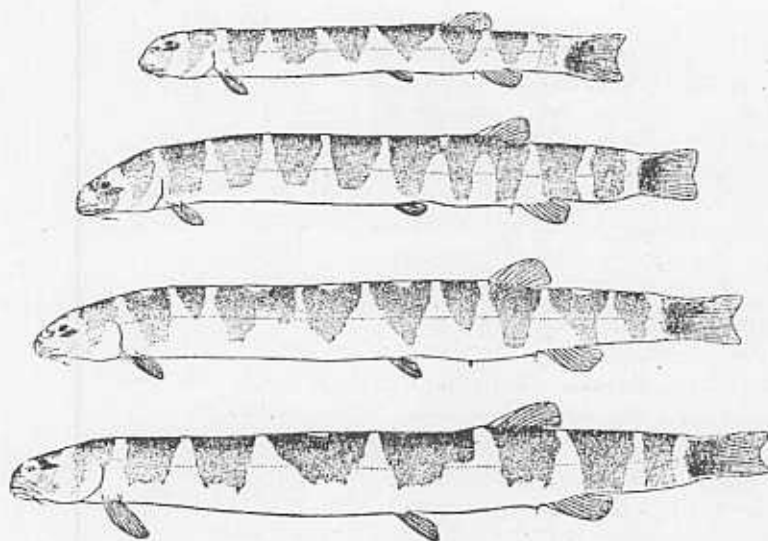
Acanthopthalmus (*Acanthopthalmus*) *semicinctus* Fraser-Brunner.

1940. *Acanthopthalmus semicinctus*, Fraser-Brunner, *Ann. Mag. Nat. Hist.*, (11) VI, p. 172, text-fig. 1b and 3.

In a recent contribution "On some Fishes of the genus *Acanthopthalmus*, with Description of a new Species", Fraser-Brunner has separated some specimens from the Mawai District, Johore, identified by Dr. Herre as *A. kuhli* into a new species, *A. semicinctus*, and remarked that "This species is very distinct from *A. kuhli*, not only on account of its pattern but by reason of its stouter form, larger head and the position of its anal fin." The four specimens from the collection of the Raffles Museum examined by me also came from the same source and agree with the description and figures of *A. semicinctus* in all salient

1. Fraser-Brunner, A.—On some Fishes of the Genus *Acanthopthalmus*, with Description of a new Species. *Ann. Mag. Nat. Hist.* (11) VI, pp. 170-175 (1940).

features, though there are slight differences as shown in the figures reproduced here.



Text-fig. 1.—Lateral view of four specimens of *Acanthopthalmus semicinctus* Fraser-Brunner from the Mawai District, Johore, in the collection of the Zoological Survey of India.

Weber and de Beaufort¹ recorded *A. kuhli* from Sumatra, Java, Borneo, Singapore and Malacca, but Fraser-Brunner has given as its habitat "Sumatra; Java; ? Borneo". The two specimens of this species examined by him in the collection of the British Museum are from Java and Sumatra respectively. The colour patterns of the two are so distinct that they have been assigned to two separate subspecies. Further, it has been surmised that "when these fishes are better known, each island in the Malay Archipelago will be found to have its own species, subspecies, or race belonging to this group".

In view of the above taxonomic findings, the present records of *A. kuhli* from Siam and the Malay Peninsula require further elucidation. In recording this species from Siam (Chantaboon), Fowler² observed: "A very variable species pattern, most of the examples not even alike on both sides of the body. Bleeker's imperfect figure in 1863 does not show the species satisfactorily.

1. Weber, M. and de Beaufort, L. F.—The Fishes of the Indo-Australian Archipelago, III, p. 33 (Leiden: 1916).

2. Fowler, H. W.—Zoological Results of the Third De Schauensee Siamese Expedition, Part I.—Fishes. *Proc. Acad. Nat. Sci. Philadelphia*, LXXXVI, p. 101 (1934).

Meinken (1932) has figured 2 interesting variations." Unfortunately Meinken's¹ article is not available in Calcutta so I am unable to judge the precise specific limits of the species figured by him. Suvatti² has recorded *A. kuhlii* from two other localities in Siam Khau Sabap, Canthaburi and Nong Kho, S. E. Siam.

There are many records of the occurrence of *A. kuhli* from the Malay Peninsula (*vide* Fowler, H. W.—A List of the Fishes known from Malaya. *Fisheries Bull. Singapore*, I, p. 53, 1938; Selangor, Negri Sembilan, Malacca, Singapore, Seletar River). Herre and Myers³ recorded that "A typical specimen 55 mm. long was taken in the outlet of Lake Chin Chin, near Jasin, Malacca, and one of 19 mm. from the Mawai District, Johore." Later Herre⁴ found "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." As indicated above, Herre's specimens of *A. kuhli* from Johore have now been designated as *A. semicinctus*, but what species, subspecies or races are represented among the specimens from other localities it is not possible to say, though there is a probability that all the Siamese and Malayan examples are referable to *A. semicinctus*.

Herre made the following observations regarding the habitat and colouration of his *A. kuhli* from Johore:—

"This species is subject to a good deal of variation in depth, and preserved specimens are apt to be good deal thicker than in life. Their pinkish colour 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 dense mat of filamentous green algae. In such places they have plenty of food and are amply protected from enemies and the direct heat of the sun."

Acanthopthalmus (Cobitophis) anguillaris Vaillant.

- 1916. *Acanthopthalmus anguillaris*, Weber and de Beaufort, *Fish. Indo-Austral. Archipel.*, III, p. 35, fig. 15.
- 1934. *Acanthopthalmus anguillaris*, Fowler, *Proc. Acad. Nat. Sci. Philadelphia*, LXXXVI, p. 103.
- 1940. *Cobitophis perakensis*, Herre, *Bull. Raffles Mus. Singapore*, No. 16, p. 8, pl. ii.

I have examined a paratype of Herre's *Cobitophis perakensis*, 54 mm. in total length. Herre distinguished it from the

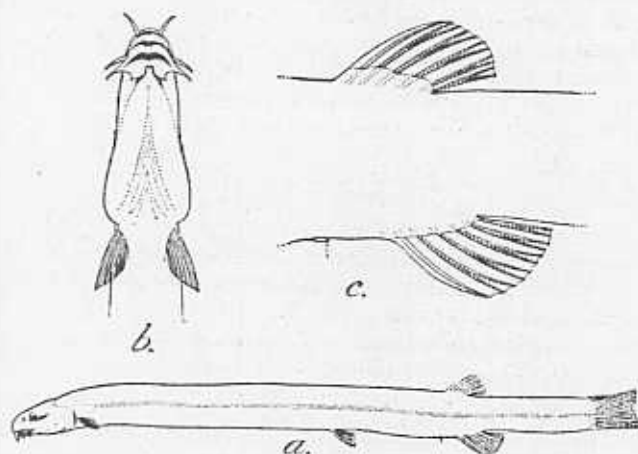
1. Meinken, H.—*Acanthopthalmus kuhli* (C. et. V.). *Bl. Aquarien-kunde Stuttgart*, XLIII, pp. 257-259, 1 fig. (1932).

2. Suvatti, C.—*Index to Fishes of Siam*, p. 58 (Bangkok: 1936).

3. Herre, A. W. C. T. and Myers, G. S.—A Contribution to the Ichthyology of the Malay Peninsula. *Bull. Raffles Mus. Singapore*, No. 13, p. 65 (1937).

4. Herre, A. W. C. T.—Additions to the fish fauna of Malaya and notes on rare or little known Malayan and Bornean fishes. *Bull. Raffles Mus. Singapore*, No. 16, p. 33 (1940).

closely allied species "in the position of the dorsal, and in proportions". A study of the literature has shown that there is little difference between *C. perakensis* and *Acanthopthalmus anguillaris*. In both the species the dorsal and the anal fins are situated opposite to each other. In the former the anal origin is stated to be opposite the first divided ray of the dorsal, which ends opposite the second divided anal ray. The dorsal fin of *A. anguillaris*, as noted for the type-specimen, is more extensive,

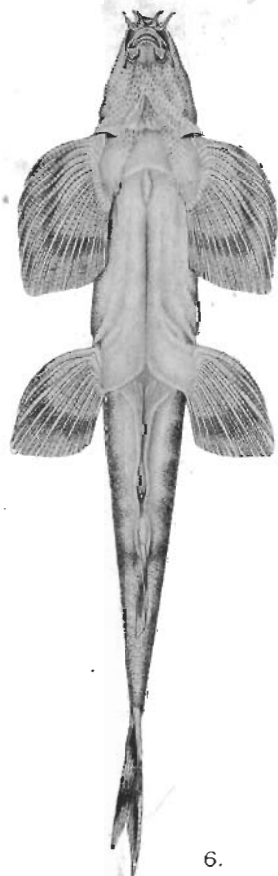


Text-fig. 2.—*Acanthopthalmus (Cobitophis) anguillaris* Vaillant.

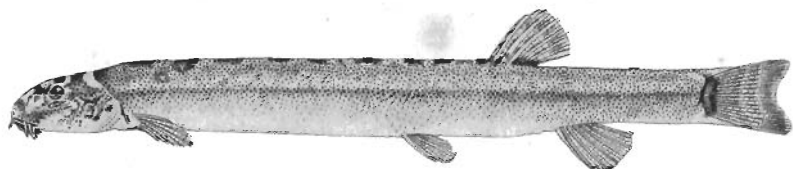
a. Lateral view of a paratype of Herre's *Cobitis perakensis*. $\times 1\frac{1}{2}$; b. Ventral surface of head and anterior part of body of same. $\times 4\frac{1}{2}$; c. Lateral view of a portion of the body in the region of the dorsal and anal fins showing their relative positions. $\times 5$.

for the end of the dorsal is stated to be above the end of the anal. In the specimen examined by me the respective positions of the two fins correspond with Herre's description, though in his figure of *C. perakensis* the dorsal is shown as extending to above the end of the anal. As regards body proportions, much significance cannot be attached in such small, eel-like forms; they are subject to considerable variations both with localities, nature of substratum, availability of food and the sizes of the specimens examined. Unfortunately Fowler did not discuss the range of variation of different characters of this species though he had 392 specimens from Siam for examination.

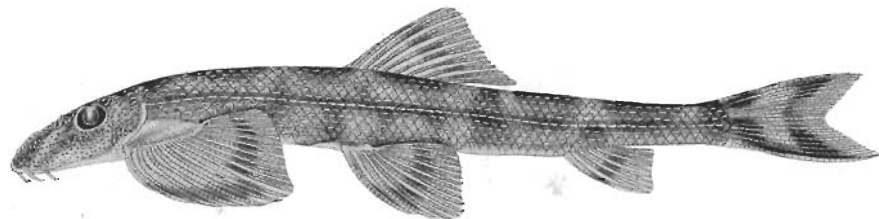
The known range of distribution of *A. anguillaris*, Borneo and Siam, also points to its possible occurrence in the Malay Peninsula. The morphological characters discussed above and the geographical distribution of the species clearly indicate that



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Herre's *Cobitophis perakensis* is identical with *A. anguillaris*. From the Malay Peninsula, specimens of *A. anguillaris* have hitherto been obtained from the lake above the Chenderoh Dam in Upper Perak.

Acanthophtalmus (*Cobitophis*) *muraeniformis* de Beaufort
(Plate V, figs. 1-3)

1933. *Acanthophtalmus* (*Cobitophis*) *muraeniformis*, de Beaufort, *Bull. Raffles Mus. Singapore*, No. 8, p. 32.
1936. *Acanthophtalmus* (*Cobitophis*) *muraeniformis*, Tweedie, *ibid.*, No. 12, p. 19.
1937. *Acanthophtalmus muraeniformis*, Herre and Myers, *ibid.*, No. 13, p. 65.
1938. *Acanthophtalmus muraeniformis*, Fowler, *Fisheries Bull. Singapore*, No. 1, pp. 53, 250.

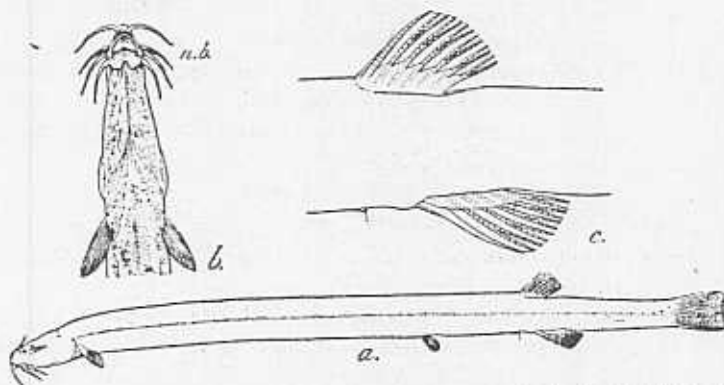
Acanthophtalmus muraeniformis is a very characteristic loach and can readily be distinguished by its colouration, the number of barbels, the position of the dorsal fin and the relative length of the paired fins. Herre and Myers have shown that the depth of the body and the length of the head are subject to considerable variation. I have examined three specimens from Kota Tinggi, Johore and 25 from Kuala Tahan, Pahang. In one of the specimens from the former locality and in all the specimens from Pahang the colour markings are not so well developed and the body is more finely mottled with a somewhat darker band along the lateral line. In these specimens the broad, brown blotches on the back are sometimes diffuse or absent. There is, however, a black spot in the axil of the pectoral fin and a black band at the base of the caudal fin. In some of the specimens there may be 2 pairs of labial barbels. The caudal fin is slightly emarginate in a number of specimens.

Acanthophtalmus (*Cobitophis*) *vermicularis* Weber & de Beaufort

1916. *Acanthophtalmus vermicularis*, Weber and de Beaufort, *Fish. Indo-Austral. Archipel.*, III, p. 34.

In the collection under report, there are two specimens, about 80 mm. in length, which I refer to *Acanthophtalmus vermicularis*; these examples agree very closely with the description of the species as given by Weber and de Beaufort, except that they are provided with well-marked nasal barbels. It is likely that these appendages may have been overlooked in the type-specimen, which was collected in Sumatra. Our specimens were obtained from Kuala Tahan, Pahang and Ulu Lebir, Kelantan. This species can readily be distinguished from *A. anguillaris* by the presence of the nasal barbels and by the position of the dorsal fin in relation to the anus and the anal fin. Among the species hitherto included in the genus *Acanthophtalmus*, *A. vermicularis* is unique in possessing nasal

barbels. According to some authors it is a good character for separating genera, but I regard it as of specific value only.



Text-fig. 3.—*Acanthophtalmus (Cobitophis) vermicularis* Weber and de Beaufort.

a. Lateral view of a specimen from Kuala Tahan, Pahang. $\times 1\frac{1}{2}$; b. Ventral surface of head and anterior part of body of same. $\times ca 3$; c. Lateral view of a portion of the body in the region of the dorsal and anal fins showing their relative positions. $\times 4$.

Acanthophtalmus vermicularis has hitherto been known from Sumatra; it is recorded here for the first time from the Malay Peninsula.

***Acanthopsis choirorhynchus* (Bleeker)**

1916. *Acanthopsis choirorhynchus*, Weber and de Beaufort, *Fish. Indo-Austral. Archipel.*, III, p. 25, figs. 8, 9.
 1938. *Acanthopsis choirorhynchus*, Fowler, *Fisheries Bull. Singapore*, No. 1, p. 54.
 1940. *Acanthopsis choirorhynchus*, Herre, *Bull. Raffles Mus. Singapore*, No. 16, p. 33.

I have examined two specimens of *Acanthopsis choirorhynchus* from Jalong, Perak, 148 mm. and 162 mm. in length respectively. This species is widely distributed in Sumatra, Java, Borneo, Malay Peninsula, Siam, Annam and Burma. From the Malay Peninsula it has been recorded from several localities (*vide* Fowler, 1938).

***Botia hymenophysa* (Bleeker)**

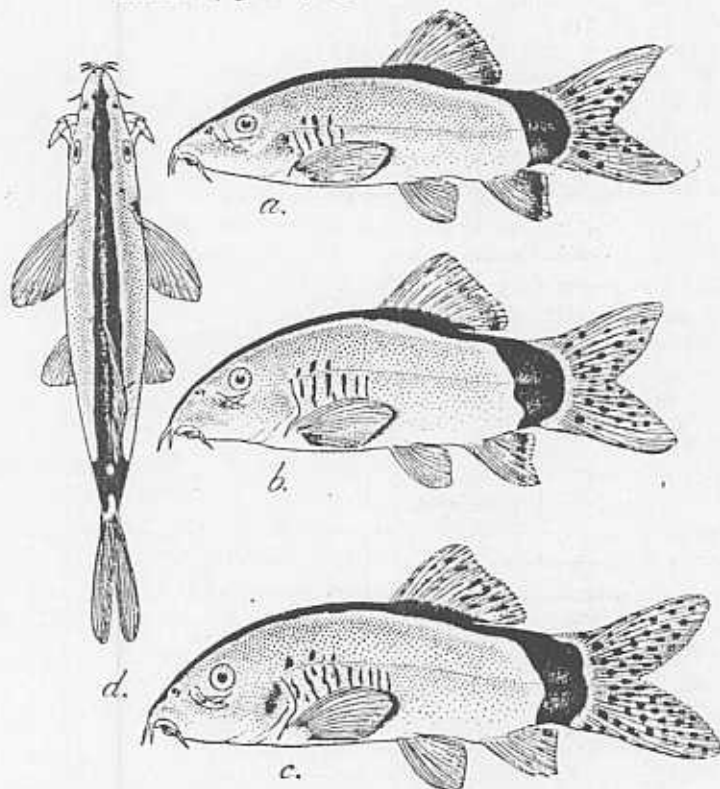
1916. *Botia hymenophysa*, Weber and de Beaufort, *Fish. Indo-Austral. Archipel.*, III, p. 24.
 1936. *Botia hymenophysa*, Tweedie, *Bull. Raffles Mus. Singapore*, No. 12, p. 19.
 1938. *Botia hymenophysa*, Fowler, *Fisheries Bull. Singapore*, No. 1, p. 54.

I have examined two fine specimens of *Botia hymenophysa*, 160 mm. and 168 mm. in length respectively, from the King

George V National Park, F.M.S., and a young example, 92 mm. in length from Tasek Bera, Pahang. The young specimen is somewhat lighter in colour, but the dark edges of the lateral bands are very distinct. In the colouration of the dorsal and caudal fins also, this specimen differs from the other two larger examples. The range of distribution of *B. hymenophysa* extends from Java, Sumatra, Borneo, through the Malay Peninsula to Siam.

Botia modesta Bleeker

1922. *Botia modesta*, Hora, *Rec. Ind. Mus.*, XXIV, p. 317.
 1923. *Botia modesta*, Hora, *Journ. Nat. Hist. Soc. Siam*, VI, p. 148.
 1931. *Botia horae*, H. M. Smith, *Proc. U. S. Nat. Mus.*, LXXIX, art. 7, p. 4, fig. 2.
 1934. *Botia modesta*, Fowler, *Proc. Acad. Nat. Sci. Philadelphia*, LXXXVI, p. 101, figs. 53, 54.



Text-fig. 4.—*Botia modesta* Bleeker. $\times 2/3$.
 a., b., c. Three specimens of different sizes showing variation in colouration; d. View of the longest specimen from the dorsal surface.

Botia modesta is represented in the collection by three specimens, 66 mm. to 77 mm. in length; they were collected from the King George V National Park at Kuala Tahan, Pahang. These specimens are characterised by a black dorsal band which runs from the tip of the snout to the base of the caudal fin where it joins a broad band in front of the base of the caudal fin. These black areas are encircled by narrow whitish areas while the general body colour is grayish. The sides of the body above the pectoral fins are marked with a variable number of short, narrow bands. The dorsal fin is provided with a row of spots in the middle and the tip of the anal fin is blackish. The caudal fin is covered with numerous, black, rounded spots.

The colouration of *B. modesta* appears to be very variable as already pointed out by Fowler, and I agree with him that *B. horae* Smith represents only a juvenile form of *B. modesta*. In the Malayan examples the colour pattern is quite different from what has been described so far.

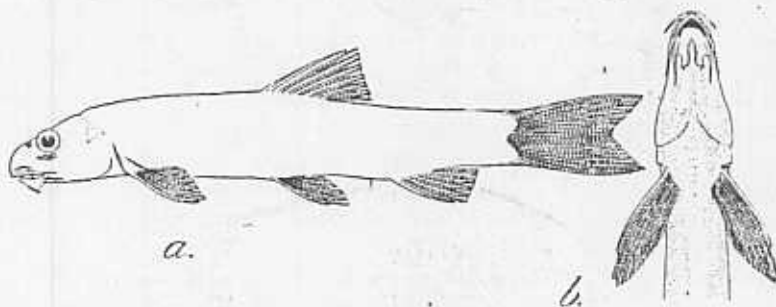
B. modesta has hitherto been known from Siam; it is recorded here from the Malay Peninsula for the first time.

Lepidocephalus furcatus de Beaufort

1933. *Lepidocephalus furcatus*, de Beaufort, *Bull. Raffles Mus. Singapore*, No. 8, p. 32.

1938. *Lepidocephalus furcatus*, Fowler, *Fisheries Bull. Singapore*, No. 1, p. 54.

I have examined a typical, partially desiccated, specimen of *Lepidocephalus furcatus*; it is about 33 mm. in length. This species, as remarked by de Beaufort, is remarkable in possessing a forked tail (the caudal fin is normally truncate in the species of this genus). In *L. irrorata* Hora¹, commonly found in the



Text-fig. 5.—*Lepidocephalus furcatus* de Beaufort.

a. Lateral view of a typical specimen. $\times 2\frac{1}{2}$; b. Ventral surface of head and anterior part of body of same. $\times 3\frac{1}{2}$.

1. Hora, S. L.—Fish and Fisheries of Manipur with some observations on those of the Naga Hills. *Rec. Ind. Mus.*, XXII, p. 196, pl. ix, fig. 5.

lake and rivers of the Manipur Valley, Assam, the tail is not forked to the same extent as in *L. furcatus*, but is distinctly concave. Besides the nature of the caudal fin, in the marking on the fins also the two species are somewhat similar.

Six specimens of *L. furcatus* were obtained from the Bukit Merah Reservoir, Perak. So far the species is endemic to the Malay Peninsula.

***Lepidocephalus hasselti* (Cuvier & Valenciennes)**

1916. *Lepidocephalus hasselti*, Weber and de Beaufort, *Fish. Indo-Austral. Archipel.*, III, p. 29.
1940. *Lepidocephalus hasselti*, Herre, *Bull. Raffles Mus. Singapore*, No. 16, p. 33.

Though *Lepidocephalus hasselti* has been known to occur in Sumatra and Java on the one hand and Tenasserim and Siam¹ on the other, it was only recently recorded by Herre from the Malay Peninsula (Mawai District, Johore). I have examined 9 specimens, 30 mm. to 40 mm. in length, from Sauk, Upper Perak and Pengkalan Chepah, Kota Bharu, Kelantan. The five specimens from Perak had previously been examined and correctly determined by Dr. Herre.

***Lepidocephalus macrochir* (Bleeker). (Plate V, fig. 4)**

1916. *Lepidocephalus macrochir*, Weber and de Beaufort, *Fish. Indo-Austral. Archipel.*, III, p. 29.
1933. *Acanthopthalmus pahangensis*, de Beaufort, *Bull. Raffles Mus. Singapore*, No. 8, p. 31.
1938. *Acanthopthalmus pahangensis*, Fowler, *Fisheries Bull. Singapore*, No. 1, p. 54.

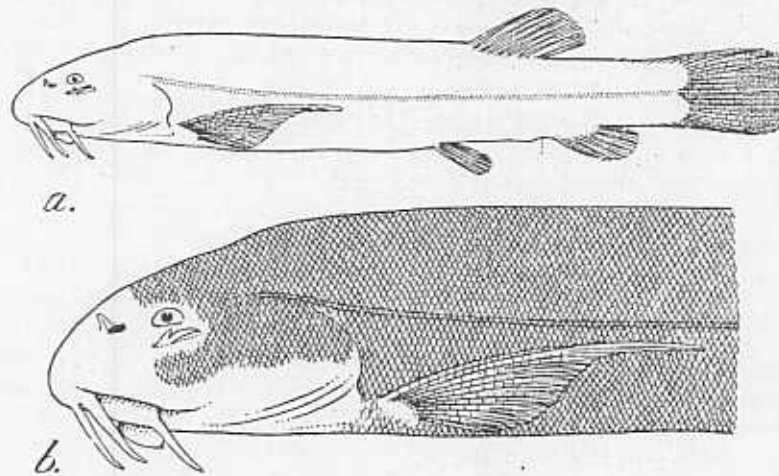
In discussing the systematic position of his new species, *Acanthopthalmus pahangensis*, de Beaufort remarked:

"In the position of the dorsal this species comes near to *A. kuhli* and *A. borneensis*. It differs from both, besides in the fin formulae, in the long falcate pectorals. In this respect it agrees with *Lepidocephalus macrochir*, with which species it has more points of resemblance. It differs however by having the head scaleless, the chief difference between the two genera *Lepidocephalus* and *Acanthopthalmus*."

A. pahangensis is known from a single specimen, 44.5 mm. in length; it was obtained from a "fish-drive" off Mentakab, Pahang River. I have carefully studied this specimen and found it to be covered with a thick coating of whitish, mucous substance. When this covering of mucus was removed with the help of fine needles and brush, scales were found to be present on the head in the region below and behind the eyes. Thus there is no doubt that the fish belongs to the genus *Lepidocephalus* Bleeker. The falcate pectorals characterise it as *L. macrochir*.

1. Suvatti, C.—*Index to Fishes of Siam*, p. 60 (Bangkok, 1936).

Attention may be directed to the fact that the proportions given by de Beaufort for his *A. pahangensis* differ considerably from those given for *L. macrochir* by Weber and de Beaufort.



Text-fig. 6.—*Lepidocephalus macrochir* (Bleeker).

a. Lateral view of the type-specimen of *Acanthophtalmus pahangensis* de Beaufort (= *L. macrochir*). $\times 2\frac{1}{4}$; b. Lateral view of head and anterior part of body showing distribution of scales on the head. $\times 4\frac{1}{2}$.

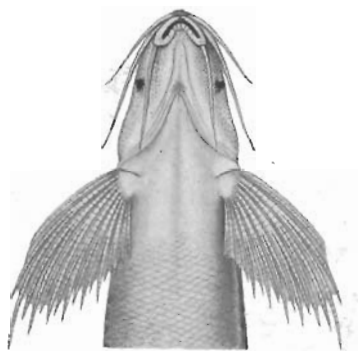
These differences may be due to the fact that the only known specimen of the former is about half the normal size attained by the latter.

L. macrochir has so far been known from Java and Sumatra; it is recorded here for the first time from the Malay Peninsula.

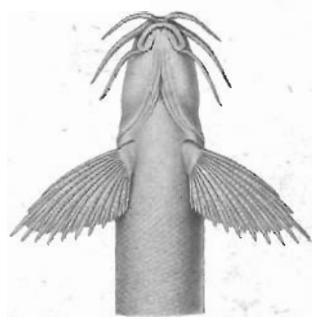
? *Nemachilus fasciatus* (Cuv. & Val.). (Plate VI, fig. 1)

- 1936. *Nemachilus fasciatus*, Tweedie, *Bull. Raffles Mus. Singapore*, No. 12, p. 19.
- 1938. *Nemacheilus fasciatus*, Fowler, *Fisheries Bull. Singapore*, No. 1, p. 250.
- 1940. *Nemacheilus fasciatus*, Herre, *Bull. Raffles Mus. Singapore*, No. 16, p. 33.

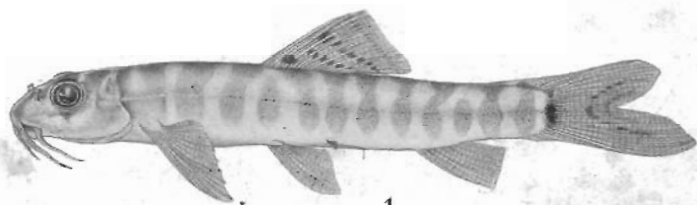
I have examined a specimen from Johore determined by de Beaufort as *Nemachilus fasciatus*; it is stated to have been collected in 1898. At the present time it is badly damaged and is in a very poor state of preservation. It is very difficult to be sure of its exact position, but its very long barbels and distinct scales indicate its resemblance to *N. selangoricus*. Tweedie and Fowler have based their records of the occurrence of *N. fasciatus* in the Malay Peninsula on de Beaufort's determination of this specimen.



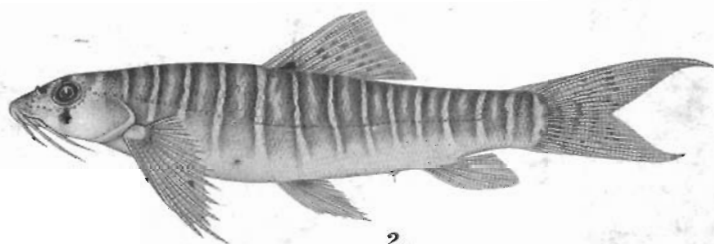
3.



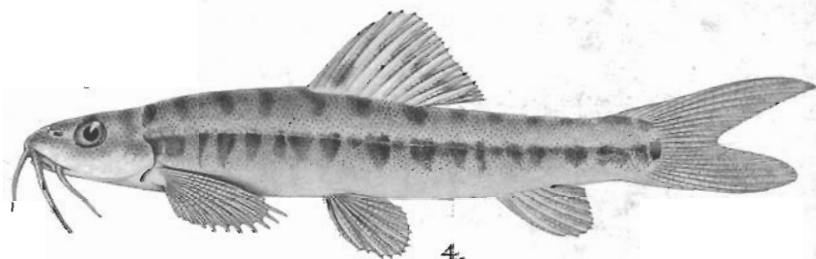
5.



1.



2.



4.

Recently Herre assigned a specimen, 29 mm. long, taken from a stream 5 miles north of Kota Tinggi, Johore, to *N. fasciatus*. So small a specimen of *Nemachilus* is generally difficult to determine specifically as the adult colouration and other features usually develop at a somewhat later stage.

Among the 3 specimens from Mawai District, Johore, determined by Herre as *N. selangoricus* there are two, 44 mm. in length, which do not belong to that species, but exhibit some similarity with *N. fasciatus*. I figure a specimen in which the caudal fin is abnormal, to show the main features of these examples but, in the absence of adult material, I do not wish to comment on their specific position, and for the time being refer them doubtfully to *N. fasciatus*.

N. fasciatus is common in Sumatra, Java and Borneo, and has also been recorded from Siam.¹ In view of its distribution there is every probability of its occurrence in the Malay Peninsula also.

***Nemachilus masyæ* Smith. (Plate VI, fig. 4, 5)**

1933. *Nemacheilus masyæ*, Smith, *Journ. Siam Soc. Nat. Hist. Suppl.*, IX, p. 58, pl. i, fig. 3, text-fig. 3.

1934. *Nemacheilus masyæ*, Fowler, *Proc. Acad. Nat. Sci. Philadelphia*, LXXXVI, p. 108.

Nemachilus masyæ is represented by a single, mature, female specimen about 80 mm. in length (62.5 mm. without caudal); it was collected from the King George V National Park. In all the salient features the specimen agrees with the description of the species as given by Smith. As noticed by Smith in the case of the two specimens obtained by Mr. Havmoller from a pond in Ronpibun, the tips of the rays of the pectoral fins are produced into long filamentous processes and the pelvic and the anal fins have fimbriated edges. Attention has already been directed by Smith and Fowler to a certain amount of variation in the colouration of the species.

Nemachilus masyæ is widely distributed in Siam and is recorded here from the Malay Peninsula for the first time.

***Nemachilus selangoricus* Duncker. (Plate VI, figs. 2, 3)**

1904. *Nemachilus selangoricus*, Duncker, *Mitteil. Naturhist. Mus. Hamburg*, XXI, p. 175.

1937. *Nemacheilus selangoricus*, Herre and Myers, *Bull. Raffles Mus. Singapore*, No. 13, p. 65.

1938. *Nemacheilus selangoricus*, Fowler, *Fisheries Bull. Singapore*, No. 1, p. 54.

1940. *Nemacheilus selangoricus*, Herre (in part), *Bull. Raffles Mus. Singapore*, No. 16, p. 34.

The precise specific limits of *Nemachilus selangoricus* are not well defined and unfortunately the species has not been

1. Suvatti, C.—*Index to Fishes of Siam*, p. 57 (Bangkok: 1936).

figured so far. Recently Herre redescribed the species from several fresh examples obtained from Borneo, Singapore and Johore, but from an examination of a part of the material determined by him as *N. selangoricus* I have found that he had mixed up two distinct forms under this name. According to Duncker's brief description of the species the following are the important diagnostic features of *N. selangoricus*:—(i) The six barbels, 4 rostral and 2 maxillary, are well developed; they almost reach the gill-openings. (ii) The caudal fin is deeply forked. (iii) The body is marked with 10–12 dark, vertical bands which are separated by very narrow interspaces of a light ground colour. The bands extend up to about half of the distance below the lateral line and sometimes they coalesce or become irregularly divided up, particularly below the anterior end of the dorsal fin. The dorsal fin is provided with three rows of spots and there is also a black suborbital spot.

Judging from the characters enumerated above, I am able to refer to *N. selangoricus* 4 specimens collected from the following localities:—

		Standard length
Singapore	2 specimens	44.0, 48.5 mm.
Rengam, Johore ..	1 specimen	52.0 mm.
Mawai Dist., Johore	1 specimen	28.0 mm.

All the specimens examined by me are females and are, therefore, devoid of the small, stumpy, suborbital process described by Duncker in his specimens. The most characteristic feature of the species is its colouration which in some respects resembles that of *Nemachilus savona* (Ham.) and *N. dayi* Hora¹. In *N. selangoricus* the pale, narrow, vertical bars are generally bordered by deep black streaks. In the specimen from Rengam, Johore, which is a female full of eggs, the rays of the pectoral and to some extent of the pelvic fins are produced beyond the membrane into filamentous processes as has been noticed above in the case of *N. masyae*. The lobes of the caudal fin are greatly produced, the upper lobe is considerably longer than the lower. The body is covered with small, but fairly distinct, scales.

Nemachilus selangoricus is a small loach in which the head and the anterior part of the body are somewhat depressed, while the tail region is compressed from side to side. The head is short and bluntly pointed; its length is contained from 4.6 to 4.7 times in the standard length. It is somewhat wider than high. The height of the head is contained from 1.5 to 2.0 times and its width from 1.4 to 1.8 times in its length. The eyes are

1. Hora, S. L.—Loaches of the genus *Nemachilus* from Eastern Himalayas, with the description of a new species from Burma and Siam. *Rec. Ind. Mus.*, XXXVII, pp. 56, 57 (1935).

of moderate size and are placed at the sides more or less in the middle of the head near the dorsal surface; they are not visible from the ventral surface. The diameter of the eye is contained from 3.4 to 3.5 times in the length of the head, from 1.0 to 1.2 times in the interorbital width and from 1.1 to 1.2 times in the length of the snout. The nostrils are close to the anterior border of the eye; the anterior nostril is tubular with the posterior wall of the tube produced into a conical flap. The mouth is small, inferior, lunate and horizontal; it is situated only slightly behind the tip of the snout and is bordered by fleshy and continuous lips. The lower lip is slightly interrupted in the middle and the two portions are crenulated in this region. The lateral line tubes are continued on the head and extend both above and below the eyes. The gill-openings do not extend beyond the base of the pectoral fins. There are 3 pairs of well-developed barbels, 2 pairs rostral and one pair maxillary. The outer rostral barbels are the longest; these as well as the maxillary barbels miss the gill-openings by a short distance.

The depth of the body is contained about 5.5 times in the standard length but in a female full of eggs it is only 4.1 times. The caudal peduncle is well formed; its least height being contained from 1.2 to 1.4 times in its length. The scales are small, distinct and imbricate; they cover the entire body except the ventral surface between the pectoral fins. The lateral line is complete.

The dorsal fin commences in advance of the pelvics and the anterior point of its origin is considerably nearer the tip of the snout than the base of the caudal fin; its longest ray is almost as long as the head or its base. The paired fins are placed horizontally and are of equal length; in some specimens, however, the rays of the pectoral fin are produced into long filamentous processes. The pectoral does not reach the pelvic fin which does not extend to the anal opening. The origin of the anal fin is considerably nearer the base of the caudal than the commencement of the pelvic fin. The caudal fin is deeply forked; its outer rays are sometimes greatly produced. The upper lobe of the caudal fin is longer than the lower.

Reference has been made above to the characteristic colouration of the species. In smaller specimens a short, prominent black bar is present in the middle of the base of the caudal fin which, like the dorsal, is provided with rows of spots in its proximal half. The first two branched rays of the dorsal fin possess a conspicuous black spot at their bases.

Nemachilus selangoricus is recorded from several localities in the Malay Peninsula, and its occurrence in Borneo (*vide* Herre 1940) requires further confirmation.

Measurements in millimetres

Standard length	..	..	52.0	48.5	44.0
Length of head	..	..	11.3	10.3	9.3
Depth of body	..	..	12.6	8.6	8.2
Height of head at occiput	..	..	7.6	6.0	4.7
Width of head	..	..	8.0	6.5	5.0
Diameter of eye	..	..	3.3	3.0	2.6
Length of snout	..	..	4.0	3.5	3.0
Interorbital width	..	..	3.9	3.3	2.6
Longest ray of dorsal	..	..	11.3	9.0	10.0
Longest ray of anal	..	..	7.8	6.8	7.0
Length of pectoral	..	..	15.5	7.8	12.0
Length of ventral	..	..	9.6	7.8	8.3
Length of caudal peduncle	..	..	8.0	6.0	5.8
Least height of caudal peduncle	..	..	5.5	4.5	5.0

3. Loaches of the family Homalopteridae

In the fauna of the Malay Peninsula, the Homalopteridae have so far been represented by three species belonging to the genus *Homaloptera*, viz., *H. tweediei* Herre, *H. wassinkii* Bleeker and *H. zollingeri* Bleeker. The first species was recently described by Herre from young specimens taken from a shallow rapid creek in the Mawai District, Johore, about 40 miles north of Singapore. I have examined 3 specimens of *H. tweediei*. With regard to the possible further distribution of this species reference may here be made to the remarks made by me¹ on the species represented by two undetermined specimens of *Homaloptera* from Perak preserved in the collection of the Zoologisches Museum der Universität, Berlin. It was stated:

"In general facies it corresponds to the large-eyed species of *Homaloptera* and is characterised by the possession of fewer rays in the pectoral fins. The pectoral fin is provided with 12-13 rays of which 4-5 anterior rays are simple. The ventral fin possesses 8 rays of which 2 anterior rays are simple. The air-bladder is like that of *H. rupicola* enclosed in two fairly large, thin-walled bony capsules. These specimens probably represent a new species but as I did not take the full description of the specimens during my visit to Berlin I am now unable to characterise the species and, therefore, refrain from giving it a new name."

Homaloptera tweediei also belongs to the group of large-eyed species and is characterised by fewer rays in the pectoral fins. In a very young specimen, about 21 mm. in length, the air-bladder was found enclosed in two fairly large, thin-walled bony capsules. Thus there seems every probability that the Perak specimens in the Berlin Museum belong to *H. tweediei*, but one cannot be certain without a further examination of the material. The relatively large size of the scales, the pectorals extending beyond the commencement of pelvics and the naked ventral surface up to the pelvic fins are some of the other important diagnostic features of *H. tweediei*. The species is so far endemic to the Malay Peninsula.

The earliest known species of *Homaloptera* from the Malay Peninsula is *H. wassinkii*; it was doubtfully recorded by

¹. Hora, S. L.—Classification, Bionomics and Evolution of Homalopterid Fishes. *Mem. Ind. Mus.*, XII, p. 288 (1932).

Duncker¹ from Kuala Lumpur, but Weber and de Beaufort² did not include this record among the list of habitats of this species. In 1932, I³ made the following remarks on two young specimens from Kuala Lumpur, labelled as *H. wassinkii*, in the collection of the Amsterdam Museum:

"They are *Helgia*-like in appearance and are provided with large eyes. The head is long and narrow and the body is considerably elevated. The pectorals extend beyond the commencement of the ventrals. It is very difficult to be certain of the determination of these specimens."

However, a definite record of the occurrence of *H. wassinkii* in Malayan waters (Perak) is published in this journal (No. 17, p. 5). Besides the Malay Peninsula, this species is known from Sumatra, Java and Borneo.

Homaloptera zollingeri is more widely distributed and though its occurrence in the Malay Peninsula was recorded only recently (Hora, *loc. cit.*, No. 17, p. 6), it was already known from Sumatra and Java on the one hand and Siam on the other.

In the fresh material that I have examined now, I have found 4 specimens of *H. zollingeri* and 19 specimens of a new species of *Homaloptera*. The four Malayan species of *Homaloptera* can be distinguished by the following key:—

Key to the Malayan species of *Homaloptera*

- I. Origin of dorsal behind origin of ventrals; lateral line 41-47 .. *H. wassinkii*.
- II. Origin of dorsal opposite to or before origin of ventrals—
 - A. Scales smooth, without keels; lateral line 36-37 .. *H. tweediei*.
 - B. Scales provided with prominent keels—
 1. Lateral line 45-48; abdomen scaly with the exception of the space between pectorals .. *H. zollingeri*.
 2. Lateral line 57-60; abdomen to base of anal fin totally naked .. *H. leonardi*, sp. nov.

Homaloptera leonardi, sp. nov. (Plate V, figs. 5, 6)

D. 3/8; A. 2/5; P. 6/10-11; V. 2/8; C. 18.

Homaloptera leonardi is a small and slender loach, in which the head and body are greatly depressed but the tail region is slightly compressed and whip-like; the dorsal profile is slightly arched but the ventral surface is flattened and horizontal up to the commencement of the anal fin. The head tapers anteriorly, but its apex is broadly pointed and somewhat trenchant. The head is relatively longer in smaller individuals; its length is contained from 5.3 to 6.0 times in the total length

1. Duncker, G.—Die Fische der malayischen Halbinsel. *Mitteil. Naturhist. Mus. Hamburg*, XXI, p. 175 (1904).
2. Weber, M. and de Beaufort, L. F.—*The Fishes of the Indo-Australian Archipelago*, III, p. 10 (Leiden: 1916).
3. Hora, S. L.—Classification, Bionomics and Evolution of Homalopterid Fishes. *Mem. Ind. Mus.*, XII, p. 280 (1932).

and from 4.3 to 4.8 times in the length without the caudal. The width of the head is almost equal to its length in front of the posterior border of the eye and its height at occiput is about half the length of the head. The snout is broad, flat and obtusely pointed; it is slightly longer than half the length of the head and in consequence the eyes are situated entirely in the posterior half of the head. The eyes are dorso-lateral in position and are of moderate size; the diameter of the eye is contained from 3.6 to 4.1 times in the length of head, from 2.0 to 2.2 times in the length of the snout and from 1.0 to 1.3 times in the inter-orbital width. In the smaller specimens the eyes are proportionately larger and the interorbital space is smaller and more convex. The nostrils are situated slightly in front of the eyes, and are separated by a well-marked membranous flap. The mouth is inferior, small, lunate and horizontal; it is bordered by thick, plain lips which are continuous at the angles of the mouth. The lower lip is interrupted in the middle and the jaw is left bare. The middle portion of the lower lip is produced backwards into two prominent ridges. The rostral groove is fairly well marked and is continued round the angle of the mouth but is widely interrupted in the middle. The barbels are short and stumpy. The lower jaw is shovel-like and is provided with a sharp rasping edge.

The body is relatively deeper in smaller individuals; its height is contained from 8.7 to 12.0 times in the length and from 8.0 to 9.6 times in the length without the caudal. The caudal peduncle is long and narrow; its least height is contained from 2.6 to 3.0 times in its length. The body is covered with small, carinate scales, those on the dorsal surface are somewhat larger in size. There are 57 to 60 scales along the lateral line, $6\frac{1}{2}$ rows above it to the base of the dorsal fin and 6 rows between it to the origin of the pelvic fins; the number of predorsal scales is about 18. The head and the ventral surface of the body up to the origin of the anal fin are absolutely naked.

The commencement of the dorsal fin is slightly in advance of that of the pelvics and is slightly nearer to the tip of the snout than to the base of the caudal fin; it is somewhat rounded and its height is considerably greater than the depth of the body below it. The pectoral fins are pedunculate, horizontal and fan-shaped; they are longer than the head but do not reach the pelvic fins; they are provided with 6 unbranched and 10-11 branched rays. The pelvic fins are similar to the pectorals but are much shorter; they do not extend as far as the anal opening; they are provided with 2 unbranched and 8 branched rays. The anal fin is short, but it is longer than the depth of the body. The caudal fin is longer than the head and is deeply forked with the lower lobe longer than the upper; its length is contained from 3.7 to 4.4 times in the standard length. Some of the outer rays in both the lobes are closely applied together so as to form oar-like structures.

MALAYAN FISHES IN THE COLLECTION OF THE RAFFLES MUSEUM

The body is marked with six black saddle-shaped patches on the dorsal surface which may extend to the sides as far as the lateral line; they are separated by narrow whitish bands. In between the black bands on the sides along the lateral line is another row of spots and this is followed by another series of spots, some of which extend to the ventral side. The head is dark above and light below. The ventral surface of the body is dull white. All the fins are marked with varying numbers of bands.

Locality.—Kuala Tahan, Pahang (King George V National Park).

Type-specimen.—F. 13213, Zoological Survey of India, Indian Museum, Calcutta.

Remarks.—In general facies *H. leonardi* is a *Balitora*-like fish and from its totally naked ventral surface, greatly flattened body and broad paired fins it seems to be well adapted to live in swift currents. In these characters it bears close resemblance to *H. tate-regani* Popta¹, but differs from it in having fewer scales along the lateral line (57 to 60 versus 64), more predorsal scales (18 versus 14), fewer rays in the pectorals (6/11 versus 8/12), larger eyes (3.6 to 4.1 versus 7 times in length of head), extent of pectorals (widely apart versus reaching pelvics) and colouration. Attention may, however, be directed to the similarity in the form of the rostral groove and lips² in the two species. *H. tate-regani* is so far known from a single specimen, 85 mm. long, collected from the river Bō, Borneo.

The new species of *Homaloptera* is named after Mr. G. R. Leonard, Superintendent of the King George V National Park, in slight recognition of the help rendered by him in the collection of fishes from Kuala Tahan, Pahang.

Measurements in millimetres

Total length ..	57.0	54.0	50.0	49.0	46.0	44.0	39.5	35.0
Standard length ..	45.0	44.0	40.0	39.0	36.5	35.6	31.5	28.0
Length of caudal ..	12.0	10.0	10.0	10.0	9.5	9.4	8.0	7.0
Length of head ..	9.5	9.0	8.3	8.5	8.0	8.0	7.0	6.5
Depth of body ..	5.0	5.0	4.2	4.1	4.5	4.5	3.9	3.5
Diameter of eye ..	2.3	2.3	2.2	2.1	2.1	2.0	1.9	1.8
Length of snout ..	5.0	5.0	4.8	4.7	4.8	4.8	4.0	3.7
Interorbital width ..	3.0	3.0	2.8	2.8	2.8	2.7	2.3	2.1
Distance between snout and origin of dorsal fin ..	21.0	20.0	18.0	18.0	17.0	16.5	15.0	13.2
Length of caudal peduncle ..	8.0	7.5	6.5	6.0	6.5	6.5	5.8	4.8
Least height of caudal peduncle ..	2.9	2.8	2.5	2.0	2.3	2.1	2.0	1.8
Length of pectoral fin ..	11.0	11.0	10.0	10.5	9.5	9.0	7.5	7.0
Length of dorsal fin ..	10.5	11.0	10.0	10.0	9.5	9.0	8.0	6.8
Length of ventral fin ..	9.0	9.5	8.0	9.0	7.2	7.0	6.2	5.5
Length of anal fin ..	6.0	6.0	5.0	5.5	5.5	5.3	4.6	4.5

1. Weber M. and de Beaufort, L. F.—*The Fishes of the Indo-Australian Archipelago*, III, p. 19 (Leiden: 1916).

2. For the structure of rostral groove and lips of *H. tate-regani* see Hora in *Mem. Ind. Mus.*, XII, pl. xi, fig. 4 (1932).

Homaloptera zollingeri Bleeker

1916. *Homaloptera zollingeri*, Weber and de Beaufort, *Fish. Indo-Austral. Archipel.*, III, p. 14.

1940. *Homaloptera zollingeri*, Hora, *supra*, p. 6.

I refer 4 specimens, 55 mm. to 68.5 mm. in length, obtained from the King George V National Park to *Homaloptera zollingeri*. One of the two specimens from Kuala Tahan is much darker in colour and the bands on the body are somewhat obscure. The dorsal surface of the outer rays of its paired fins and the anterior rays of the dorsal and anal fins are dusky. The caudal fin tipped with white and its upper lobe is provided with a prominent transverse band in the middle.

EXPLANATION OF PLATE V

Cobitidæ and Homalopteridæ from the Malay Peninsula

Fig. 1.—Lateral view of a specimen of *Acanthopthalmus* (*Cobitophis*) *muraeniformis* de Beaufort from Kota Tinggi, Johore, showing typical colour pattern. $\times 2\frac{1}{4}$.

Fig. 2.—Ventral surface of head and anterior part of body of same. $\times 3\frac{1}{3}$.

Fig. 3.—Lateral view of a specimen of the same from Kuala Tahan, Pahang, showing a different, lighter colour pattern. $\times 2\frac{1}{4}$.

Fig. 4.—Ventral surface of head and anterior part of body of the type-specimen of *Acanthopthalmus pahangensis* de Beaufort (= *Lepidocephalus macrochir*). $\times 2\frac{1}{4}$.

Fig. 5.—Lateral view of the type-specimen of *Homaloptera leonardi*, sp. nov. $\times 2\frac{1}{4}$.

Fig. 6.—Ventral view of same. $\times 2\frac{1}{4}$.

EXPLANATION OF PLATE VI

Nemachilus from the Malay Peninsula

Fig. 1.—Lateral view of a specimen of *Nemachilus fasciatus* (Cuv. & Val.) from Mawai District, Johore. $\times 2$.

Fig. 2.—Lateral view of a specimen of *Nemachilus selangoricus* Duncker from Rengam, Johore. $\times 1\frac{1}{3}$.

Fig. 3.—Ventral surface of head and anterior part of body of same. $\times 2\frac{1}{4}$.

Fig. 4.—Lateral view of a specimen of *Nemachilus masyæ* Smith from King George V National Park, F.M.S. $\times 1\frac{3}{8}$.

Fig. 5.—Ventral surface of head and anterior part of body of same. $\times 1\frac{1}{3}$.