

# ZOOLOGISCHE MEDEDELINGEN

UITGEGEVEN DOOR HET

RIJKSMUSEUM VAN NATUURLIJKE HISTORIE TE LEIDEN  
(MINISTERIE VAN CULTUUR, RECREATIE EN MAATSCHAPPELIJK WERK)

Deel 43 no. 18

16 juli 1969

---

## THE MALAYAN CYPRINOID FISHES OF THE FAMILY HOMALOPTERIDAE

by

**ERIC R. ALFRED**

National Museum, Singapore

### INTRODUCTION

The Homalopteridae comprise small, loach-like fishes that occur in rapids, riffles and other fast-flowing parts of streams and rivers throughout the mainland of Malaya. In his monographic study, Silas (1953) reported six species from Malaya, viz., *Homaloptera zollingeri* Bleeker, *H. wassinki* Bleeker, *H. orthogoniata* Vaillant, *H. tweediei* Herre, *H. leonardi* Hora and *Neohomaloptera johorensis* Herre, while Tweedie (1952) recorded *H. ocellata* Van der Hoeven and I described *H. ogilviei* Alfred (1967). In the present account, the earlier records of *H. zollingeri*, *H. wassinki* and *H. ocellata* are relegated to synonymy. Nine species, all of the genus *Homaloptera* Van Hasselt, are described, including a new record and two new species.

Fowler's characterisation of the sub-genera *Homalopteroides* Fowler (1905) and *Homaloptera* (sensu stricto) has been accepted here. While also accepting this division, Silas (1953) however diminished the distinction between the two sub-genera by characterising *Homaloptera* as with the origin of the dorsal fin opposite or in front of that of the ventral fins. This appears to be due to the fact that he inadvertently followed Hora (1941: 61) in including *H. tweediei* in this sub-genus, although the dorsal origin in the species is behind that of the ventrals. Herre (1944) added the monotypic sub-genus *Neohomaloptera*, which Silas (1953) raised to the rank of a genus. Except for the presence of four pairs of barbels, as against three in *Homaloptera*, and the lower pectoral fin ray count, I do not find the other diagnostic features mentioned by Silas sufficiently distinctive. *Neohomaloptera* is accordingly afforded only sub-generic rank.

All the local species have at least part of the ventral surface, between the snout and the anus, free from scales. This feature has been used in differentiating various species by Bleeker (1863-1864) but subsequent workers (Weber & De Beaufort, 1916; Hora, 1932; Silas, 1953) have afforded it scant attention. The present study has shown that these naked areas vary consistently in shape and extent between certain species (fig. 1), and this feature can be used as a specific diagnostic character. However, in three Malayan species (fig. 1g-i) the differences are slight.

The methods of making counts and measurements follow Alfred (1967). The following abbreviations are used: — BM (British Museum (Natural History), London), KU (Faculty of Fisheries, Kasetsart University, Bangkok), NMS (National Museum, Singapore), RMNH (Rijksmuseum van Natuurlijke Historie, Leiden), SU (Division of Systematic Biology, Stanford University), USNM (U.S. National Museum, Washington), ZMA (Zoologisch Museum, Amsterdam), ZSI (Zoological Survey of India, Calcutta).

For information on, access to, or for loan of material under their care I am grateful to Dr. M. Boeseman (RMNH), Dr. P. H. Greenwood (BM), Dr. A. G. K. Menon (ZSI), Dr. Supap Poonpoka (KU) and Dr. Warren C. Frehofer (SU). Type specimens and other material were examined when I visited London, Leiden and Amsterdam in 1959 and Bangkok in 1965. This account forms part of a study for a Ph.D. at the School of Biological Sciences, University of Malaya, and I am grateful to Prof. A. J. Berry for his supervision of the work and comments on the manuscript, and to Dr. Jose I. Furtado and Mrs. P. Y. Berry for their donations of specimens.

#### KEY TO THE MALAYAN HOMALOPTERIDAE

1. Origin of dorsal fin in front of origin of pelvic fins . . . . . 2
- Origin of dorsal fin behind origin of pelvic fins . . . . . 6
2. Lateral line scales 40-45 . . . . . 3
- Lateral line scales 56-61 . . . . . 4
3. Length of scaleless venter behind pectoral fin base contained 1.5-2.0 in length of pectoral fin base. Posterior outline of scaleless venter W-shaped (fig. 1a). Coloration with 6-7 distinct dark blotches across the dorsum and sides . . . . . *H. zollingeri*
- Length of scaleless venter behind pectoral fin base contained 2.0-3.0 in length of pectoral fin base. Posterior outline of scaleless venter crescentic (fig. 1b). Coloration almost completely dark brown with 6-7 faint darker blotches across the dorsum and sides . . . . . *H. nigra*
4. Scales carinate. Scaleless venter reaching either behind or before base of pelvic fins . . . . . 5
- Scales not carinate. Scaleless venter reaching base of pelvic fins (fig. 1c) . . . . . *H. ogilviei*
5. Caudal peduncle scales 16-19. Scaleless venter reaching anus (fig. 1d) . . . . . *H. leonardi*
- Caudal peduncle scales 28-34. Scaleless venter not reaching behind margins of pectoral fins (fig. 1e) . . . . . *H. orthogoniata*

6. Four pairs of barbels. Scaleless venter reaching base of pelvic fins (fig. 1f) . . . . . *H. johorensis*  
 — Three pairs of barbels. Scaleless venter not reaching base of pelvic fins . . . . . 7  
 7. Lateral line scales 32-36. Transverse scales  $4\frac{1}{2}$ - $5\frac{1}{2}$ / $4\frac{1}{2}$ - $5\frac{1}{2}$ . Scaleless venter usually with an isolated row of mid-ventral scales (fig. 1g) . . . . . *H. tweediei*  
 — Lateral line scales 36-40. Transverse scales  $5\frac{1}{2}$ - $7\frac{1}{2}$ / $5$ - $7$ . Scaleless venter without an isolated row of mid-ventral scales . . . . . 8  
 8. Total pectoral rays 13-14. Transverse scales  $6$ - $6\frac{1}{2}$ / $6$ - $6\frac{1}{2}$ . Eyes prominent above dorsal profile. Scaleless venter as in fig. 1h . . . . . *H. nebulosa*  
 — Total pectoral rays 15-17. Transverse scales  $5\frac{1}{2}$ - $7$ / $5$ - $7$ . Eyes not prominent above dorsal profile. Scaleless venter as in fig. 1i . . . . . *H. smithi*

## SPECIES ACCOUNTS

**Homaloptera (Homaloptera) zollingeri** Bleeker

*Homaloptera zollingeri* Bleeker, 1853: 159 (Batavia, Bandung, Java).

*Homaloptera zollingeri*; Alfred, 1962: 36 (Lahat, Sumatra).

Material examined. — BM 1866.5.2.63 (1) and RMNH 5076 (3), Lahat, Sumatra, P. L. van Bloemen Waanders (Bleeker collection); NMS 1760 (1), River Jelai, 14th mile Tampin to Kuala Pilah road, Negri Sembilan, P. Y. Berry, 8.10.61; NMS 2008 (11), BM 1967.11.15.1-2 (2), SU 66420 (2), RMNH 25918 (4), same locality, M. Dali & C. K. Quek, 1.5.67.

Description. — Dorsal fin rays iii.8, anal rays ii-iii.5, pectoral rays iv-v.10-12, pelvic rays ii.8. Origin of dorsal fin in front of pelvic fins, opposite 15th-17th scale on lateral line. Predorsal length 2.02-2.69 in standard length. Height of dorsal fin 3.89-5.77, height of anal fin 5.35-8.27, length of pectoral fin 4.12-5.84, length of pelvic fin 4.56-6.20 in standard length. Length of dorsal fin base 6.07-8.27 in standard length and 1.28-1.56 in height of that fin. Pectoral fins not reaching pelvic fins. Origin of pelvic fin opposite 16th-18th scale on lateral line. Pelvic fins reaching well beyond anus. Origin of anal fin opposite 32nd-35th scale on lateral line. Length of anal fin base 9.02-12.75 in standard length and 1.32-2.14 in height of that fin.

Scales in lateral line 41-45, above lateral line  $5\frac{1}{2}$ -6, between lateral line and origin of pelvic fin 5- $6\frac{1}{2}$ . Caudal peduncle scales  $3\frac{1}{2}$ - $4\frac{1}{2}$ / $1\frac{3}{2}$ - $4\frac{1}{2}$ . Predorsal scales 13-15. Scales small and keeled. Ventral surface scaleless up to slightly behind pectoral fin base but to well in front of the hindmost reach of that fin. Length of unscaled area behind pectoral fin base (fig. 2a) contained 1.48-1.96 times in length of pectoral fin base. Posterior outline of unscaled area W-shaped (fig. 1a).

Head depressed. Snout blunt. Body depressed in front of, and compressed behind dorsal fin. Depth of body at origin of dorsal fin 6.06-8.55, length of head 3.82-5.06, depth of head 7.72-10.55, width of head 5.29-7.63 in standard length. Least depth of caudal peduncle 10.09-11.45 in standard length, 1.61-

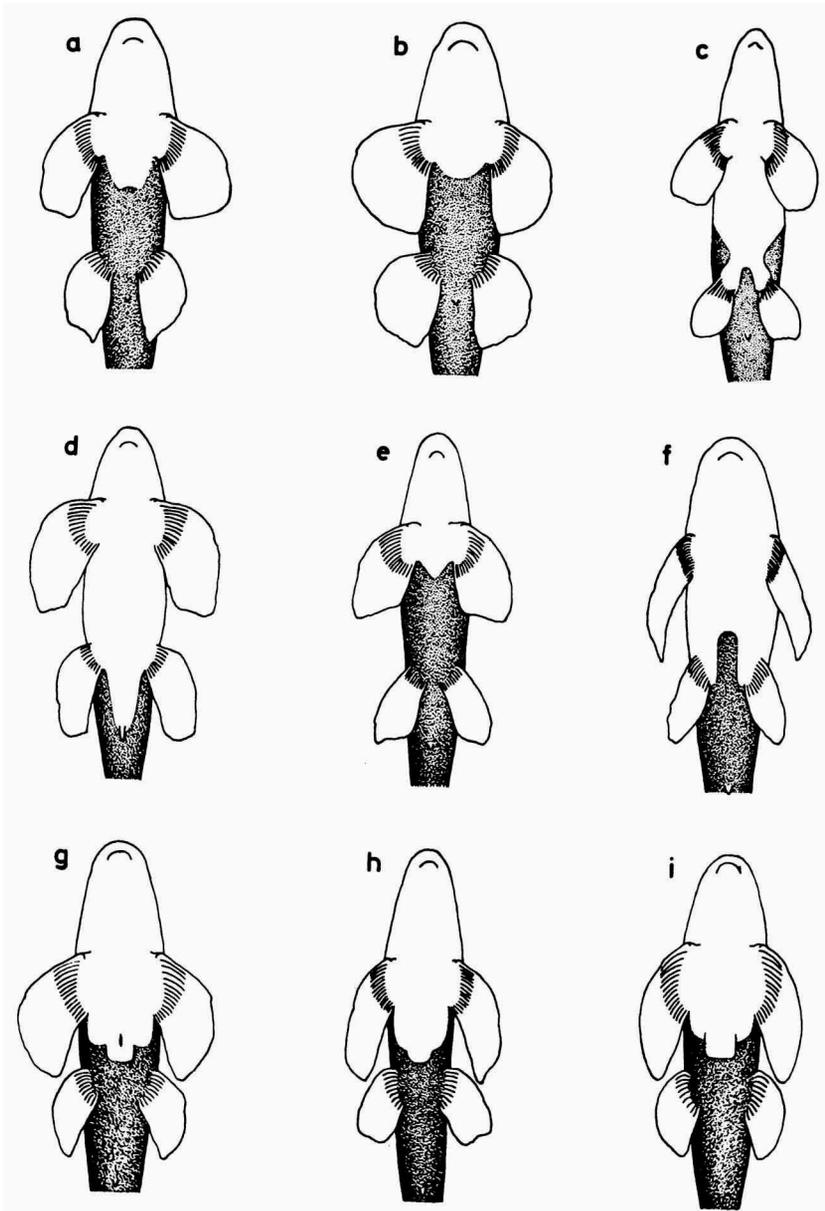


Fig. 1. Diagram of ventral surfaces of a, *H. zollingeri*; b, *H. nigra*; c, *H. ogilviei*; d, *H. leonardi*; e, *H. orthogoniata*; f, *H. johorensis*; g, *H. tweediei*; h, *H. nebulosa*; and i, *H. smithi*, to show extent and shape of unscaled areas (scaled surface stippled).

2.10 in its own length. Length of caudal peduncle 5.36-7.09 in standard length. Length of snout 1.66-2.00, postorbital length 2.65-3.15, interorbital width 2.45-3.15, width of gape 4.05-4.77, depth of head 1.84-2.50, width of head 1.29-1.51 in length of head. Diameter of eye 3.12-4.41 in length of head, 1.63-2.31 in length of snout, 1.16-1.59 in postorbital length. A pair of maxillary and two pairs of rostral barbels, of which the inner rostral is slightly shorter than the other two. Maxillary barbel equals 3.91-5.44 in length of head.

T.l. 42.3-79.8 mm; s.l. 33.2-71.2 mm.

Coloration. — In life, the ground colour is light greenish-brown. Front and sides of head dark brown with a dark brown transverse patch across occiput. Behind this the body has 5-6 dark brown circular blotches across the dorsum and sides, of which the first is between the head and dorsal fin, the second at the dorsal origin, the third at the hind end of the dorsal base, the fourth and fifth opposite the anal fin, and the last around the caudal peduncle. Pectoral and pelvic fins almost completely light brown, and each with a faint lighter transverse patch at the hind end of the base. Dorsal and anal fins light brown, the former with 3, the latter with 1-2 lighter transverse bands. Dorsal fin light edged. Caudal fin dark brown with lobes white-tipped and upper lobe with two pale, irregular transverse bands. In alcohol, the ground colour fades and the body markings become accentuated.

Comments. — One of the criteria used for separating this species from *H. ophiolepis* Bleeker, is the presence of a single keel on the scales of the dorsum as against multiple keels in the latter (Weber & De Beaufort, 1916; Silas, 1953). I however find that the largest specimens in hand have multiple keels on few of the anterior dorsal scales and I therefore do not consider this a useful diagnostic character.

All previous Malayan records of this species are now referred to *H. nigra* (see below). The species also has a remarkably similar coloration to *H. leonardi* and the two may be easily confused in the field.

**Homaloptera (Homaloptera) nigra** sp. nov. (pl. 1, figs. 1, 2)

*Homaloptera zollingeri*; (nec Bleeker) Hora, 1941a: 6 (Plus River, Jalong, Perak); Hora, 1941b: 64 (King George V National Park); Silas, 1953: 199 (Kuala Tahan, King George V National Park, Pahang; Plus River, Jalong, Perak).

Holotype. — NMS 2009, Chegar Sireh, River Tahan, King George V National Park, Pahang, Malaya, E. R. Alfred, 3.3.58.

Paratypes. — NMS 1548 (5), BM 1967.11.15.7-8 (2), SU 66424 (2), RMNH 25922 (2). same data as holotype; NMS 1550 (6), Kuala Tahan, Pahang, C. S. Ogilvie, 1949; ZSI F108/2 (1), Kuala Tahan, King George V National Park, Pahang, M. Tweedie, 4.1940; ZSI F110/2 (1), Plus River, Jalong, Perak, M. Tweedie, 8.1938.

Diagnosis. — A species of *Homaloptera* with the origin of the dorsal fin anterior to the origin of the pelvic fins. Pectoral rays iii-v.10-12. Pectoral fins not reaching pelvic fins. Pelvic fins reaching well beyond anus. Scales with prominent keels. Lateral line 40-44. Caudal peduncle scales 16-18. Scaleless venter reaching slightly behind pectoral fin base, its posterior outline crescentic. Length of scaleless venter behind pectoral fin base (fig. 2b) contained 2.18-3.07 times in length of pectoral fin base. Head and body almost completely dark brown with 6-7 faint darker blotches across dorsum and sides.

Description. — Dorsal fin rays iii.8(iii.8), anal rays iii.5 (ii-iii.5), pectoral rays iv.11(iii-v.10-12), pelvic rays ii.8(ii.8-9). Origin of dorsal fin in front of pelvic fins, opposite 14th(14th-17th) scale on lateral line. Predorsal length

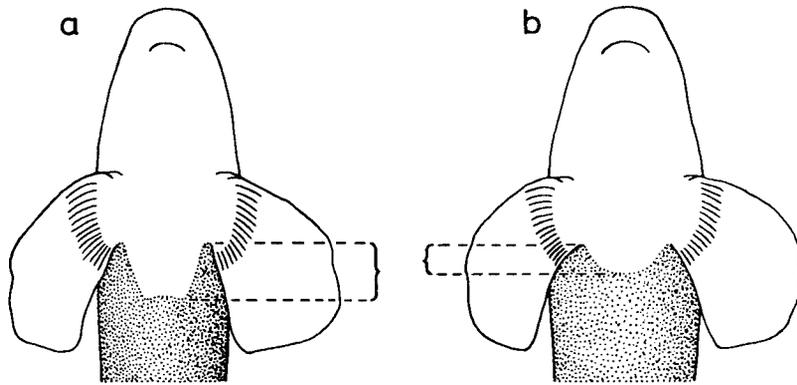


Fig. 2. Method of measuring length of naked venter in a, *H. zollingeri*, and b, *H. nigra*.

2.03(1.99-2.47) in standard length. Height of dorsal fin 4.58(4.21-5.17), height of anal fin 6.24 (5.96-7.41), length of pectoral fin 4.27(4.05-4.99), length of pelvic fin 5.05(4.06-5.58) in standard length. Length of dorsal fin base 6.97 (6.28-7.93) in standard length and 1.55(1.39-1.83) in height of that fin. Pectoral fins not reaching pelvic fins. Origin of pelvic fin opposite 15th (15th-18th) scale on lateral line. Pelvic fins reaching well beyond anus. Origin of anal fin opposite 31st(30th-35th) scale on lateral line. Length of anal fin base 11.52(10.27-14.30) in standard length and 1.83(1.50-2.14) in height of that fin.

Scales in lateral line 41(40-44), above lateral line 6(6-7), between lateral line and origin of pelvic fin 5(4-6). Caudal peduncle scales  $4\frac{1}{4}$ ( $3\frac{1}{2}$ - $4\frac{1}{3}$ ). Predorsal scales 14(12-16). Scales small and keeled. Ventral surface scaleless up to slightly behind pectoral fin base but to well in front of

the hindmost reach of that fin. Length of unscaled area behind pectoral base contained 2.62(2.18-3.07) times in length of pectoral fin base. Posterior outline of unscaled area crescentic (fig. 1b).

Head depressed. Snout blunt. Body moderately depressed in front of and compressed behind dorsal fin, its dorsal profile curved and ventral profile almost horizontal. Depth of body at origin of dorsal fin 6.38(5.50-8.41), length of head 3.83(3.88-4.72), depth of head 7.57(7.88-9.97), width of head 5.20(4.83-6.35) in standard length. Least depth of caudal peduncle 10.40(10.53-13.31) in standard length, 1.80(1.71-2.15) in its own length. Length of caudal peduncle 5.76(5.40-7.27) in standard length. Length of snout 1.86(1.78-1.99), postorbital length 2.71(2.63-3.26), interorbital width 2.76(2.48-2.84), width of gape 4.60(3.32-4.72), depth of head 1.97(1.41-2.49), width of head 1.35(1.16-1.47) in length of head. Diameter of eye 4.18(3.40-4.03) in length of head, 2.24(1.77-2.17) in length of snout, 1.55(1.13-1.80) in postorbital length. A pair of maxillary and two pairs of rostral barbels, of which the inner rostral pair is very slightly shorter than the other two which are more or less equal. Maxillary barbel equals 5.52(4.49-5.84) in length of head.

T.l. 50.0-81.6; s.l. 40.0-77.4 mm. Holotype, t.l. 67.5, s.l. 53.0 mm.

Coloration. — In life, the dorsum and sides of the head and body, including the ventral surface behind the pelvic fins are dark brown (almost black). Ventral surface between snout and pelvic fins dusky. Fins dark brown. Dorsal fin with 1-2 and anal with 1 light-brown transverse bands. Caudal lobes pink-tipped with 2 irregular light-brown bands across the upper lobe. Dorsum of head with a few fine bright-red spots and vermiculations.

Comments. — By virtue of the dorsal origin being located anterior to the pelvics, the lateral line count being 40-44 and the anterior dorsal scales being keeled, *H. nigra* comes closest to *H. zollingeri* and *H. ophiolepis*. The former is distinguished by its coloration and the difference in the length and shape of the naked venter (fig. 1), while *H. ophiolepis* is distinguished by its coloration (Bleeker, 1863-1864), higher lateral line count (47-50) and lesser body depth (10.8-11.6).

Like *H. zollingeri*, the largest specimens have multiple keels on few of the anterior dorsal scales. Owing to the close similarity between the two species, it is not surprising that earlier records (Hora, 1941a, 1941b; Silas, 1953) have been ascribed to the former. I have examined Hora's and Silas's specimens (herein designated as paratypes) and I have now no doubt of the distinction.

**Homaloptera (Homaloptera) ogilviei** Alfred

*Homaloptera ogilviei* Alfred, 1967: 587, figs. 1-4 (River Jelai, Negri Sembilan; River Tok Dor, Trengganu; Muar River, Kuala Pilah, Negri Sembilan; Kluang, Johore; River Tahan, Pahang; and Perak River, Kuala Kangsar, Perak, Malaya).

Material examined. — NMS 2007 (2), SU 66421 (2), River Jelai, 14th mile Tampin to Kuala Pilah road, Negri Sembilan, M. Dali & C. K. Quek, 1.5.67.

For a description of this species reference may be made to Alfred (1967). The 4 topotypes listed above were collected subsequent to my description.

**Homaloptera (Homaloptera) leonardi** Hora

*Homaloptera leonardi* Hora, 1941b: 61, pl. 5, figs. 5 & 6 (Kuala Tahan, King George V National Park, Pahang).

*Homaloptera leonardi*; Silas, 1953: 201 (Kuala Tahan, King George V National Park, Pahang).

Material examined. — Paratype, NMS 1573 (1), Kuala Tahan, King George V National Park, Pahang, Malaya, G. R. Leonard, 1939; ZSI F111/2 (4), same locality, M. Tweedie, 4.1940; NMS 1499 (3), same locality, C. S. Ogilvie, 3.1949; NMS 1500 (6), BM 1967.11.15.3-4 (2), SU 66422 (2), RMNH 25921 (4), Chegar Sireh, River Tahan, King George V National Park, Pahang, E. R. Alfred, 28.2.58; NMS 1754 (8), River Pergau, Kampong Jeli, Kelantan, E. R. Alfred, 6.8.66.

Description. — Dorsal fin rays ii-iii.7-8, anal rays ii.5, pectoral rays vi.10-11, pelvic rays ii.7-8. Origin of dorsal fin in front of pelvic fins, opposite 17th-18th scale on lateral line. Predorsal length 1.84-2.59 in standard length. Height of dorsal fin 4.46-5.78, height of anal fin 5.68-7.31, length of pectoral fin 3.62-5.07, length of pelvic fin 4.16-5.65 in standard length. Length of dorsal fin base 5.27-6.72 in standard length and 1.08-1.25 in height of that fin. Pectoral fins not reaching pelvic fins. Origin of pelvic fin opposite 18th-20th scale on lateral line. Pelvic fins reaching anus. Origin of anal fin opposite 40th-42nd scale on lateral line. Length of anal fin base 8.84-11.48 in standard length and 1.31-1.76 in height of that fin.

Scales in lateral line 56-57, above lateral line 6-7½, between lateral line and origin of pelvic fin 5-7. Caudal peduncle scales 3½-4/1/3½-4½. Predorsal scales 13-16. Scales small and keeled. Ventral surface scaleless up to anus (fig. 1d).

Head depressed. Snout blunt. Body depressed in front of, and compressed behind dorsal fin. Depth of body at origin of dorsal fin 7.30-10.60, length of head 3.88-5.12, depth of head 8.44-9.80, width of head 5.47-7.38 in standard length. Least depth of caudal peduncle 13.48-18.41 in standard length, 1.76-2.60 in its own length. Length of caudal peduncle 5.66-7.57 in standard length. Length of snout 1.69-2.02, postorbital length 2.72-3.64, interorbital width 2.23-3.03, width of gape 4.04-5.65, depth of head 2.05-2.19,

width of head 1.00-1.57 in length of head. Diameter of eye 3.40-6.41 in length of head, 1.90-3.71 in length of snout, 1.25-2.12 in postorbital length. A pair of maxillary and two pairs of rostral barbels, of which the inner rostral pair is very slightly shorter than the other two which are more or less equal. Maxillary barbel equals 4.86-7.50 in length of head.

T.l. 35.5-64.6 mm; s.l. 28.7-50.0 mm.

Coloration. — In life, the ground colour is light greenish-brown. Dorsum and sides of head dark brown. A series of 6 conspicuous, dark brown, circular patches on the dorsum with the hindmost 3 extending across the lateral line. The first patch is between the head and dorsal fin, the second at the dorsal origin, the third at the hind end of the dorsal base, the fourth opposite the edge of the dorsal fin, the fifth opposite the anal fin and the last around the caudal peduncle. A series of dark brown conjoined blotches forming an irregular band along the lateral line. Ventral surface of head and body completely devoid of markings. Fins dusky. Pectorals and pelvics dark brown at the base, the former with 2, the latter with 1 curved, dark brown transverse bands. Anal with 1 and dorsal with 2 brown transverse bands. Lower basal part of caudal fin conspicuously dark brown, upper part lighter. Caudal lobes with brown subterminal transverse bands. In alcohol, the ground colour fades and the markings are more conspicuous.

Comments. — Hora (1941b) erroneously described the naked venter as extending to the origin of the anal fin. In my series, which includes a paratype, it extends only as far back as the anus. The species is previously known from the type locality and its range is now extended northwards to the River Pergau in Kelantan.

### **Homaloptera (Homaloptera) orthogoniata** Vaillant

*Homaloptera orthogoniata* Vaillant, 1902 : 122, fig. 33 (Raoen and Bloecoe, Borneo).

*Homaloptera orthogoniata*; Hora, 1950 : 54 (Perak); Silas, 1953 : 200 (Perak, Malay Peninsula).

*Homaloptera ocellata*; (nec Van der Hoeven) Tweedie, 1952 : 82, fig. 3 (Kuala Tahan).

Material examined. — Syntypes, RMNH 7790 (6), River Bloecoe, Borneo, A. W. Nieuwenhuis, 1896-1897; syntype, RMNH 7791 (1), Nanga Raoen, Borneo, J. Büttikofer, 1894; SU 39390 (2), Tapah Fisheries Station, Perak, A. W. Herre, 24.10.40; NMS 1541 (1), Kuala Tahan, King George V National Park, Pahang, C. S. Ogilvie, 12.1951; NMS 1542 (1), Kota Tinggi, Johore, M. Tweedie, 12.1956; NMS 1543 (4), BM 1967.11.15.5-6 (2), RMNH 25919 (2), River Muar, Kuala Pilah, Negri Sembilan, P. Y. Berry, 8.10.61; NMS 1544 (2), River Jelai, 14th mile Tampin to Kuala Pilah road, Negri Sembilan, P. Y. Berry, 7.7.63; NMS 1547 (5), same locality, T. Selvarajah & E. R. Alfred, 5.9.61; NMS 1545 (2), Latah Kuntoh, River Tahan, King George V National Park, Pahang, E. R. Alfred, 2.1961; NMS 1546 (2), River Korbu, Kampong Jalong, Perak, P. Y. Berry, 2.8.60; NMS 1551 (2), SU 66423 (1), Chegar Sireh, River Tahan, King George V National Park, Pahang, E. R. Alfred, 3.3.58.

Description. — Dorsal fin rays ii-iii.7-8, anal rays ii-iii.5, pectoral rays v-vii.8-12, pelvic rays ii.6-7. Origin of dorsal fin in front of pelvic fins, opposite 15th-19th scale on lateral line. Predorsal length 1.83-2.09 in standard length. Height of dorsal fin 4.48-5.34, height of anal fin 5.14-6.56, length of pectoral fin 4.13-4.90, length of pelvic fin 5.06-6.55 in standard length. Length of dorsal fin base 6.88-7.43 in standard length and 1.31-1.59 in height of that fin. Pectoral fins not reaching pelvic fins. Origin of pelvic fin opposite 18th-20th scale on lateral line. Pelvic fins reaching anus. Origin of anal fin opposite 38th-42nd scale on lateral line. Length of anal fin base 9.15-12.98 in standard length and 1.50-1.92 in height of that fin.

Scales in lateral line 58-63, above lateral line  $9\frac{1}{2}$ - $11\frac{1}{2}$ , between lateral line and origin of pelvic fin 9-15. Caudal peduncle scales  $6\frac{1}{2}$ - $8\frac{1}{6}$ / $6\frac{1}{2}$ -8. Predorsal scales 20-25. Scales small and keeled. Ventral surface scaleless up to slightly behind pectoral fin base but to well in front of the hindmost reach of that fin (fig. 1e). Posterior outline of unscaled area V-shaped.

Head conical and slightly depressed, its ventral surface flattened. Snout pointed. Body moderately compressed, its dorsal profile curved and ventral profile almost horizontal. Depth of body at origin of dorsal fin 4.15-6.22, length of head 3.10-4.45, depth of head 6.26-7.78, width of head 6.08-6.99 in standard length. Least depth of caudal peduncle 9.15-11.07 in standard length, 1.66-2.05 in its own length. Length of caudal peduncle 4.76-6.68 in standard length. Length of snout 1.67-1.83, postorbital length 2.47-2.76, interorbital width 2.75-3.27, width of gape 4.35-5.56, depth of head 1.75-2.04, width of head 1.48-1.91 in length of head. Diameter of eye 5.76-8.00 in length of head, 2.26-4.52 in length of snout, 2.24-3.00 in postorbital length. A pair of maxillary and two pairs of rostral barbels which are more or less equal in length. Maxillary barbel equals 4.93-7.14 in length of head.

T.l. 30.7-104.0 mm; s.l. 23.8-82.3 mm.

Coloration. — In life, the ground colour of the head and body is pale red with the ventral surface from the snout to the pelvic fins lighter. In addition, the posterior part of the body may have a yellowish-grey tinge. The markings on the head and body are dark reddish-brown outlined with black next to the reddish-brown coloration and with yellow outside the black. The number and shape of the markings are slightly variable but they are generally as follows: — The first is on the dorsum between the pectoral fins. Its posterior outline is oval, while it bifurcates anteriorly and runs as a pair of stripes through the eyes and to the outer rostral barbels. From each eye there is another stripe running vertically downwards and slightly backwards on each side of the head. Slightly behind the anterior bifurcation the marking extends an arm on each side to the pectoral base. The second marking is on

the dorsum and sides surrounding the dorsal fin. It is generally circular in shape and may have one or two short ventral arms extending to the pelvic fin. Occasionally the first and second markings are dorsally conjoined. The third marking surrounds the posterior third of the caudal peduncle and extends over most of the caudal fin. In addition to these three markings the following may also be present: — A narrow, transverse, dorsal patch between the first and second marking; a circular dorsal patch between the second and third marking; and a broad, transverse ventral patch joining the lateral line on each side and across the anterior anal base.

Fins dark reddish-brown over the basal  $\frac{2}{3}$  to  $\frac{3}{4}$ , and with the remaining areas pale yellow or pale red. The caudal fin has in addition a dark reddish-brown band across each lobe. The caudal also usually has a pale pink spot at the centre of the base and similar spots may be present on the hind bases of the other fins.

In alcohol, the pale red, yellow and black coloration disappears.

Comments. — Vaillant (1902, fig. 33) illustrated a specimen with a blunt snout. I have examined his type series and find that this is an abnormality very likely due to damage to the specimen. In the remaining types as with all the other material available, the snout is more pointed and is as shown by Tweedie (1952, fig. 3). Unfortunately the latter mis-identified his specimen as *H. ocellata* Van der Hoeven.

The species is previously known from a single locality in Perak and its range is now extended to Pahang, Negri Sembilan and Johore.

### **Homaloptera (Neohomaloptera) johorensis** Herre

*Homaloptera (Neohomaloptera) johorensis* Herre, 1944: 51 (Simpang Rengam, Johore).

*Homaloptera (Neohomaloptera) johorensis*; Hora, 1950: 54 (Simpang Rengam, Johore).

*Neohomaloptera johorensis*; Silas, 1953: 203 (Simpang Rengam, Johore).

Material examined. — SU 39841 (1), Simpang Rengam, Johore, Malaya, A. W. Herre, 12.10.40; NMS 1999 (1), 14th mile Muar to Parit Sulong road, Johore, P. Y. Berry, 7.5.61; NMS 2015 (36), BM 1967.11.15.11-12 (2), SU 66426 (2), RMNH 25920 (10), River Sarang Buaya, 14th mile Muar to Parit Sulong road, Johore, E. R. Alfred & C. K. Quek, 28.9.67.

Description. — Dorsal fin rays iii.6, anal rays ii-iii.4, pectoral rays iii-iv.7-9, pelvic rays ii.7. Origin of dorsal fin behind origin of pelvic fins, opposite 15th-18th scale on lateral line. Predorsal length 1.54-1.74 in standard length. Height of dorsal fin 4.12-5.50, height of anal fin 5.20-7.16, length of pectoral fin 3.06-3.93, length of pelvic fin 3.72-7.54 in standard length. Length of dorsal fin base 5.89-7.70 in standard length and 1.18-1.83 in height of that fin. Pectoral fins reaching pelvic fins. Origin of pelvic fin opposite 10th-14th scale on lateral line. Pelvic fins not reaching anus. Origin of anal

fin opposite 23rd-29th scale on lateral line. Length of anal fin base 8.74-13.31 in standard length and 1.39-2.31 in height of that fin.

Scales in lateral line 31-37, above lateral line  $5\frac{1}{2}$ - $6\frac{1}{2}$ , between lateral line and origin of pelvic fin 4-5. Caudal peduncle scales  $3\frac{1}{2}$ / $1\frac{1}{2}$ . Predorsal scales 16-20. Scales small and not keeled. Ventral surface scaleless up to hind end of pelvic fin base, except for an oblong mid-ventral patch of scales extending forwards between those fins (fig. 1f).

Head depressed, its ventral surface flattened. Snout blunt. Body moderately compressed, its anterior dorsal profile convex and anterior ventral profile concave or almost horizontal. Depth of body at origin of dorsal fin 4.37-5.70, length of head 3.29-3.89, depth of head 5.83-7.95, width of head 4.55-5.78 in standard length. Least depth of caudal peduncle 7.38-10.48 in standard length, 1.13-1.71 in its own length. Length of caudal peduncle 5.38-7.19 in standard length. Length of snout 1.78-2.33, postorbital length 1.87-2.58, interorbital width 2.08-2.91, width of gape 2.63-4.90, depth of head 1.64-2.36, width of head 1.22-1.69 in length of head. Diameter of eye 2.27-5.00 in length of head, 1.04-2.25 in length of snout, 1.18-2.25 in postorbital length. Two pairs of maxillary and two pairs of rostral barbels of which the inner maxillary is the shortest and situated close to the outer maxillary and the outer rostral is longer than the other three and equals 2.18-3.45 in length of head.

T.l. 20.6-28.4 mm; s.l. 16.3-23.7 mm.

Coloration. — In life, the dorsum and sides of the head and body, including the ventral surface behind the anal origin, is mottled with fine, reddish-brown spots, forming several thin, vague, longitudinal bands, one along each scale row. Posteriorly, this mottling tends to form 4 broad, vague bands encircling the body, with the first across the dorsal origin, the second across the hind end of the dorsal fin, the third behind the anal base, and the last around the caudal base. Occasionally 1-3 such bands may be present between the head and the dorsal origin. Laterally, a dark brown stripe runs from the inner rostral barbel through the eye, thence along the lateral line, fading away opposite the hind end of the pectoral base. Usually, there is another such stripe running downwards from the eye to the pectoral base.

Fins with a yellowish tinge which is most pronounced in the caudal. Paired fins and anal fin with a single transverse row, and dorsal fin with 2-3 such rows of black spots. Caudal with 2-3 irregular, dark brown transverse bands. A small black blotch at the dorsal and anal origin and on the anterior base of the paired fins, and a larger conspicuous one on the lower caudal base.

In alcohol the red and yellow coloration disappears.

Comments. — From *Homaloptera* as defined by Hora (1932), the sub-

genus *Neohomaloptera* was distinguished by Herre (1944) as follows: — Two pairs of barbels at the angle of the mouth, instead of one; the rays of the pectoral and ventral reduced in number, the former with 12 or 13 instead of 14 to 20, the latter with 7 instead of 8 to 10; the pectoral further has but 3 or 4 simple rays instead of 4 to 8. The caudal is slightly rounded, not forked or emarginate, as in typical *Homaloptera*; the caudal peduncle is short and as deep as long.

On the basis of these distinctions, Silas (1953) gave *Neohomaloptera* generic rank. However, on comparing these characters for the nine Malayan species (table 1), I find that apart from the presence of two pairs of maxillary

Table 1. Comparison of some characters in Malayan Homalopteridae

Species	Simple pectoral rays	Total pectoral rays	Total pelvic rays	Depth caudal peduncle in its length
<i>zollingeri</i>	4-5	15-16	10	1.61-2.10
<i>nigra</i>	3-5	14-16	10-11	1.71-2.15
<i>ogilviei</i>	5	15-18	8-9	1.95-3.32
<i>leonardi</i>	6	16-17	9-10	1.76-2.00
<i>orthogoniata</i>	5-7	15-17	8-9	1.66-2.05
<i>johorensis</i>	3-4	11-12	9	1.13-1.71
<i>tweediei</i>	3-5	13-16	9-10	1.27-1.95
<i>nebulosa</i>	4-5	13-14	9	1.31-1.48
<i>smithi</i>	5-6	16-18	9	1.42-2.00

barbels and the lower total pectoral ray count of 11-12 (not 12-13 as originally described), the other features are not adequately distinctive. The shape of the caudal fin is also emarginate and not rounded. I have therefore reverted *Neohomaloptera* to its original sub-generic rank.

The species is previously known from only two specimens, the holotype and a topotype, both collected in 1940. Despite a number of attempts at the type locality I failed to collect any specimens. Its re-discovery now after 20 years is therefore of interest. The large series available was collected from an adjacent river drainage about 40 miles north-east of the type locality.

### **Homaloptera (Homalopteroides) tweediei** Herre

*Homaloptera tweediei* Herre, 1940: 7, pl. 1 (Mawai, Johore).

*Homaloptera* (Sp. aff.?) *Wassinskii*; (nec Bleeker) Duncker, 1904: 175 (Kuala Lumpur).

*Homaloptera wassinskii*; (nec Bleeker) Fowler, 1938: 55 (Kuala Lumpur).

*Homaloptera tweediei*; Tweedie, 1940: 75 (Mawai District, Johore); Hora, 1950: 54 (Mawai District, Johore); Herre, 1944: 51 (Kota Tinggi, Johore); Silas, 1953: 199 (Mawai District, Johore); Tweedie, 1953: 172, pl. 38, fig. 17 (Kota Tinggi, Johore).

Material examined. — Paratype, BM 1938.12.1.132 (1), Mawai District, Johore, Malaya, A. W. Herre 27.2.37; NMS 1496 (4), same data; SU 39842 (1), Kota Tinggi, Johore, A. W. Herre, 17.10.40; NMS 1497 (6), Mawai District, Johore, M. Tweedie, 3.1938; NMS 2014 (5), River Sedili, West of Gunong Sumalayang, Johore, E. R. Alfred, 15.9.67; NMS 2016 (1), River Mupor (Ulu), Mawai District, Johore, E. R. Alfred, 4.10.67; NMS 2017 (8), River Machap, 8th mile Ayer Itam to Johore Bahru road, Johore, C. K. Quek & A. Raphael, 28.9.67; NMS 1755 (3), 2nd mile Kampong Batu Tiga road, Selangor, E. R. Alfred, 5.6.66; ZMA 103207 (2), Kuala Lumpur, Selangor, G. Dürcker, 1901; NMS 1498 (1), Kuala Brang, Trengganu, M. Tweedie, 8.1950; NMS 1757 (21), same locality, E. R. Alfred, 8.7.58; NMS 1576 (14), River Tok Dor, Kampong Tok Dor, Trengganu, E. R. Alfred, 5.7.58; NMS 1758 (6), BM 1967.11.15.13-14 (2), SU 66427 (2), RMNH 25924 (5), same locality, E. R. Alfred & C. K. Quek, 4.8.66.

Description. — Dorsal fin rays ii-iii.6-7, anal rays ii-iii.4-5, pectoral rays iii-v.7-11, pelvic rays ii.7. Origin of dorsal fin behind origin of pelvic fins, opposite 13th-17th scale on lateral line. Predorsal length 1.72-1.97 in standard length. Height of dorsal fin 3.45-5.35, height of anal fin 5.17-8.11, length of pectoral fin 3.17-4.28, length of pelvic fin 4.19-5.98 in standard length. Length of dorsal fin base 5.33-8.39 in standard length and 1.25-1.84 in height of that fin. Pectoral fins reaching pelvic fins. Origin of pelvic fin opposite 11th-14th scale on lateral line. Pelvic fins not reaching anus. Origin of anal fin opposite 24th-30th scale on lateral line. Length of anal fin base 9.12-16.18 in standard length and 1.47-2.50 in height of that fin.

Scales in lateral line 32-36, above lateral line  $4\frac{1}{2}$ - $5\frac{1}{2}$ , between lateral line and origin of pelvic fin 4-6. Caudal peduncle scales  $2\frac{1}{2}$ - $3\frac{1}{2}$ /13- $3\frac{1}{2}$ . Predorsal scales 11-18. Scales small and not keeled. Ventral surface scaleless up to in front of origin of pelvic fins (fig. 1g).

Head depressed, its ventral surface flattened. Snout blunt. Body depressed in front of, and moderately compressed behind dorsal fin origin, its dorsal profile slightly curved and ventral profile almost horizontal. Depth of body at origin of dorsal fin 5.08-6.44, length of head 2.88-3.68, depth of head 5.96-7.92, width of head 4.65-5.88 in standard length. Least depth of caudal peduncle 7.20-11.46 in standard length, 1.27-1.95 in its own length. Length of caudal peduncle 4.34-7.51 in standard length. Length of snout 2.14-2.77, postorbital length 2.00-2.50, interorbital width 2.68-4.17, width of gape 3.26-5.69, depth of head 1.93-2.39, width of head 1.35-1.83 in length of head. Diameter of eye 2.68-4.11 in length of head, 1.16-1.80 in length of snout, 1.22-1.89 in postorbital length. A pair of maxillary and two pairs of rostral barbels, of which the maxillary is longer than the other two and equals 3.39-5.86 in length of head.

T.l. 18.4-37.7 mm; s.l. 14.4-30.0 mm.

Coloration. — In life, the ground colour is pale yellow. An irregular and diffuse dark brown lateral stripe runs from the base of the outer rostral

barbel to the eye and thence to the caudal base. Dorsum and sides of head and body with fine black specks with vague indications of the following 5 transverse bands: — The first across the occiput, the second at the anterior dorsal base, the third at the hind end of the dorsal fin, the fourth opposite the anal fin, and the last around the caudal base. A short dark brown stripe runs from the base of the inner rostral barbel to about half way to the eye. There is also a dark brown patch behind the eye on the opercle, below the lateral stripe. Head, body, and fins sometimes with fine pink specks.

Fins hyaline. Caudal fin basally dusky brown with an irregular, dusky transverse band at about half way along its length. Other fins with fine black specks forming 1-3 transverse bands. Pectoral with a dark patch at the base.

In alcohol, the pale yellow and pink coloration disappears.

Comments. — Until I re-examined a paratype, I was much confused about the identity of my specimens whenever I used Hora's key (1941b: 61), where he erroneously characterised the species as with the dorsal origin opposite to or before that of the pelvic fins. In *H. tweediei* the dorsal origin is distinctly behind that of the pelvics, and there are no Malayan species where those positions are opposite each other.

The species is previously known from a small area in south-east Johore and its range is now extended northwards to Selangor and Trengganu.

**Homaloptera (Homalopteroides) nebulosa** sp. nov. (pl. 1, figs. 3, 4)

Holotype. — NMS 2020, River Sok, Kampong Sok, Kelantan, Malaya, E. R. Alfred, 5.8.66.

Paratypes. — NMS 1759 (1), BM 1067.11.15.15 (1), SU 66428 (1), RMNH (1), same data as holotype.

Diagnosis. — A species of *Homaloptera* with the origin of the dorsal fin behind the origin of the pelvic fins. Pectoral rays iv-v.9-10. Pectoral fins reaching pelvic fins. Pelvic fins not reaching anus. Scales not keeled. Lateral line 36-40. Caudal peduncle scales 16. Transverse scale rows 6-6½|1|6-6½. Scaleless venter reaching in front of origin of pelvic fins. A dark brown stripe along lateral line with 5-6 irregular brown patches across dorsum and sides.

Description. — Dorsal fin rays iii.6(iii.6-7), anal rays ii.5(ii.4-5), pectoral rays v.9(iv-v.9-10), pelvic rays ii.7(ii.7). Origin of dorsal fin behind origin of pelvic fins, opposite 18th(16th-17th) scale on lateral line. Predorsal length 1.06(1.79-1.85) in standard length. Height of dorsal fin 3.89(4.04-4.44),

height of anal fin 5.70(5.31-6.24), length of pectoral fin 3.45(3.36-3.83), length of pelvic fin 4.08(4.37-4.69) in standard length. Length of dorsal fin base 6.81(6.39-7.22) in standard length and 1.75(1.46-1.69) in height of that fin. Pectoral fins reaching pelvic fins. Origin of pelvic fin opposite 16th (14th-15th) scale on lateral line. Pelvic fins not reaching anus. Origin of anal fin opposite 28th(28th-30th) scale on lateral line. Length of anal fin base 9.42(9.29-11.00) in standard length and 1.65(1.71-1.95) in height of that fin.

Scales in lateral line 40(36-39), above lateral line 6(6½), between lateral line and origin of pelvic fin 6(6-6½). Caudal peduncle scales 3½/1/3½(3½/1/3½). Predorsal scales 18(16). Scales small and not keeled. Ventral surface scaleless up to in front of origin of pelvic fins (fig. 1h).

Head depressed, its ventral surface flattened. Snout pointed. Body moderately compressed, its dorsal profile curved and ventral profile almost horizontal. Depth of body at origin of dorsal fin 5.98(5.63-6.42), length of head 3.40(3.28-3.36), depth of head 6.81(6.62-7.00), width of head 5.21(5.19-5.63) in standard length. Least depth of caudal peduncle 8.72(8.04-9.24) in standard length, 1.39(1.31-1.48) in its own length. Length of caudal peduncle 6.28(5.63-6.56) in standard length. Length of snout 2.18(2.16-2.26), post-orbital length 2.32 (2.09-2.19), interorbital width 2.77(2.80-3.09), width of gape 3.79 (3.50-3.78), depth of head 2.00(1.97-2.13), width of head 1.53 (1.58-1.63) in length of head. Diameter of eye 2.88(3.04-3.19) in length of head, 1.32(1.35-1.90) in length of snout, 1.24(1.41-1.52) in postorbital length. A pair of maxillary and two pairs of rostral barbels, of which the maxillary is longer than the other two and equals 4.00(3.72-4.67) in length of head.

T.l. 28.3-31.4 mm; s.l. 22.3-24.5 mm. Holotype, t.l. 31.4, s.l. 24.5 mm.

Coloration. — In alcohol, the entire surface of the head and body, excluding the ventral surface between the gill openings and the hind ends of pelvic fin bases, is mottled with fine brown spots. A dark brown lateral stripe runs from the base of the inner rostral barbel to the eye, and thence to the caudal base. Dorsum with 6 dark brown blotches, the first between the head and dorsal origin, the second at the dorsal origin, the third at the hind end of dorsal fin, the fourth opposite the anal fin and the fifth at and encircling the caudal base. Caudal fin brown with the lobes or tips hyaline. Other fins hyaline. Anal and pelvics with 2 and dorsal and pectorals with 3-4 transverse rows of brown spots. Pectorals and pelvics with a dark brown blotch at the base.

Comments. — In general facies, coloration, fin ray counts and shape of the naked venter, this species closely resembles *H. tweediei*. It can however be distinguished from the latter by its higher transverse scale row count and

higher lateral line count, as noted in the key (above). From *H. smithi* it is easily distinguished by the coloration, lower total pectoral fin ray count and the eyes standing out prominently above the dorsal profile of the head, a character it shares with *H. tweediei*. In contrast with *H. smithi*, which has a blunt snout and the body depressed in front of the dorsal fin, *H. nebulosa* further has a pointed snout and a moderately compressed body.

### **Homaloptera (Homalopteroides) smithi** Hora

*Homaloptera smithi* Hora, 1932: 286 (Tadi Stream and Klong Pong, Ban Kiriwong, Nakon Sritamarat, Thailand).

?*Homaloptera wassinkii*; (nec Bleeker) Hora, 1941a: 5, pl. 1, figs. 1 & 2 (Plus River, Jalong, Perak); Silas, 1953: 191 (Malay Peninsula).

Material examined. — KU (3), Klong Pong, Ban Kiriwong, Nakon Sritamarat, Thailand. H. M. Smith, 12.7.28; NMS 2012 (7), BM 1967.11.15. 9-10 (2), SU 66425 (2), River Sedili, North of Gunong Sumalayang, Johore, R. E. Sharma & E. R. Alfred, 15.9.67; NMS 2021 (7), RMNH 25923 (4), same locality, E. R. Alfred, 14.10.67; NMS 1552 (3), River Jelai, 14th mile Tampin to Kuala Pilah road, Negri Sembilan, P.Y. Berry, 8.10.61; NMS 2010 (3), same locality, C. K. Quek & M. Dali, 1.5.67; NMS 2011 (6), River Sedili, West of Gunong Sumalayang, Johore, R. E. Sharma & E. R. Alfred, 15.9.67; NMS 2019 (1), River Ketil, Baling, Kedah, J. I. Furtado, 2.4.67; NMS 2018 (2), River Sari, Kampong Padang Terap, Kedah, J. I. Furtado, 31.3.67.

Description. — Dorsal fin rays ii-iii.6-7, anal rays ii.4-5, pectoral rays v-vi.10-12, pelvic rays ii.7. Origin of dorsal fin behind origin of pelvic fins, opposite 15th-20th scale on lateral line. Predorsal length 1.07-1.85 in standard length. Height of dorsal fin 4.01-5.18, height of anal fin 5.49-6.97, length of pectoral fin 2.77-3.61, length of pelvic fin 3.89-5.04 in standard length. Length of dorsal fin base 5.74-7.51 in standard length and 1.33-1.72 in height of that fin. Pectoral fins reaching pelvic fins. Origin of pelvic fin opposite 13th-16th scale on lateral line. Pelvic fins not reaching anus. Origin of anal fin opposite 27th-31st scale on lateral line. Length of anal fin base 9.00-14.44 in standard length and 1.53-2.50 in height of that fin.

Scales in lateral line 35-40, above lateral line  $5\frac{1}{2}$ - $7\frac{1}{2}$ , between lateral line and origin of pelvic fin 5-7. Caudal peduncle scales  $3\frac{1}{2}$ / $1\frac{3}{2}$ . Predorsal scales 16-22. Scales small and not keeled. Ventral surface scaleless up to in front of origin of pelvic fins (fig. 11).

Head depressed, its ventral surface flattened. Snout blunt. Body depressed in front of, and compressed behind dorsal fin, its dorsal profile curved and ventral profile almost horizontal. Depth of body at origin of dorsal fin 5.47-6.67, length of head 3.06-3.72, depth of head 6.00-7.50, width of head 4.75-5.80 in standard length. Least depth of caudal peduncle 8.18-10.01 in standard length, 1.42-2.00 in its own length. Length of caudal peduncle 4.87-6.58 in standard length. Length of snout 1.89-2.32, postorbital length 1.97-

2.48, interorbital width 2.21-3.13, width of gape 2.91-3.89, depth of head 1.78-2.46, width of head 1.32-1.67 in length of head. Diameter of eye 2.90-3.84 in length of head, 1.25-1.92 in length of snout, 1.23-1.83 in postorbital length. A pair of maxillary and two pairs of rostral barbels, of which the maxillary is the longest and equals 3.50-5.39 in length of head.

T.l. 25.3-62.3 mm; s.l. 20.2-50.6 mm.

Coloration. — In life, the ground colour is dirty yellow, with brown markings on the head and body excepting the ventral surface between the snout and the anal origin. Dorsum with 6 brown saddles, the first two between the head and the dorsal fin, the third at the dorsal origin, the fourth at the hind end of the dorsal fin, the fifth opposite the anal fin, and the sixth around the caudal base. Laterally, the body is pale brown. Dorsum and sides of head mottled with brown. A brown stripe runs forward from the eye, through the base of each rostral barbel to the tip of the snout forming a U-shaped marking. Behind the eye, the stripe is continued along the lateral line to the caudal base as a series of brown blotches. Fins pale yellow, pectorals with 2 and others with 1 brown transverse bands. In addition there is a brown blotch at the dorsal and anal origins and on the bases of the pectorals and pelvics. Caudal fin base brown, with a brown longitudinal stripe along the lowermost rays.

In alcohol the yellow coloration disappears and becomes dirty white.

Comments. — I now provisionally refer to this species the specimen described by Hora (1941a : 5, pl. 1, figs. 1 & 2) as *H. wassinkii* Bleeker. Unfortunately the specimen is lost and there is no way of verifying its identity. However, on comparing his measurements and the details in his figure with those of my *H. smithi* and the type series of *H. wassinkii* (Alfred, 1962 : 36), his specimen cannot be referred to the latter. In particular his has a lesser body depth (6.61), smaller eye (4.32), and lower lateral line count (40).

*H. smithi* is previously known from Thailand and is new to Malaya.

#### ECOLOGICAL NOTES

The morphological adaptations of homalopterid fishes, such as those described by Hora (1932 : 322-327), have led to the general assumption that these fishes are confined to torrential streams at high altitudes. Commenting on torrent-dwelling organisms in Malaya, Johnson (1957 : 62) however suggests that there are distinctive low-level and high-level torrent faunas and that at high levels fishes are absent, while *Homaloptera*, which he includes in his low level fauna, are "distributed along a set of narrow zones at the

foot of mountain ranges". In their study of the related Bornean genus *Gastromyzon*, Inger & Chin (1961 : 167) describe these fishes as characteristic of small, clear and swift forest streams wherever these pass a boulder-strewn bottom. They further point out that "though one usually associates that situation with moderate elevations such streams occur in many places in Borneo within a few hundred feet of sea level." My own observations *Homaloptera* are in agreement with those of Inger & Chin. The 51 collections upon which the present study is based came from altitudes ranging between about 25-800 ft above sea level. At higher altitudes, in the cascading, boulder-strewn torrents of the upper reaches of rivers, *Homaloptera* is absent, although certain generalised forms, e.g., *Puntius lateristriga* (Valenciennes) and *Acrossocheilus hendersoni* (Herre), and crevice-dwelling forms, e.g., *Clarias teijsmanni* Bleeker and *Mastacembelus unicolor* (Cuvier), may be present. *Homaloptera* is also less conservative than *Gastromyzon* and is not confined to boulder-strewn habitats. Based on the type of substratum with which they are generally associated, the following 4 habitat types may be recognised: —

(1) *Rocks*. These are the rock- and pebble-strewn riffles and rapids that occur intermittently along the middle and lower reaches of streams and rivers (pl. 2, fig. 1). They include Johnson's low level torrents and Inger & Chin's boulder-strewn streams.

(2) *Loose gravel*. Comparatively slower flowing riffles than (1) usually on the lower reaches of streams, in which the substratum comprises beds of loose gravel overlying sand (pl. 2, fig. 2).

(3) *Dead vegetation*. Riffle-like situations brought about by clumps of partly submerged logs and dead branches of trees, often with small accumulations of dead leaves snagged among them (pl. 2, fig. 3).

(4) *Living vegetation*. The semi-aquatic and terrestrial vegetation (mainly grasses) on the banks of streams which are subjected to partial flooding (pl. 2, fig. 4).

Following the method used by Beck (1965), the differences in the physical features of the 4 habitat types may be revealed by differences in species composition when the non-common species are listed for each pairing of habitat types (table 2). This information must however be used conservatively since it is possible that one or more species did not appear in my collections although they do occur in those habitat types where they have not been collected. Consideration should also be given to stray individuals between different habitat types which may be closely adjacent to one another. Nevertheless, it is interesting to note that differences do exist in each pairing of habitat types.

Table 2. Non-common homalopterid species

Rocks	×	Loose gravel
<i>zollingeri</i>		<i>johorensis</i>
<i>nigra</i>		
<i>leonardi</i>		
<i>orthogoniata</i>		
<i>smithi</i>		
<i>tweediei</i>		
Rocks	×	Living vegetation
<i>zollingeri</i>		<i>johorensis</i>
<i>nigra</i>		<i>tweediei</i>
<i>leonardi</i>		<i>ogilviei</i>
<i>orthogoniata</i>		
<i>smithi</i>		
Rocks	×	Dead vegetation
<i>zollingeri</i>		<i>tweediei</i>
<i>nigra</i>		<i>ogilviei</i>
<i>leonardi</i>		
<i>orthogoniata</i>		
Dead vegetation	×	Loose gravel
<i>tweediei</i>		<i>johorensis</i>
<i>ogilviei</i>		
<i>smithi</i>		
<i>nebulosa</i>		
Dead vegetation	×	Living vegetation
<i>smithi</i>		<i>johorensis</i>
<i>nebulosa</i>		
Living vegetation	×	Loose gravel
<i>tweediei</i>		o
<i>ogilviei</i>		

The present study includes sampling from 28 different localities as follows: — Rocks (10), Loose gravel (2), Dead vegetation (6) and Living vegetation (10). Applying the species-presence method used by Curtis & Greene (1949), presence percentages are given in figure 3, showing the ecological preferences of each species. The figures are however low and mostly below 50%. This is undoubtedly mainly due to my collections extending outside the geographical range of each species. Hence if we restrict the sampling to a selected area well within the geographical range of a group of species, as has been done for the River Tahan (fig. 4), presence percentages are much higher.

Figure 3 indicates that there are four non-ubiquitous species, viz., *H. zollingeri*, *H. nigra*, *H. leonardi* and *H. orthogoniata*, with the remaining five

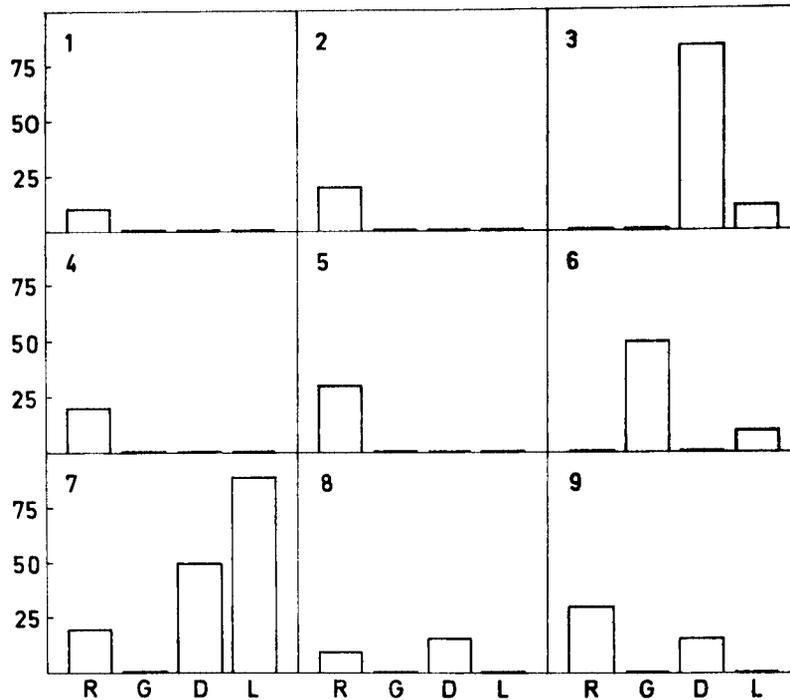


Fig. 3. Bar diagrams of presence percentages (ordinates) for nine species of *Homaloptera* in each of the four habitat types. R = Rocks, G = Loose gravel, D = Dead vegetation, L = Living vegetation. 1. *H. zollingeri*, 2. *H. nigra*, 3. *H. ogilviei*, 4. *H. leonardi*, 5. *H. orthogoniata*, 6. *H. johorensis*, 7. *H. tweediei*, 8. *H. nebulosa*, 9. *H. smithi*.

species showing varying degrees of ubiquity. The fact that non-ubiquity is confined to rocks is indicative that the substratum here is comparatively much more stable and permanent. Thus, loose gravel and dead vegetation are easily dispersed not only during floods, but whenever there is an increased volume of water flow following the intermittent, short and heavy bouts of local rainfall that are of common occurrence in Malaya. Such flooding would however favour access to living vegetation, which may on the other hand be totally inaccessible especially during drought. Occurrences of these three habitat types may therefore be considered as no more than ephemeral. Hence, while *H. ogilviei* may show a marked ecological preference for dead vegetation, it can often be subjected to dispersal or loss of this substratum resulting in it having to seek out other convenient substrata which, in this instance, is living vegetation. A similar explanation could be given for the ubiquitous distribution of *H. johorensis* and *H. tweediei*. *H. smithi* occurs on rocks and dead vegetation with a preference for the former. Its presence on the latter

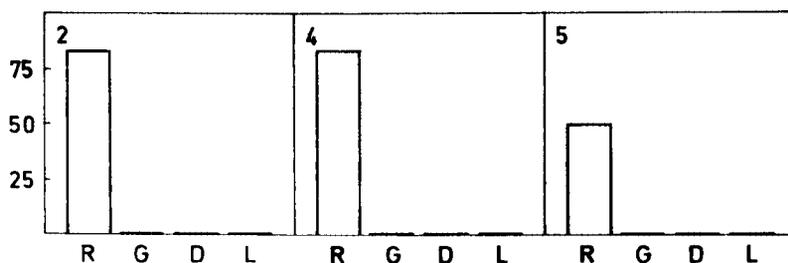


Fig. 4. Bar diagrams of presence percentages for three species of *Homaloptera* on the River Tahan. (Abbreviations as in fig. 3).

may be accounted for by stray individuals since, in all instances that it was collected from dead vegetation, it also occurred in much larger numbers on rocks in the close vicinity. The occurrence of *H. tweediei* on rocks could also be similarly accounted for. The data on *H. nebulosa* are inconclusive and further sampling is necessary.

In an attempt to map out the distribution of *Homaloptera* in relation to water velocity and habitat type, a survey was made of the riffle at Chegar Sireh, River Tahan, during 24 February-3 March, 1958 (fig. 5). The riffle lies immediately downstream of a point where the river sharply turns left. Two habitat types were recognisable, viz., rocks and dead vegetation. A few large trees, mainly *Dipterocarpus oblongifolius*, formed a partial canopy and offered moderate shade. Water temperature readings averaged 25.2° C, pH 7.2, and alkalinity 19 p.p.m. Water velocity was determined crudely by the flotation method using a 2" specimen tube partly filled with water. Direction of current was plotted with the same specimen tube, excepting for the seepage through the exposed rocks of the centre of the riffle where a solution of indigo was used. Specimens were collected by the following two methods: — (i) holding a fine mesh hand-net between my feet, hand scooping rocks and pebbles into the net, and then examining the contents on the bank, and (ii) observing and turning over rocks and pebbles underwater with a face-mask and snorkel, and using a small rigid, conical net made of fine wire mesh.

Figure 5 shows that the 4 species of *Homaloptera* occurring at Chegar Sireh, were found almost exclusively within the main channel of the river and in water velocities ranging from 2.5 to 4.3 ft/sec. Within this range, the ecological isolation of *H. ogliviei* to dead vegetation, and *H. leonardi*, *H. nigra* and *H. orthogoniata* to rocks was well marked. Of the rock-dwelling species, *H. leonardi* occurred in the highest water velocity (4.3 ft/sec) while *H. orthogoniata* and *H. nigra* were found towards the lowest (2.5-3.0 ft/sec).

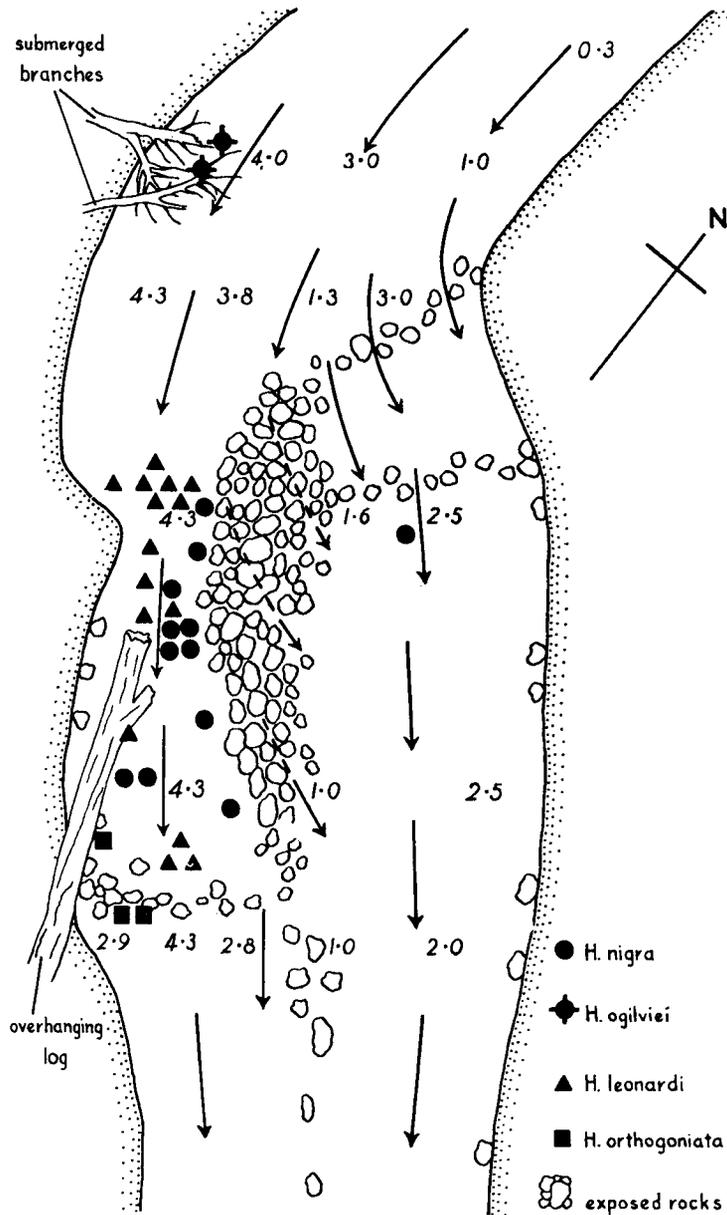


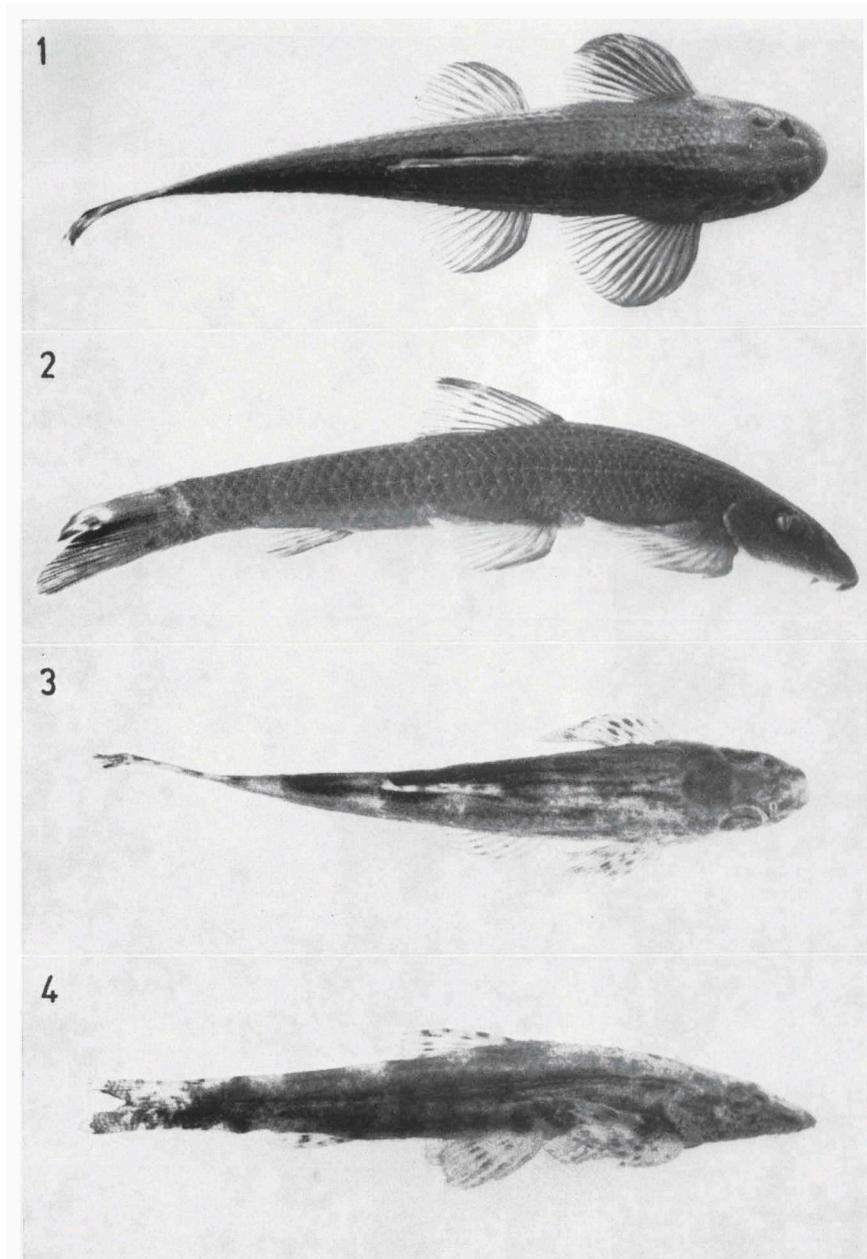
Fig. 5. Sketch map of Chegar Sireh, River Tahan, Pahang, 24 Feb.-3 March, 1958, showing distribution of *Homaloptera* in relation to habitat type and water velocity. (The arrows denote direction of water flow and the figures are water velocity in feet/second).

Underwater observations however indicated that while *H. orthogoniata* was usually located on the surface of rocks and hence exposed to the current, *H. leonardi* and *H. nigra* were usually crevice dwellers. Of the 3 other species of torrent fishes collected, viz., *Glyptothorax major* (Boulenger), *G. platypogonoides* (Bleeker) and *Acrochordonichthys rugosus* (Bleeker), none occurred with the homalopterids. *Glyptothorax* was found on and under rocks at an average water velocity of 2.8 ft/sec, while *Acrochordonichthys* was found buried in sand under rocks at a water velocity of 2.0 ft/sec., and well away from the main channel of the river.

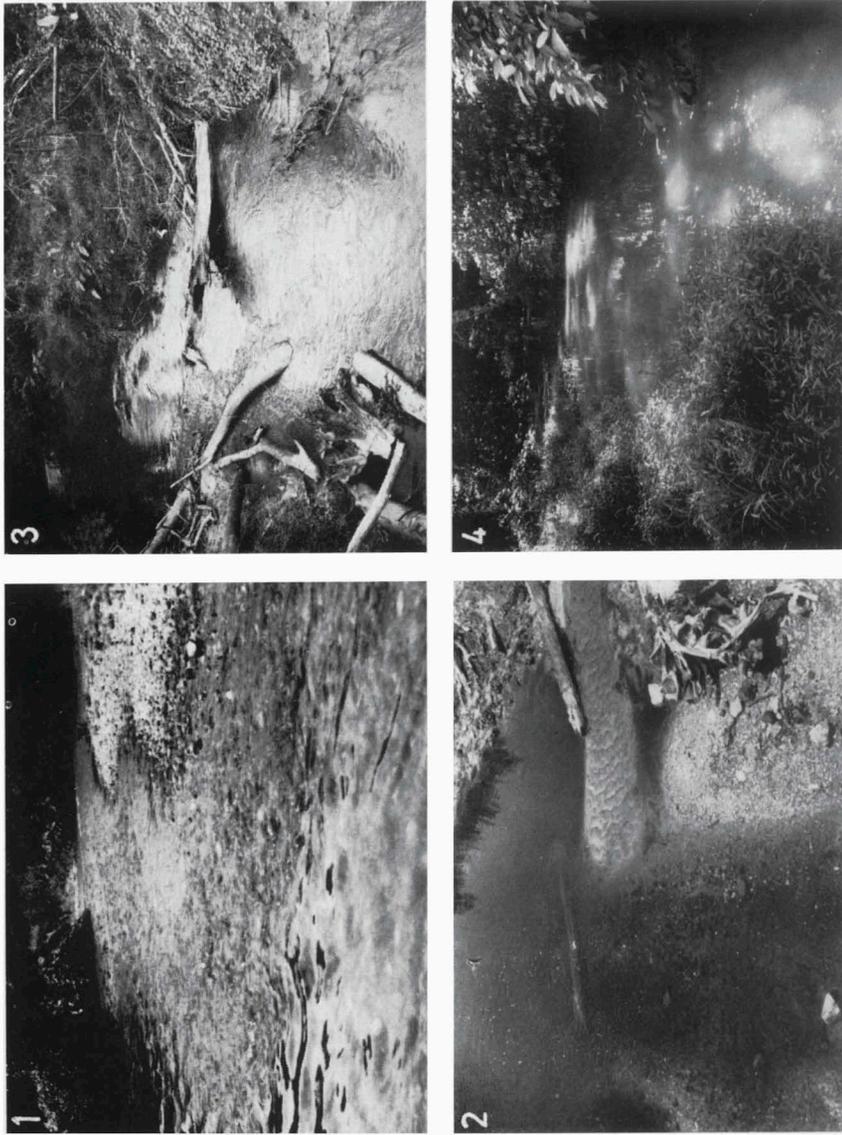
## REFERENCES

- ALFRED, E. R., 1962. Notes on a re-examination of some Bleeker type specimens of Indo-Malayan fresh-water fishes. Part 1. Cobitidae and Homalopteridae. — Bull. Nat. Mus. Singapore, 30: 32-37.
- , 1967. Homaloptera ogilviei, a New Species of Homalopterid Fish from Malaya. — Copeia, 1967 (3): 587-591, figs. 1-4.
- BECK, W. M., 1965. The Streams of Florida. — Bull. Florida State Mus., 10 (3): 91-126.
- BLEEKER, P., 1853. Over eenige nieuwe soorten van Homaloptera v. Hass. (Balitora Gray), van Java en Sumatra. — Nat. Tijdschr. Ned. Indië, 4: 155-164.
- , 1863-64. Atlas Ichthyologique des Indes Orientales Néerlandaises, 3: 1-150, pls. 102-144.
- CURTIS, J. T., & H. C. GREENE, 1949. A study of relic Wisconsin prairies by the species-presence method. — Ecology, 30 (1): 83-92, figs. 1, 2.
- DUNCKER, G., 1904. Die Fische der malayischen Halbinsel. — Mitt. naturh. Mus. Hamburg, 21: 133-207, map 1, text-fig. 1, pls. 1, 2.
- FOWLER, H. W., 1905. Some Fishes from Borneo. — Proc. Acad. Nat. Sci. Philadelphia, 57: 455-523.
- , 1938. A list of the fishes known from Malaya. — Fish. Bull. Singapore, 1: 1-268, i-lvi.
- HERRE, A. W. C. T., 1940. New species of fishes from the Malay Peninsula and Borneo. — Bull. Raffles Mus. Singapore, 16: 5-26, pls. 1-20.
- , 1944. Notes on fishes in the Zoological Museum of Stanford University. XVII. New fishes from Johore and India. — Proc. Biol. Soc. Washington, 57: 45-52.
- HORA, S. L., 1932. Classification, Bionomics and Evolution of Homalopterid Fishes. — Mem. Indian Mus., 12 (2): 263-330, figs. 1-4, pls. 10-12.
- , 1941a. On a small collection of fish from Perak, Federated Malay States. — Bull. Raffles Mus. Singapore, 17: 5-11, figs. 1, 2, pl. 1.
- , 1941b. Notes on Malayan fishes in the Collection of the Raffles Museum, Singapore. Parts 1 & 2. — Bull. Raffles Mus. Singapore, 17: 44-64, figs. 1-6, pls. 5, 6.
- , 1950. Notes on Homalopterid fishes in the collection of certain American Museums. — Rec. Indian Mus., 48 (1): 45-57.
- INGER, R. F., & P. K. CHIN, 1961. The Bornean Cyprinoid Fishes of the Genus *Gastromyzon* Günther. — Copeia, 1961 (2): 166-176, figs. 1-5.
- JOHNSON, D. S., 1957. A Survey of Malayan Freshwater Life. — Malayan Nat. Journ., 12 (2): 57-65, figs. 1-6.
- SILAS, E. G., 1953. Classification, Zoogeography and Evolution of the Fishes of the Cyprinoid families Homalopteridae and Gastromyzonidae. — Rec. Indian Mus., 50 (2): 173-264, figs. 1-6, pl. 5.

- TWEEDIE, M. W. F., 1940. Additions to the collections of fishes in the Raffles Museum.  
— Bull. Raffles Mus. Singapore, 16: 68-82.
- , 1953. Malayan Aquarium Fishes. 2. Carps and Loaches. — Malayan Nat. Journ.,  
7 (5): 167-172, pls. 35-38.
- VAILLANT, L., 1902. Poissons. Résultats zoologiques de l'expédition scientifique néerlandaise au Bornéo Central. — Notes Leyden Mus., 24: 1-166, figs. 1-47, pls. 1, 2.



Figs. 1, 2, *Homaloptera nigra* (holotype); figs. 3, 4, *Homaloptera nebulosa* (holotype).



Habitat types of Malayan Homalopteridae. 1, Rocks; 2, Loose gravel; 3, Dead vegetation;  
4, Living vegetation.