

THE GIANT MALAYAN CATFISH, *WALLAGO LEERII*
BLEEKER, 1851, AND THE IDENTITIES OF
WALLAGONIA TWEEDIEI HORA & MISRA, 1941, AND
WALLAGO MACULATUS INGER & CHIN, 1959
(TELEOSTEI: SILURIDAE)

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ABSTRACT.- The taxonomy of the giant Malayan catfish, *Wallago leerii* Bleeker, 1851 (Teleostei: Siluridae), which occurs in the larger streams and rivers of Thailand, Peninsular Malaysia, Sumatra and Borneo, is clarified. *Wallagonia tweediei* Hora & Misra, in Hora & Gupta, 1941, from Pahang, Peninsular Malaysia, is shown to be a junior subjective synonym of *Wallago leerii*. Its biology is also reviewed. The usefulness and variability of the various taxonomic characters used thus far are discussed. *Wallago maculatus* Inger & Chin, 1959, from Sabah, Borneo, cannot be distinguished from *W. leerii* by known meristic or morphometric characters, but is tentatively regarded as a separate species because of its distinctive colour pattern in life.

INTRODUCTION

Roberts (1982) revised the systematics of the large predatory Southeast Asian silurid catfishes of the genus *Wallago* Bleeker, 1851. Several questions however, particularly regarding the validity of *Wallago tweediei* (Hora & Misra, 1941) and *Wallago maculatus* Inger & Chin, 1959, could not be answered with certainty due to lack of specimens.

Wallagonia tweediei was described on the basis of a single very large (1450 mm TL) specimen collected from Kuala Tahan in Pahang, Peninsular Malaysia (Hora & Misra, in Hora & Gupta, 1941). Roberts (1982) did not examine this specimen, and was apparently not aware of any other subsequent records of this species. Roberts (1982: 890) while recognising *Wallago maculatus* Inger & Chin, 1959, as a valid species, suggested that it might too be conspecific with *W. leerii*.

In diagnosing *W. leerii*, Roberts (1982) had available several specimens from Borneo and Sumatra, only one specimen from Singapore and none from Peninsular Malaysia, the latter being the type locality of *W. tweediei*. In the Zoological Reference Collection, National Uni-

versity of Singapore, there are numerous specimens of *Wallago* from Peninsular Malaysia, some identified by Michael Tweedie as *W. tweediei* (see Tweedie, 1950). This material includes the cast of the holotype of *W. tweediei*. Numbers of *W. leerii* of various sizes, including young, were obtained from aquaria and reared to larger sizes to ascertain changes in morphology due to growth.

The results of these studies show that *Wallagonia tweediei* is a subjective synonym of *W. leerii*. The present note serves to document the morphometric data which supports the present contention. Variations in colour patterns as well as changes in fin and body proportions are also discussed. Specimens of *Wallago* are among the largest freshwater fish in Malaysia and Borneo and have some commercial importance. Surprisingly, very little is known about the biology of *Wallago leerii*. D'Aubenton & Blanc (1967) had provided a synopsis of the systematics and biology of the other East Asian species, *Wallago attu* (Bloch & Schneider, 1801). As such, all available information on the biology, behaviour and ecology of *W. leerii* has also been gathered to assist in future studies of the species. *Wallago maculatus* Inger & Chin, 1959, is here regarded as a valid species, differing in its vertebral formula and its distinctive life colour.

Specimens are deposited in the Zoological Reference Collection (ZRC), Department of Zoology, National University of Singapore; California Academy of Science (including collections formerly at the Stanford University) (CAS and CAS-SU), San Francisco, U.S.A.; Field Museum of Natural History (FMNH), Chicago, U.S.A.; Sabah Museum, (SBM), Kota Kinabalu, Sabah, Malaysia; Fisheries Research Centre (FRCL), Likas, Kota Kinabalu, Sabah, Malaysia; and Balitbang Zoology, Museum Zoologicum Bogoriense (MZB), Bogor, Java, Indonesia. The abbreviations TL and SL are used for total and standard length respectively, with all measurements in millimetres.



Fig. 1. *Wallago leerii*. Freshly caught holotype male of *Wallagonia tweediei*, 1450 mm TL, ZRC 350, Kuala Tahan, Pahang (photograph: M.W.F. Tweedie). This was the photograph on which Hora & Misra's (in Hora & Gupta, 1941: 18) Text-fig. 2 was based.



Fig. 2. *Wallago leeri*. Another view of the freshly caught holotype male of *Wallagonia tweediei*, 1450 mm TL, ZRC 350, Kuala Tahan, Pahang (photograph: M.W.F. Tweedie).



Fig. 3. *Wallago leeri*. Large specimen (ca. 1400mm), Taman Negara National Park, Pahang. Caught 1990 (not preserved), showing darker body which obscures longitudinal bands (photograph: F. Lim).

Family **Siluridae**

Genus ***Wallago* Bleeker, 1851**

***Wallago leerii* Bleeker, 1851**
(Figs. 1-7)

Wallago Leerii Bleeker, 1851: 427 [Borneo: Sambas; Sumatra: Palembang]; Bleeker, 1862: 80 [no new locality]; Günther, 1864: 37 [no new locality]; Vaillant, 1902: 44 [central Borneo]; Sounter, 1933: no page number [Peninsular Malaysia: Perak]

Wallago nebulosus Vaillant, 1902: 46 [Borneo: Tepoe, Mahakam]; Haig, 1950: 80, 102 [list]

Ompok nebulosus - Fowler, 1905: 465 [no new locality]

Wallago leerii - Weber & de Beaufort, 1913: 202 [Sumatra: Palembang and Banka; Borneo: Kahajan, Kapuas, Sambas and Sarawak]; Tweedie, 1936: 18 [Peninsular Malaysia]; Fowler, 1938: 248 [no new localities]; Alfred, 1966: 34 [no new localities]; Roberts, 1982: 891 [no new localities]; Zakaria-Ismail, 1984: 25 [no new locality]; Roberts, 1989: 3, 152 [Singapore; Sumatra: Djambi; Borneo: Pleyharie River, Kapuas and Mahakam River]; Kottelat, 1989: 14 [no new locality]; Zakaria-Ismail, 1989: 288 [Peninsular Malaysia: Sungai Bernam; Borneo: Sungai Tekam]; Lim, Kottelat & Ng, 1990a: 319 [Peninsular Malaysia: Endau-Rompin]; Lim, Ng & Kottelat, 1990b: 44 [Peninsular Malaysia: Endau-Rompin and Sungai Sedili]; Lim & Ng, 1990: 150 [no new locality]

Wallago miostoma - Weber & de Beaufort, 1913: 202 [Sumatra: Djambi; Borneo: Kapuas, Mahakam and Baram]; Haig, 1950: 80, 102 [Singapore]; Tweedie, 1956: 62, Pl. 6c, d [Peninsular Malaysia: Kota Tinggi, Johor] (not *Wallago miostoma* Vaillant, 1902: 44)

Wallagonia miostoma - Smith, 1933: 75 [Central Siam]; Smith, 1945: 332 [Thailand: Menam Chao Phya, Paknampo section]; Mizuno & Furtado, 1982: 324, Pl. 4C(1) [Peninsular Malaysia: Tasek Bera, Pahang]; Imaki *et al.*, 1981: 40, fig. 73 [Borneo: Sintang, Kapuas] (not *Wallago miostoma* Vaillant, 1902: 44)

Wallagonia leerii - Myers, 1938: 98 [no new localities]; Hora & Gupta, 1941: 18 [Peninsular Malaysia: Telok Anson, Perak]; Mohsin & Ambak, 1983: 206, 248 [list]

Wallagonia tweediei Hora & Misra, in Hora & Gupta, 1941: 18, Text-figs. 2, 3 [Peninsular Malaysia: Kuala Tahan, Pahang]; Tweedie, 1950: 97, Fig. 1 [no new locality]; Mohsin & Ambak, 1983: 206, 248 [list]

Wallago tweediei - Haig, 1950: 80, 102 [list]; Foenander, 1956: 126 [no new locality]

Wallago sp. - Johnson, 1973: 103 [? Singapore]; Davies & Rahim, 1989: 7 [Peninsular Malaysia: Bernam drainage, Perak]

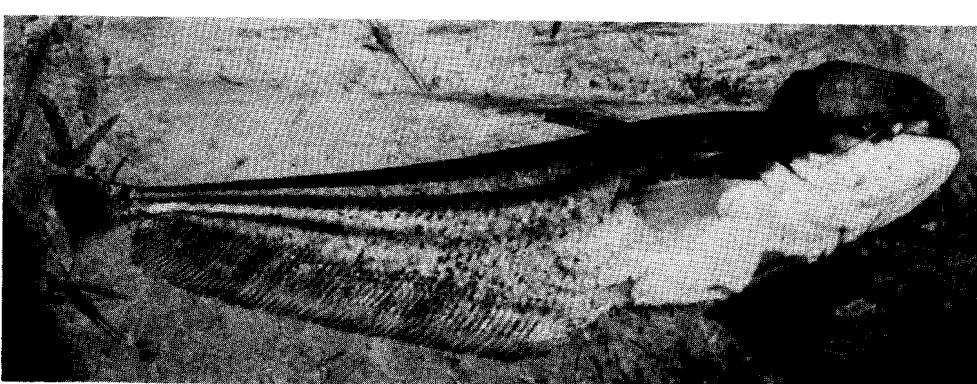


Fig. 4. *Wallago leerii*. Large specimen (longer than 1000 mm SL), Kuala Tahan, Pahang, caught in 1956, not preserved (photograph: E.R. Alfred).

Material examined. - SUMATRA: 1 ex. (MZB 1767), Lampung Selatan, coll. S. Wirjoadmodjo, 23.vi.1974. — 1 ex. (MZB 5213), Bagam Sali, Tasek Serai, Kec. Mandau, Riau district, coll. A. Sain, 2.i.1984. — 1 ex. (ZRC29511), coll. Universiti Indonesia, 1980s.

BORNEO: KALIMANTAN - 1 ex. (MZB 4811), Selimbau, Kapuas Hulu, Kalimantan, coll. A. Munandar, 8.v.1983. — 1 ex. (179 mm SL, radiograph examined) (CAS 49405), Kapuas, coll. T.R. Roberts, 1976. SARAWAK - 2 ex. (ZRC 22996, 22997), fish market, near Sungai Sadong, Serian, obtained by P.K.L. Ng, 2.vii.1992.

PENINSULAR MALAYSIA: PAHANG - 1 ex., (holotype of *Wallagonia tweediei*, 1450 mm TL) (ZRC 350), Taman Negara, Kuala Tahan, coll. M.W.F. Tweedie, iv.1940. — 1 ex. (ZRC 2992), Taman Negara, Kuala Tahan, coll. C.S. Ogilvie, xi.1948. — 1 ex. (head only) (ZRC 2993), Taman Negara, Kuala Tahan, coll. C.S. Ogilvie, iii.1949. — 1 ex. (ZRC 2994), coll. 1941. — 1 ex. (tail only) (ZRC 2995), Taman Negara, Kuala Tahan, coll. C.S. Ogilvie, 1948. — 1 ex. (fins only) (ZRC 3055), Taman Negara, Kuala Tahan, coll. C.S. Ogilvie, xii.1952. — 1 ex. (head only) (ZRC 3068), Taman Negara, Kuala Tahan, coll. C.S. Ogilvie, 1952. — 1 ex. (ZRC 3070), Taman Negara, Kuala Terenggan, Sungai Tembeling, coll. C.S. Ogilvie, 19.vi.1950. — 1 ex. (ZRC 29512), Taman Negara, coll. C.F. Lim, 1970s. — 1 ex. (ZRC 6978), Tasek Bera, coll. J.I.F. Furtado, 19.x.1968. — 1 ex. (ZRC 6979), Tasek Bera, coll. J.I.F. Furtado, 24.ii.1969. — 1 ex. (398 mm SL) (ZRC 6980), Tasek Bera, Fort Iskandar, coll. J.I.F. Furtado, 19.x.1968. — 1 ex. (448 mm SL) (ZRC 6981), Fort Iskandar, Tasek Bera, coll. J.I.F. Furtado, 24.ii.1969. — 2 ex. (ZRC 7920-7921), Tasek Bera, coll. J.I.F. Furtado, 9.x.1968. — 1 ex. (ZRC 7953), Tasek Bera, coll. J.I.F. Furtado, 3.x.1967. — 1 ex. (ZRC 7954), Tasek Bera, coll. J.I.F. Furtado, 1967. — 1 ex. (ZRC 8049), Tasek Bera, coll. J.I.F. Furtado, 11.xii.1967. — 1 ex. (ZRC 8803), Tasek Bera, Fort Iskandar, coll. J.I.F. Furtado & "H.H.J.", 20.iii.1967. — 2 ex. (ZRC 8812-8813), Tasek Bera, coll. J.I.F. Furtado, 1966-1968. — 2 ex. (ZRC 8841-8842), Tasek Bera, coll. J.I.F. Furtado, 13.x.1969. TERENGGANU - 1 ex. (ZRC 23935), Rantau Abang, 56 km mark, Kuantan to Kuala Terengganu Road, coll. M. Kottelat, P.K.L. Ng *et al.*, 18.iii.1992. JOHOR - 1 ex. (ZRC 2091), Kota Tinggi, coll. Van Kleef Aquarium staff, vii.1955. — 1 ex. (ZRC 29510), Kota Tinggi area, purchased from aquarium dealer by P.K.L. Ng, 22.iv.1992. — 1 ex. (skull only) (ZRC 29509), Johor, Sungai Endau, coll. C.F. Lim, 6.xi.1972. — 1 ex. (ZRC uncat.), no data. PERAK - 1 ex. (ZRC 2990 Telok Anson, coll. Fisheries Department, xii.1922. SELANGOR - 1 ex. (ZRC 14903), north Selangor Peat Swamp Forest, coll. fishermen, obtained P.K.L. Ng, vi.1991. — 4 ex. (ZRC 11663-11666), no locality data, probably somewhere in Peninsular Malaysia, coll. University of Singapore, Department of Zoology, no date.

SINGAPORE - 1 ex. (304 mm SL, radiograph examined) (CAS-SU 14839), coll. A.W.C.T. Herre, 1936.

Unknown locality - 1 ex. (ZRC 5631), from Singapore aquarium, obtained P.K.L. Ng, vi.1987. — 1 ex. (ZRC 5632), from Singapore aquarium, obtained P.K.L. Ng, vii.1988. — 3 ex. (81-144 mm SL) (ZRC 6982-6984), obtained P.K.L. Ng, 1988. — 1 ex. (ZRC 11458), from Singapore aquarium, obtained P.K.L. Ng, 1988.

Diagnosis. - (present data and fide Roberts, 1982). - Large silurid, up to 1500 mm SL (probably more), vertebral formula 11-12+48-52. First branchial arch with 12-17 gill rakers. Branchiostegal rays 14-18. Fin-ray counts: dorsal I,4; pectoral I,12-15; pelvic 9-11; anal 61-75; caudal 16-21. Base of anal and caudal fins not fused, caudal fin bilobed, lobes triangular in small individuals, truncate in adult specimens. Eyes non-subcutaneous, small, just above edge of mouth. Gape very wide, reaching anterior edge of eye. In life, dorsum dark olive-green to dark grey; sides two distinct pale longitudinal stripes, more prominent in larger specimens; sides usually with numerous small black, grey and white dots and small blotches forming marbled pattern (more obvious in smaller specimens); membranes of fins dusky grey to almost black.

Taxonomic remarks. - The status of the genera *Wallago* Bleeker, 1851, and *Wallagonia* Myers, 1938, has been discussed by Myers (1948) and Roberts (1982), with *Wallagonia* being an unnecessary junior synonym (see Haig, 1950; Roberts, 1982). Roberts (1982) noted that the real *Wallago miostoma* Vaillant, 1902, is not a *Wallago* but a species of *Ompok*, and almost all specimens which have been referred to "W. miostoma" are *W. leerii* instead. He also showed that *W. nebulosus* Vaillant, 1902, is a subjective junior synonym of *W. leerii*.

Hora & Misra, in Hora & Gupta (1940) described *Wallagonia tweediei* on the basis of a right anterior gill arch, notes and photographs (Figs. 1, 2) provided by Michael Tweedie of a very large silurid from Kuala Tahan in Pahang. It measured 4 feet 9 inches in length, and due to its size, only a plaster cast of the whole fish and some critical parts were supposedly preserved. Hora & Misra (in Hora & Gupta, 1940) however, could only cite two characters to distinguish their species from congeners, the different number of rakers (12) on the lower limb of the gill arch, and the different shape of the caudal fin (being only slightly emarginate).

Hora & Misra noted that Tweedie had said (in a letter) that since the type specimen of the fish "... was too bulky to be preserved *in toto* ... a plaster mould was taken and its fins and one gill arch were preserved" (p. 19). The cast is still in the ZRC (No. 350) (Fig. 5A) and is in a relatively good condition. It appears however, that Tweedie had also preserved the head and utilised it as part of the overall cast (the rest of the fish is made of paper-mache). This composite cast shows the teeth and branchiostegal rays clearly.

In a little known paper, Tweedie (1950), examined three more specimens of *W. tweediei*, and corrected the information he had supplied to Hora & Misra. Tweedie noted that the ventral fin count should be 10 to 11 and not eight. More importantly, he commented that the caudal fin of the type was damaged and should be best described as bilobed. Tweedie also made some important observations of its life colours. He also provided a good figure (see Fig. 5B) of one of his specimens. The single remaining species character was the number of gill rakers, which Tweedie confirmed as apparently valid.

Roberts (1982) commented that he had specimens of *W. leerii* from Sumatra which had total gill raker counts of 12, and the actual number seems to vary between 12 and 16. The holotype of *W. tweediei* has a total gill raker count of 15. He had doubts about the low ventral fin count (8) and unusual caudal fin shape, which he attributed possibly to miscount or damage. The low ventral fin count had already been corrected by Tweedie (1950). Roberts noted that the number of branchiostegal rays of the type of *W. tweediei* was not recorded. The well preserved "cast" of the holotype has 15 branchiostegal rays, well within the range known for *W. leerii*.

The unusual caudal fin shape figured by Hora & Misra (1941: Fig. 2a) is easily explained. Hora & Misra had based their figure on a photograph of the specimen sent by Tweedie. Tweedie was kind enough to send me the original photographs of the specimen in question (Fig. 1). What happened was that the two lobes of the caudal fin had overlapped one another, concealing the cleft between them. From a distance, (or barring careful scrutiny), the edge of the caudal fin appears slightly emarginate and not forked as it should be. A clearer recent colour photograph of another specimen from Kuala Tahan, Pahang, by Eric Alfred (Fig. 3) shows exactly the same condition. Tweedie (1950) had already commented on the fragility of the membrane connecting the two caudal lobes which is very prone to tearing, and causing the two lobes to overlap each other even more easily when the fish is landed. Even in larger live aquarium specimens, the connecting membrane tears very easily, taking about a week or so to heal.

A feature of *W. leerii* is also the sharper and more tapering caudal lobes (see Weber & de Beaufort, 1913, as *W. miostoma*) (Fig. 5D) which enhances the forked appearance of the tail. In all known *W. tweediei*, these lobes are more distinctly truncate or rounded in appearance. The body of *W. tweediei* also appear to be distinctly stouter and higher compared to *W. leerii*. We have obtained and reared small aquarium specimens which very closely resemble *W. leerii*. The above differences are all due to size and growth. The fish gradually develop the caudal and body features of *W. tweediei* as they grow larger (see Fig. 6A-C).

Tweedie (1950) described the live colours of *Wallago tweediei* as a beautiful brassy-olive on the dorsal and head aspects, the body being marbled white and black, with two brown longitudinal bands. He suggested that this distinctive colour pattern may have taxonomic significance. In fact, Tweedie (1956) recorded a large *W. miostoma* (1060 mm SL) from near Kota Tinggi in Johor, Peninsular Malaysia mainly on the basis of this feature. Such colour variations however, are not reliable (see next paragraph). Tweedie's (1956) specimen is clearly a very large *W. leerii* in all respects, and the features mentioned by Tweedie to separate *W. miostoma* and *W. tweediei* are not significant.

Tweedie (1956) observed that the two patches of vomerine teeth of his Kota Tinggi specimen are conjugated (his Pl. 6c). A reexamination of the specimen in the ZRC (only the head and tail are preserved) confirms this. He indicated that it may be due to variation, or may perhaps be a taxonomic character separating *W. miostoma* and *W. tweediei* of equivalent sizes as the vomerine teeth of large *W. tweediei* are separate. There are no specimens of *W. leerii* (or *W. tweediei*) in the ZRC which have the two patches of vomerine teeth conjugated, even in the large holotype "cast". As the Kota Tinggi specimen agrees with *W. leerii* as defined here so well in all other respects, it is unlikely that it represents another taxon. The conjugated vomerine teeth is probably an anomalous feature. Certainly this feature is not associated with age or size, at least on the basis of the numerous other Malaysian specimens.

Aquarium observations of many specimens of *W. leerii* suggest caution in relying too much on colour. The fish can become much paler, with the marbled patterns on the body (Fig. 7A, B) been replaced by broad and dull pale grey and dirty white longitudinal bands, and the brass colour is replaced by grey or black (see Figs 1, 4, 7C). When young (about 80 mm SL or less), they are dull grey, with the marbled coloration and brassy-olive colour indistinct. They gradually develop the more striking adult colours as they grow. If they are kept in the dark for many days, they assume a uniform dull black coloration, the marbled pattern and brass colour being obscured (Fig. 3). It would thus seem that all the colour descriptions of the various Thai, Malayan, Sumatran and Bornean *Wallago* previously identified to *W. leerii* and *W. miostoma* are probably of the same species. On the basis of the body shape and colour patterns, the Bornean specimens identified to *Wallagonia miostoma* by Imaki *et al.* (1981) are clearly also *W. leerii* (fide their fig. 73).

The vertebral counts of the smallest (aquarium specimen, 81 mm SL, ZRC 6982) and largest (Malaysia, 448 mm SL, ZRC 6981) specimen of *W. leerii* are identical (14+50), confirming the constancy of this character. In the other specimens radiographed, the abdominal and caudal vertebrae varied only slightly, between 14 and 15, and 48 and 52 respectively.

Consideration of all the above aspects thus leaves little doubt that *Wallagonia tweediei* Hora & Misra, in Hora & Gupta, 1941, is a junior synonym of *Wallago leerii* Bleeker, 1851.

Distribution. - Thailand, Peninsular Malaysia, Singapore, Sumatra and Borneo. The record of this species from Singapore by Haig (1950) has been questioned by Alfred (1966) and Johnson (1973). They commented that because *Wallago* is a fish of large rivers, the absence of such rivers in Singapore would make this record very doubtful. Eric Alfred however tells me (pers. comm.) that the collector of the fish, A. W. C. T. Herre, had personally assured him that the record is genuine (see also Alfred, 1966: 34). The specimen (304 mm SL) is clearly a *W. leerii* as listed by Roberts (1982). If *Wallago leerii* did exist in Singapore waters in the past, it is almost certainly extinct now (see Alfred, 1966; Lim & Ng, 1990).

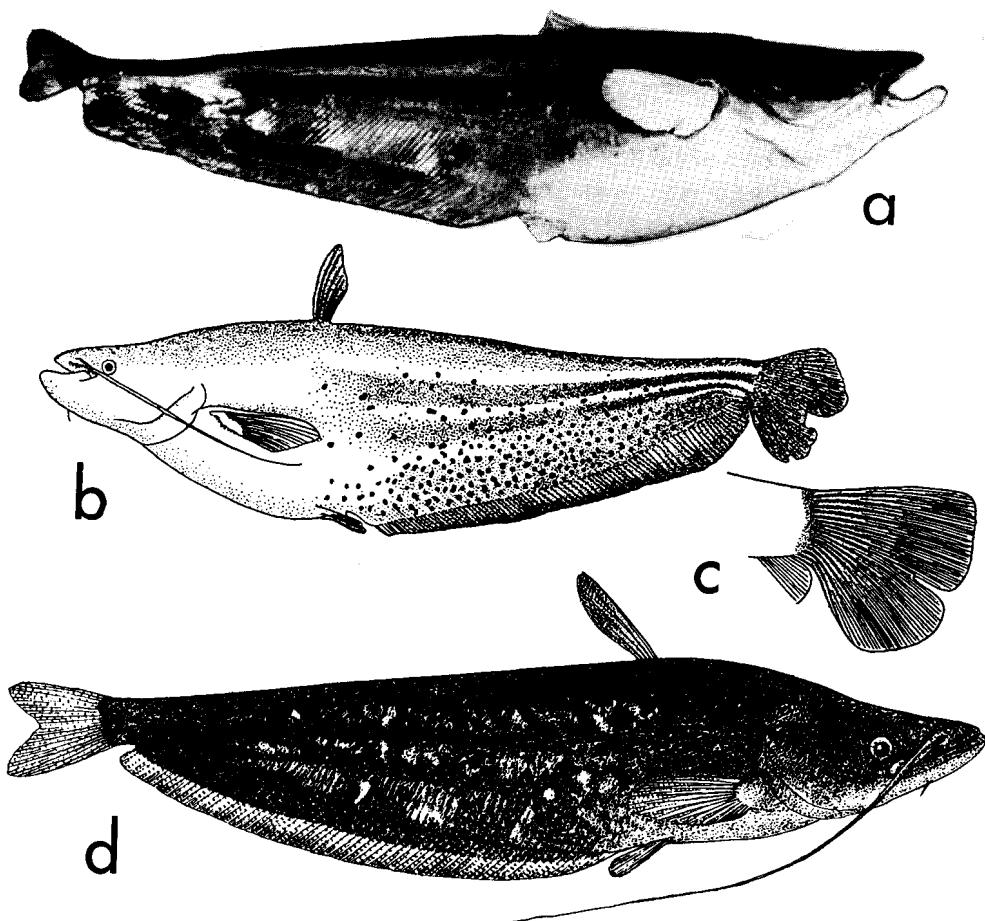


Fig. 5. *Wallago leerii*. a, Holotype male, *Wallagonia tweediei*, Kuala Tahan, Pahang (body cast and head), 1354 mm SL, ZRC 350; b, c, *Wallagonia tweediei*, large specimen from Kuala Tahan, Pahang (after Tweedie, 1950); d, *Wallago miosotoma*, Djambi, Sumatra, 315 mm SL (after Weber & de Beaufort, 1913) (nec Vaillant, 1902).

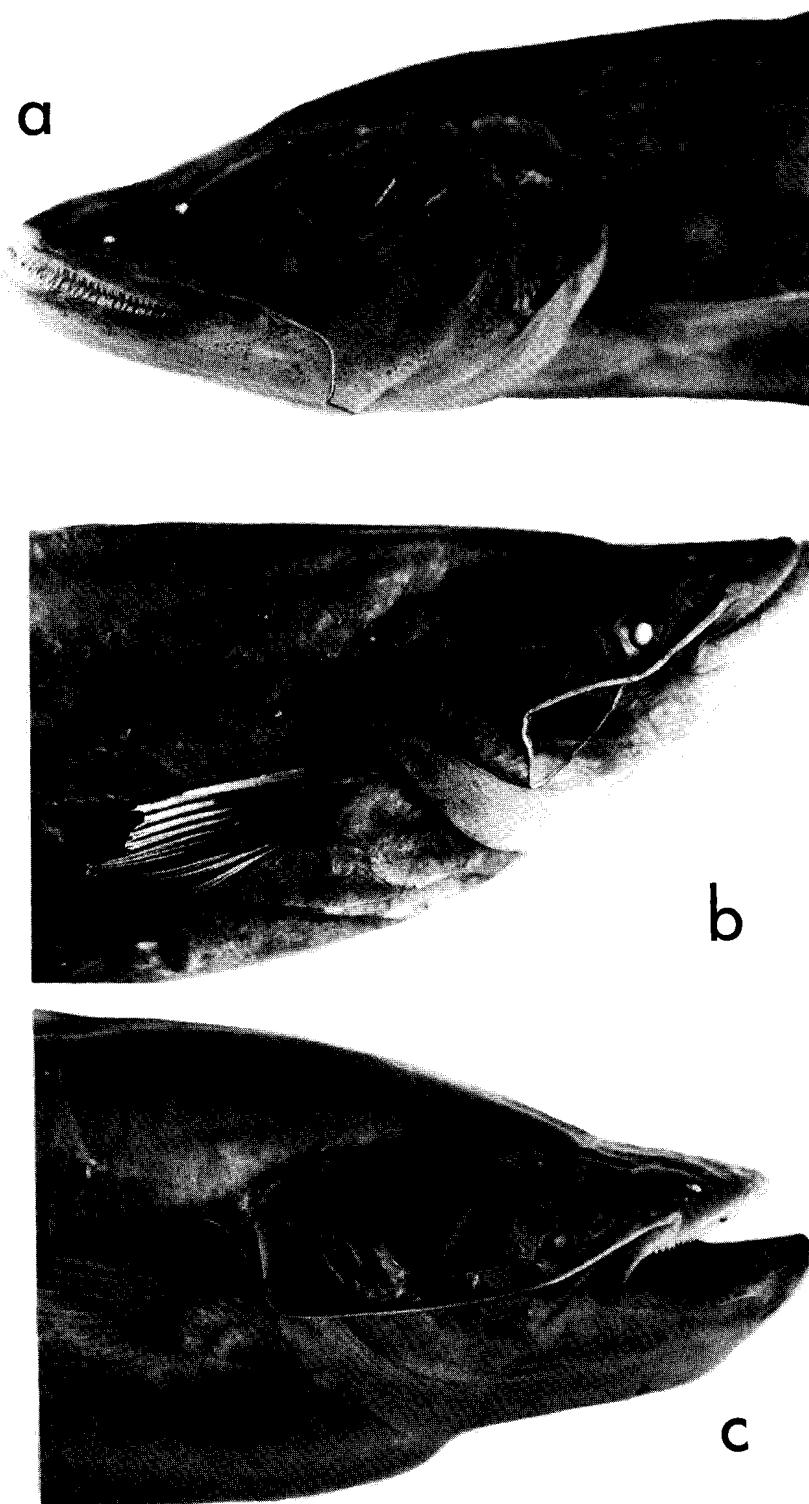


Fig. 6. *Wallago leerii*. Heads. a, ZRC 5632, 190 mm SL, aquarium specimen; b, ZRC 11458, 290 mm SL, aquarium specimen; c, ZRC 11665, 330 mm SL, Peninsular Malaysia.

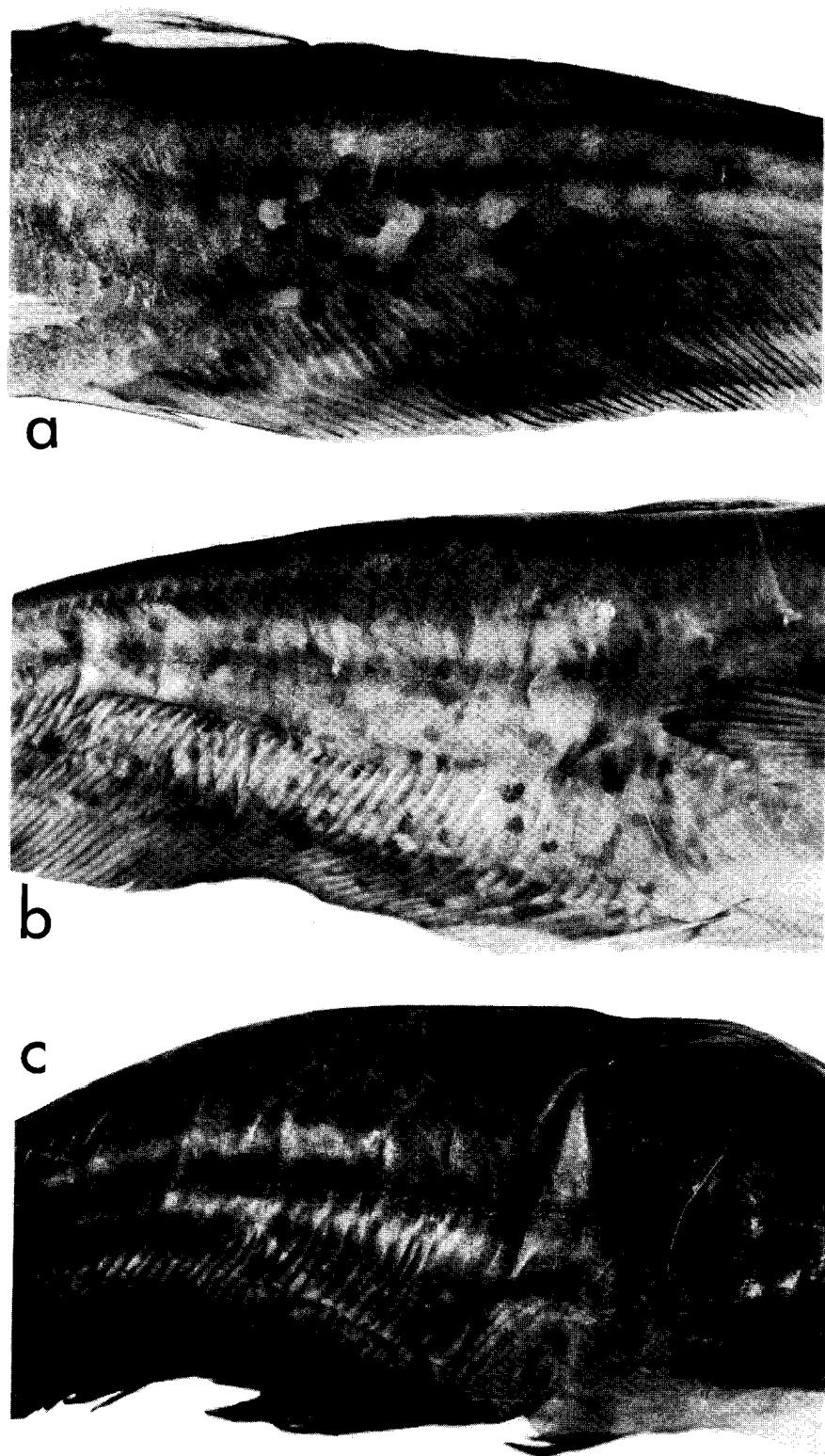


Fig. 7. *Wallago leerii*. Body, to show colour pattern. a, ZRC 5632, 190 mm SL, aquarium specimen; b, ZRC 11665, 330 mm SL, Peninsular Malaysia; c, ZRC 8813, 485 mm SL, Tasek Bera, Pahang, Peninsular Malaysia.

General biology. - The Malay natives call *Wallago* "ikan tapah", but according to Tweedie (1950), they recognise several types. *Wallago leerii* (as *Wallagonia tweediei*) is known to the natives as "ikan tapah tembaga" (Brass Tapah). There is another darker form the natives call "ikan tapah basong" (after a cylindrical vegetable shoot). The identity of the latter species is uncertain, but is probably *Wallago attu*, *Belodontichthys dinema* and/or one of the larger species of *Ompok*.

In 1933, a Malayan country newspaper, "The Field" published an article by F. G. Sounter titled "A Formidable Fish from Malaya". It was a brief account of a giant five feet catfish caught by him from Perak:

"It is called "Ikan Tapah" by the Malays, and *Wallago Leerii* in the Selangor Museum, the curator of which tells me it is grouped with the freshwater sharks. It was 5 ft. 6 in. in length, 43 in. at its greatest girth, and weighed 102 lb. It was a hen fish, and a mass of ova was evidently discharged from the vent while the fight was on, as some was protruding when it was lifted into the boat, and small fish were making feeding rings close to it, when it was pumped to the surface. Its weight when hooked was therefore probably more than that recorded out of the water."

Tweedie, in Hora & Gupta (1941: 20) noted that Sounter had informed him that the head of this fish is in the museum at Kuala Lumpur. Tweedie also mentioned another specimen in the Kuala Lumpur Museum measuring about 1.1 m in total length. The specimens had been originally identified as *W. leerii* because of the smaller number of pelvic fin rays, but were tentatively referred to *Wallagonia tweediei* by Hora and Gupta. Smith (1933, 1945) (as *Wallago miostoma*) records sizes ranging from 755 and 880 mm. He notes that this

"... fish is well known to the fishermen who give it names borne by no other species. One vernacular name is *platuk* (or *ituk* or *itok*), perhaps in allusion to its sombre colour. Another is *pla itub* (*itub*, to beat), possibly in reference to the splash made by the fish when it strikes the surface of the water after having leaped out in pursuit of small cyprinoids. Still another name is *pla khao dam* (dam, black), to distinguish it from *Wallagonia attu*, which is called *pla khao* (*khao*, white) A fishery conducted with seines in the deeper parts of the river near Paknampo yielded five or six fishes daily in December and January for the local market, and examples a meter long and weighing 50 kg. have been taken there. Another fishing center is the Lopburi River, whence fish are sent to the Bangkok market during the season of high water." (Smith, 1945: 333).

The highly predaceous nature of this fish can be best demonstrated by a report by Foenander (1956) of a very large Ikan Tapah dying after swallowing a ikan patin catfish in Taman Negara National Park, Peninsular Malaysia. The editor of the journal identified the ikan tapah as *W. tweediei*, and the ikan patin as *Pangasius ponderosus* Herre & Myers. The short passage describing this is worth citing in full:

"It is seldom that a record can be made of the natural death of large animals or fish and it may be of interest to do so and give the cause of such an episode - in this case a 100 pounder *tapah* - which occurred below Kuala Teremus of the Tekal (Tembeling) river of Pahang on the 12th August, 1953. A party of Foresters were coming down river and above a rapid, where the waters were shallow and calm, a large *tapah* was seen moving very slowly. It made no effort to escape on the approach of the boat and these men had no difficulty in killing it at the expense of a wooden paddle. On cutting up the great fish the cause of its torpor was found. It had swallowed a 15 lb *patin* and the pectoral spine of the latter had severely punctured the stomach wall of the *tapah* causing inflammation. I was only a few hours downriver of the place of this incident and heard the story soon after. Piles of uninviting, baked fish was evidence enough of the size of the *tapah*" (Foenander, 1956: 127).

Wallago leerii has also been reported to attack ducks, mousedeer and even small dogs (Tweedie, 1950). Roberts (1989: 3) noted that:

"According to fishermen interviewed in 1976, large ikan tapah (*Wallago leerii*) formerly migrated in large numbers in the Kapuas mainstream, but their numbers have declined due to intensive gill-netting. There may have been a primary migration related to reproduction or some other seasonal activity of ikan tapah, or perhaps it was a secondary or adventitious migration enabling them to feed upon migratory prey species."

Smith (1945: 20) had recorded a similar behaviour for *Wallago attu*, commenting that when

"... small cyprinoids such as *pla soi* [mainly *Cirrhinus* spp., Tyson Roberts, pers. comm.] are running upstream in their annual migration, the *pla khao* (as this fish is sometimes known to the Thai) remain with the schools and gorge themselves."

No such migratory behaviour is known or has been reported for the Malaysian *Wallago*. Large specimens of *Wallago* (up to 1.5 m long) have been known to swim into shallow clear waters in the Endau-Rompin drainage (Peninsular Malaysia) (H. H. Heah, pers. comm.), apparently lured by baited traps set by natives for other fish (see also Lim *et al.* 1990a, b). In the northern Malaysian state of Kelantan, some fishermen use huge wicker traps in the larger rivers specifically to trap *Wallago leerii* for food (H. H. Heah, pers. comm.). *Wallago leerii* is an important food fish in many parts of Southeast Asia. In Peninsular Malaysia, this fish is sometimes sold live in seafood restaurants specialising in fresh fish where it commands premium prices.

Wallago also features well in aborigine folklore. One of the recommended baits for catching *Wallago* has been to use live *Clarias* (ikan keli). Kiew (1986: 30) writes that:

"It [*Wallago*] is well known to orang asli [aborigine] fishermen that the best bait for catching the Giant Catfish (Ikan Tapah) [*Wallago leerii*] is the Common Catfish (Ikan Keli) [*Clarias* spp.]. This is because the Giant Catfish is jealous of the Common Catfish, who has a luxuriant moustache of eight whiskers (the Giant Catfish only has four!). So he has sworn to eat any Common Catfish he meets to get rid of the competition."

Aquarium observations show that the fish has an unusual habit of gulping air from the surface at irregular intervals. Just before it surfaces, it releases the air it had swallowed previously. The reasons for this is not known, but may possibly be associated with buoyancy control. *Wallago* is not known to have any adaptations for air-breathing. *Wallago leerii* has an undescribed species of monogenean trematode (genus *Silurodiscoides*) parasitising its gills (Susan Lim, pers. comm.).

In recent years, there has been an interest in the fish for aquaria in Singapore. The marbled patterns of the body, especially on smaller specimens is relatively attractive, and some Chinese believe that the long barbels of the fish are symbols of good luck. They command good prices, ranging from US\$10-30 for a healthy 100 mm specimen. I have also seen large numbers of young specimens in a wholesale aquarium in Bogor (Java) which had purportedly been collected from the Kapuas and western Kalimantan. The owner indicated that fishes from this locality have been exported to Singapore before, and it is likely that some (if not all) the specimens which have been purchased from local aquaria and reared in Singapore originated from western Borneo.

Table 1. Meristic data for specimens of *Wallago leerii* and *W. maculatus* examined.

Abbreviations: gr = gill rakers (first arch); bs = branchiostegal rays;
dors = dorsal; pect = pectoral; pelv = pelvic; caud = caudal

Locality	Cat. no.	SL (mm)	gr	bs	fin ray counts					vertebrae
					dors	pect	pelv	anal	caud	
<i>Wallago leerii</i>										
Malaysia	ZRC 11665	330	16	17	5	14	10	65	19	-
Malaysia	ZRC 11666	400	15	16	5	15	10	71	18	-
Pahang, Malaysia	ZRC 7953	370	14	14	5	14	10	65	18	-
Pahang, Malaysia	ZRC 8841	420	14	14	5	14	8	70	18	-
Pahang, Malaysia	ZRC 8049	520	14	16	5	15	11	67	18	-
Pahang, Malaysia	ZRC 8803	370	15	15	5	13	10	65	16	-
Pahang, Malaysia	ZRC 3068	630	15	15	5	15	11	69	17	-
Pahang, Malaysia	ZRC 2994	470	16	15	5	15	11	68	21	-
Pahang, Malaysia	ZRC 2992*	230	16	17	-	-	-	-	-	-
Perak, Malaysia	ZRC 2990	230	17	14	5	16	9	61	16	-
Pahang, Malaysia	ZRC 2993	180	14	14	-	-	-	-	-	-
Pahang, Malaysia	ZRC 6980	398	-	-	-	-	-	69	20	14+51
Pahang, Malaysia	ZRC 6981	448	-	-	-	-	10	71	20	14+50
Johor, Malaysia	ZRC 2091*	250	13	16	-	-	-	-	-	-
Johor, Malaysia	ZRC uncat.*	420	15	17	-	-	-	-	-	-
Singapore	CAS-SU 14839	304	-	-	-	-	-	64	19	15+48
Unknown	ZRC 6982	81	-	-	-	-	-	72	18	14+50
Unknown	ZRC 6983	93	-	-	-	-	-	71	20	15+49
Unknown	ZRC 6984	144	-	-	-	-	-	69	21	15+49
Unknown	ZRC 5632	190	15	16	5	16	10	71	19	-
Unknown	ZRC 11458	290	13	17	5	15	10	62	19	-
Kapuas, Borneo	CAS 49405	179	-	-	-	-	-	72	20	15+52

Wallago maculatus

Lamag, Sabah*	FMNH 44843a	173	15	14	5	13	9	64	-	-
Lamag, Sabah*	FMNH 44843b	160	17	14	5	13	10	67	-	-
Deramakot, Sabah	FRCL 0007	116	15	14	5	14	9	64	21	13+43
Liwagu, Sabah	ZRC uncat.	445	-	14	5	11	10	67	19	-

*ZRC 2091, 2992 and uncat. with only head preserved; in Lamag specimens, tails completely missing.

***Wallago maculatus* Inger & Chin, 1959**

(Figs. 8, 9)

Wallago maculatus Inger & Chin, 1959: 279 [Borneo: Kinabatangan River, Sabah]; Inger & Chin, 1962: 128, Fig. 63A [Borneo: Kinabatangan District, Deramakot, Lamag, Sabah]; Roberts, 1982: 891, 893 [no new locality]; Inger & Chin, 1990: 128, Fig. 63A, SC-36 Fig. S34 [no new locality]

Material examined.—BORNEO: SABAH - 2 ex., paratypes of *Wallago maculatus* (173 mm, 160 mm SL) (FMNH 44843), North Borneo, Kinabatangan, east Coast Residency, Lamag, coll. Fisheries Department, Colony of North Borneo, 1959.—1 ex., paratype of *Wallago maculatus* (116 mm SL) (FRCL(T)

0007, ex-FMNH 68033), station 5, hill stream, Deramakot, Kinabatangan River, coll. Fisheries Department, Colony of North Borneo, 2.v.1956. — 1 cast (525 mm SL) (SBM), Kinabatangan River, coll. R. Goh, ca. 1985. — 1 cast (445 mm SL) (ZRC), Kinabatangan River, coll. R. Goh, 1991/1992. [colour photographs of: 1 ex. (ca. 110 mm SL), Sungai Papar, Ulu Papar, south of Kota Kinabalu, ca. 5°43'02"N, 115°56'07"E; 2 ex. (ca. 500 mm, 1000 mm SL), Sungai Penulangan-Kegibangan, tributary of Sungai Liwagu, ca. 6°N, 116°40'E]

Diagnosis.— (present data and fide Inger & Chin, 1962). - Large silurid, up to 1000 mm SL, vertebral formula 13+43. First branchial arch with 13-19 gill rakers. Branchiostegal rays 13-15. Fin-ray counts: dorsal I,4; pectoral I,13-15; pelvic 8-10; anal 60-66; caudal 19-21. Base of anal and caudal fins not fused, caudal fin bilobed, lobes triangular in small individuals, more truncate in adult specimens. Eyes non-subcutaneous, small, just above edge of mouth. Gape very wide, reaching anterior edge of eye. In life, dorsum and sides light olive to pale yellow in large specimens, dull grey in smaller ones; sides without trace of longitudinal stripes; irregular large patches of black blotches on side of body, always below lateral line, sometimes paler and less distinct forming more "clouded" appearance in larger specimens, pattern bolder in small specimens; membranes of fins yellow to dirty yellow.

Taxonomic remarks.— *Wallago maculatus* Inger & Chin, 1959, was described from Sabah (= British North Borneo) on the basis of 12 specimens (86.8-332 mm SL). Roberts (1989) cited four characters distinguishing it from *W. leerii*, viz. the presence of black blotches on the side of the body below the lateral line (supposedly absent in *W. leerii*), the pectoral fin membrane being pale to dusky (not black as in *W. leerii*), and differences in the branchiostegal ray and gill raker counts (see Inger & Chin, 1959: 279; Roberts, 1982: 891).

A re-examination of the paratypes as well of casts of specimens much larger than those available to Inger & Chin (1959, 1962) shows that there are no obvious external meristic or morphometric characters separating it from *W. leerii*. The differences in the branchiostegal ray and gill raker counts overlap between *W. leerii* and *W. maculatus*. The anal ray number differs somewhat, with the range for *W. maculatus* being 60-66 whereas it is generally higher (61-75) in *W. leerii*. The number of branchiostegal rays is also generally lower in *W. maculatus* (13-15) (14-18 in *W. leerii*). The most significant difference is in the much lower number of vertebrae of *W. maculatus*. In *W. maculatus*, the vertebral formula is 13+43 (total 56) whereas in *W. leerii*, it is 11-12+48-52 (total 63-67) (see Table 1). Although the single *W. maculatus* radiographed is rather small (116 mm SL), the number of vertebrae in *W. leerii* is not correlated with the size of the fish (see Table 1) and there is no reason to suppose this is also not the case for *W. maculatus*.

Wallago maculatus was not figured in the original description by Inger & Chin (1959). The figure of *W. maculatus* provided by Chin, in Inger & Chin (1990: Fig. S34) is rather schematic (Fig. 8A), and gives the incorrect impression that the dorsal fin is far forward of the pelvic fins, which in *W. leerii*, is directly above or slightly in front of the pelvics. The paratypes of the species I have examined however, agree with most specimens of *W. leerii* in this character, with the dorsal fin being slightly forward of the pelvic fins.

The body colour pattern of *W. maculatus* is unusual, the row of large black blotches below the lateral line being distinctive for the species. One of the paratypes of *W. maculatus* examined has the same pattern as figured by Chin (in Inger & Chin, 1990), the other without any clear patterns. Datuk Chin Pui Kong (pers. comm.) has commented that the pattern he described for *W. maculatus* is quite accurate, and is present on most of the specimens he has seen. He has

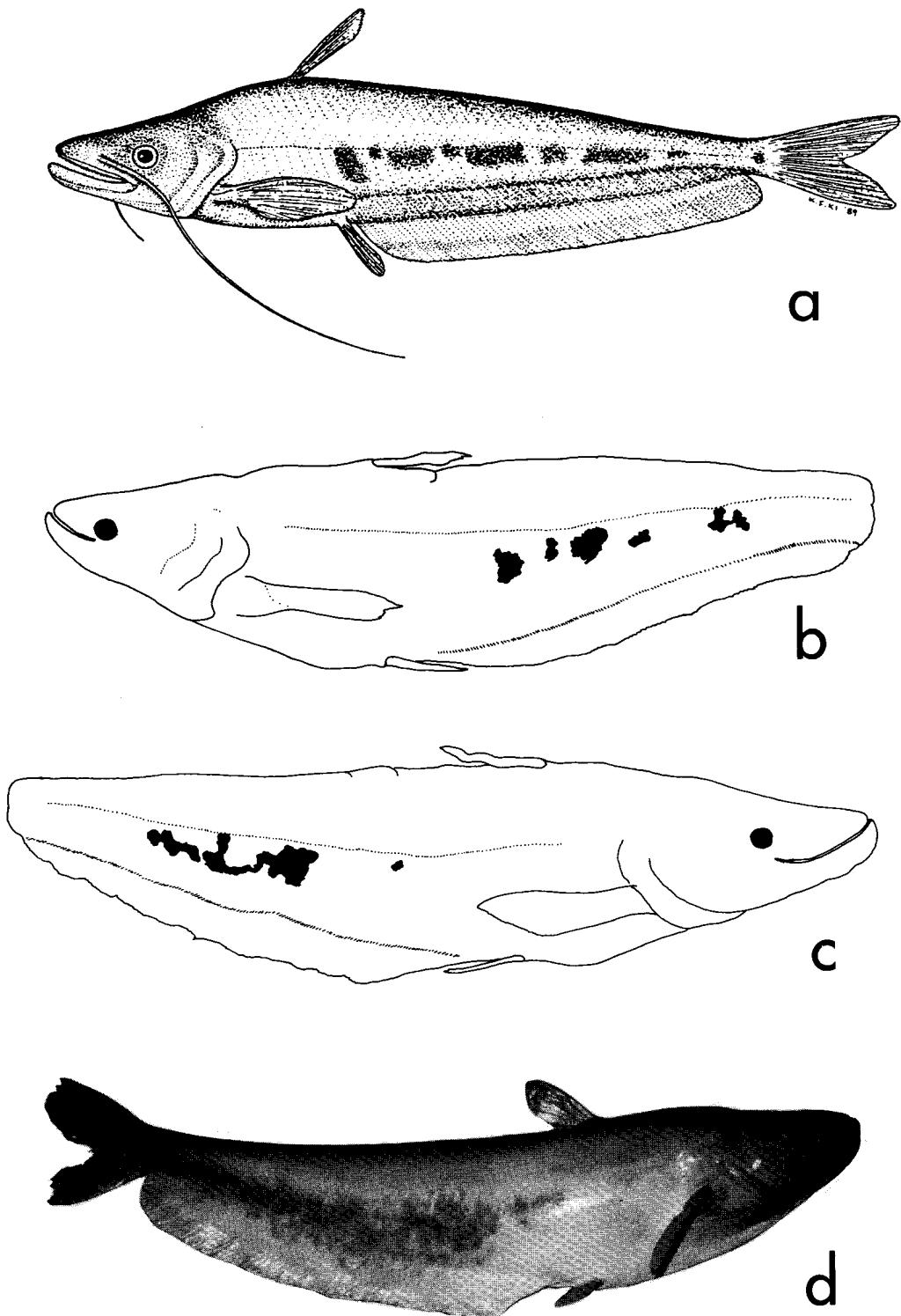


Fig. 8. *Wallago maculatus*. a, figure after Chin, in Inger & Chin (1990); b, c, paratype, 160 mm SL, FMNH 44843, Kinabatangan, Sabah (from photograph of specimen, head of b turned laterally); d, cast, 445 mm SL, ZRC, Kinabatangan, Sabah..

passed me photographs of specimens from Sungai Liwagu which shows the pattern very clearly. The black blotches are confined entirely to below the lateral line, and there is no trace of the longitudinal white and black stripes present in *W. leerii*. This pattern is evident on specimens as small as 110 mm (SL) and as large as 1000 mm. This pattern is also obvious on casts of two specimens (525 mm SL, SBM; 445 mm SL, ZRC) originally prepared by the Sabah Museum from fresh specimens. In *W. leerii*, the black blotches, when visible, are smaller, dot-like, more scattered below the lateral line, and are intermingled with grey and white patches and spots, giving the body a distinctly marbled effect. Another very distinctive feature of the species is the general coloration. The entire dorsum is a uniform golden-olive colour, without any trace of dark longitudinal stripes, even in large specimens 500 to 1000 mm SL. The areas below the black blotches are white or dirty grey. In a smaller specimen (110 mm SL), the background colour of the dorsum is dark grey while the ventrum is dirty grey. In *W. leerii*, the dorsum is usually dark olive to brassy-yellow in colour, sometimes appearing dark grey, especially in large specimens. Inger & Chin (1959: 280) noted that freshly preserved specimens of *W. maculatus* had "... a very light dusking of melanophores on membranes". On the basis of the photographs and casts, the fins of smaller specimens are pale yellow, and only slightly darker in large individuals. While live specimens of *W. leerii* I have reared sometimes occasionally have pale grey to dusky fins (usually very dark), none possess or develop any trace of yellow pigmentation.

The colour pattern reported for *W. maculatus* is not known for any specimen of *W. leerii* outside Sabah. Two recent specimens from Sarawak, Borneo (ZRC 22996, 22997) (as well as two others photographed but not preserved) have the typical colour markings of Peninsular Malaysian *W. leerii*.

In view of the present colour observations and differences in the vertebral formula, there can be little doubt that *Wallago maculatus* Inger & Chin, 1959, is a valid species.

The changes in the shape and proportions of the head, body and caudal fin lobes of *W. maculatus* with increasing size are the same as for *W. leerii* (see earlier).

Distribution.- Known only from Sabah, northern Borneo.

General biology.- The Sabahan Orang Sungei (river people) name for *W. maculatus* is "tapoh", and is probably derived from the Malay name, "ikan tapah". Inger & Chin (1962: 128) noted that the species showed no preference for clear or turbid waters, and were collected in the main

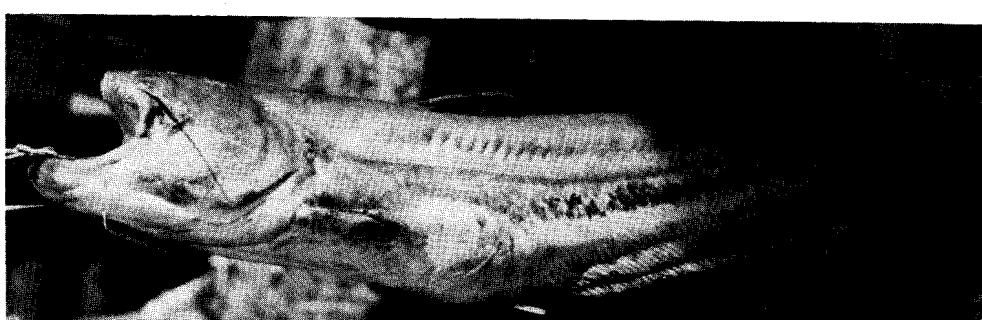


Fig. 9. *Wallago maculatus*. Large specimen ca. 1000 mm SL, Sungai Liwagu, not preserved (photograph courtesy of P. K. Chin).

Kinabatangan River as well as in small forest tributaries. According to Datuk Chin Phui Kong (pers. comm.), *W. maculatus* is not often encountered in the northern part of Sabah, and seems to be more common in the central and eastern regions to the east of the Crocker Range. There, the fish, especially large specimens, is usually caught after heavy rains, when they to wander into flooded areas. Inger & Chin (1962: 128) records specimens 750 mm SL long and up to 10.5 pounds in weight. The largest specimen known thus far is a specimen about 1000 mm SL (present data). *Wallago maculatus* is regarded as a good-tasting fish, and is regarded as "... one of the best-flavoured fishes in the Kinabatangan basin. It is caught with cast net, hook-and-line, or traps" (Inger & Chin, 1962: 129). The fish however, commands relatively low prices as locals generally prefer sea fishes in Sabah. Large specimens can be purchased in the markets for about US\$5-8.

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