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SYSTEMATIC REVISION OF THE SOUTHEAST ASIAN CYPRINID FISH GENUS *LABIOBARBUS* (TELEOSTEI: CYPRINIDAE)

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ABSTRACT. - The Southeast Asian labeoin cyprinid genus *Labiobarbus* van Hasselt, 1823, comprises six species: *L. leptocheilus* (type species) with a large and continuous range in mainland and insular Southeast Asia (including southeast Burma, Thailand, Laos, Cambodia, Vietnam, Malay peninsula, Sumatra, part of Borneo, and Java); *L. siamensis* restricted to the Chao Phraya, Bangpakong and Mekong basins of Thailand, Laos, Cambodia and probably Vietnam; *L. fasciatus* and *L. ocellatus* in southern Malay peninsula, Sumatra and Borneo; *L. festivus* in southern Malay peninsula and Borneo; and *L. sabanus*, found only in northeastern Borneo (Sabah). The species are distinguished mainly by obvious differences in coloration, and in the case of *L. fasciatus* and *L. ocellatus*, by higher scales counts (48-54 and 61-68 respectively, versus 30-44 in the other species). *Labiobarbus sabanus* is distinguished by its exceptionally thick head and body and only 18-22 branched rays in the dorsal fin (vs. 22 or more in all other species).

INTRODUCTION

Systematics and hence species identification of the labeoin cyprinid fish genera of tropical Asia is in a highly confused state. In the present instance, that of *Dangila* or *Labiobarbus*, the geographically widespread species *Labiobarbus leptocheilus* has been described repeatedly as new: three times from Java, twice from Burma, once from Indo-China, once from Sumatra, three times from Borneo, and even once from the Philippines (where the genus does not occur). Statements about geographical distribution, ecology, and other aspects of the biology of species belonging to this genus have been based on inadequate systematic knowledge.

METHODS AND MATERIALS

This systematic revision is based on recently collected and older specimens from throughout the range of the genus. Most of the material was examined during visits to institutions in Southeast Asia, Europe and the United States where it is deposited. Thus, not all of the desirable direct comparisons could be done; and in some instances facilities and time for examination were quite limited. The institutions are Zoological Reference Collection of the National University of Singapore, ZRC; Department of Zoology, Universiti Malaya, Kuala Lumpur,

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UMKL; Museum Zoologicum Bogor, MZB; Kasetsart University Museum of Fisheries (Bangkok), KUMF; Museo Civico di Storia Naturale Giacomo Doria (Genoa), MSNG; Muséum National d'Histoire Naturelle, MNHN; Nationaal Naturhistorisch Museum (formerly Rijksmuseum van Natuurlijke Historie), Leiden, RMNH; Zoological Museum, Universiteit van Amsterdam, ZMA; California Academy of Sciences (San Francisco), CAS; American Museum of Natural History, New York, AMNH; and Smithsonian Institution, Washington, D.C., USNM. Paratypes of *Labiobarbus sabanus* were borrowed from the Field Museum of Natural History, FMNH, and examined briefly in San Francisco.

Extant holotypes and other type specimens of most nominal species have been examined, and are listed under material examined. When primary type specimens are thought to be missing or lost, this is mentioned in the synonymy.

Synonymies. - Synonymies given here (as in most of my papers) include all primary synonymy (original descriptions and original designations of names) and secondary synonymy (subjective name changes due to matters of taxonomic judgment). Papers of particular importance in determining systematic status or species identification and/or geographical distribution may also be included. Generally excluded are papers without direct bearing on taxonomy, especially those for which voucher specimens are non-existent or have not been examined by me and species identifications cannot be verified on the basis of the contents of the paper itself.

Locality data. - For freshwater fishes generally, the most important locality data is the name of the river basin. Unfortunately, this is often omitted from original locality labels and museum catalog entries. Usually it can be ascertained, but often not without a laborious effort and even then a degree of uncertainty. I generally refrain from modifying locality data taken from original sources, because I feel that more often than realized this results in errors. This is especially so when one is dealing with older localities, which often have no modern equivalent. I am loathe to correct any but the most obvious spelling errors, and feel the best policy is to reproduce original locality data in the original language and only provide additional information or translation [enclosed in brackets] if there is specific need to do so beyond mere clarification. For example, specimens in the MZB collections were collected by many persons of different linguistic background and ways of recording localities. I am not so familiar with Javan localities, and moreover had very limited time in Bogor. No doubt by combing through the catalogs and other sources there I could have verified or confirmed various spellings and obtained additional information, but it would have detracted seriously from time spent locating and examining actual specimens.

In presenting the locality data, I generally list holotypes and other type specimens first, then non-types. An effort is made is list material by river basins, and then from North to South or from West to East, whichever it seems would be easiest for the reader.

As the ranges of tropical freshwater fishes are increasingly distubed by human activities, and more and more species are locally extirpated and then become threatened, endangered, or extinct, the dates (especially the years, but also the exact day and month for strongly migratory species) as well as places of collection become increasingly important. For several years now, in order to avoid any possible confusion, I have consistently recorded dates of collection for samples collected by me using the European style of day month year, with the month written out or with a three or four-letter abbreviation, thus 1 Sept. 1993.

SYSTEMATIC ACCOUNT

Labiobarbus van Hasselt, 1823

Labiobarbus van Hasselt, 1823: 132 (type species *Dangila leptocheilus* Valenciennes, in Cuvier & Valenciennes, 1842, by subsequent designation of Smith, 1945: 221, according to Kottelat, 1987: 370; Eschmeyer, 1990: 206).

Dangila Valenciennes, in Cuvier & Valenciennes, 1842: 229 (type species *Dangila leptocheilus* Valenciennes, in Cuvier & Valenciennes, 1842, by subsequent designation of Bleeker, 1863:24.

Cyrene Heckel, 1843: 1024 (type species *Cyrene ocellata* Heckel, 1843, by subsequent designation of Jordan, 1919: 215).

Nomenclatural note. - There has been a vexing question of which generic name should be used for these fishes, *Dangila* Valenciennes, 1842, or *Labiobarbus* van Hasselt, 1823. Beginning with Valenciennes, 1842, *Dangila* was used, until Smith (1945) advocated the use of *Labiobarbus* on the grounds of priority. Subsequent authors, including I, have expressed strong reservations about the use of *Labiobarbus* and urged retention of *Dangila* (Inger & Chin, 1962: 94; Roberts, 1989: 37). According to the Code, however, *Labiobarbus* should be recognized, as pointed out by Kottelat (1987: 370).

Part of the argument against use of *Labiobarbus* has been uncertainty as to what exactly van Hasselt had described, particularly since his figures were unpublished and unavailable, no type specimens were indicated, and the species included by van Hasselt in *Labiobarbus* had not been identified. This problem should have been resolved by Smith's designation of a type species for *Labiobarbus* (Smith, 1945: 221). The type species Smith designated is not *Dangila leptocheila* Valenciennes, 1842, as indicated by Kottelat (1987: 370), but rather *Labiobarbus leptocheilus* van Hasselt, 1823, a *nomen nudum* (Roberts, 1989; in press). Thus it could not be said with any assurance that Valenciennes had correctly identified van Hasselt's species. Thus the action taken by Smith (1945) and Kottelat (1987) could result in the genus *Labiobarbus* van Hasselt, 1823 based on a species described by Valenciennes, 1842, different from the species originally included in the genus by van Hasselt. This may agree with the letter of the Code, but does not agree with its spirit. As detailed below, this objection has been resolved by identification of van Hasselt's material of *Labiobarbus leptocheilus*, which does indeed correspond with Valenciennes's *Dangila leptocheila*. This identification was part of a reexamination of all available archival material (including unpublished manuscripts and illustrations) and specimens of freshwater fishes resulting from Kuhl and van Hasselt's mission to Java in 1820-23 (Roberts, in press).

Diagnosis. - *Labiobarbus* comprises labeoin fishes with two pairs (rostral and maxillary) of well developed barbels; dorsal fin very long, with four simple and 18-30 branched rays; scales in lateral series 30-68; circumpeduncular scales 16-28; gill rakers on first gill arch 38-58; rostral cap separate from upper lip, its margin smooth (without papillae or fimbriae); upper lip thin, anteromediad portion of its margin with a linear series of papillae; lower jaw with moderately developed horny jaw sheath separate from lower lip; lower lip thin, with a few scattered papillae; lips evidently lacking unculiferous ridges characteristic of such thick-lipped labeoins as *Labeo* and *Osteochilus*; palate soft and swollen, covered with hundreds of macroscopic villi or slender papillae; pharyngeal teeth in three rows, 2-3,3-4,5 on each side; vertebrae 22-26+10-15=32-40 (all vertebral counts in this paper according to methods in Roberts, 1989:22).

Remarks. - Most Labeoinae have sucker-like mouths with numerous rows of unculiferous

ridges or fimbriae on the lips; last unbranched dorsal fin ray without serrae on posterior margin. Many members have a soft palatal organ with 6 or more close-set pairs of fleshy lobes with crenulate margins. Well-known genera include *Labeo*, *Cirrhinus*, *Garra*, and *Lobocheilos*.

Labiobarbus can be distinguished easily from other labeoin genera by its elongate dorsal fin, long rostral and maxillary barbels (invariably present), maxillary barbel invariably longer than rostral barbel, and distinctive soft mouth parts. It is perhaps closest to *Cirrhinus*, which has relatively thin and apparently non-unculiferous lips, long dorsal fin with last unbranched ray non-serrate, and two well developed pairs of barbels in at least one species (*C. leschenaultii* Valenciennes, in Cuvier & Valenciennes, 1840). However, none of the *Cirrhinus* have the dorsal fin with as many as 18 branched rays; the upper lip has a smooth rather than papillose margin, and the upper as well as lower jaw a horny jaw sheeth. No *Labiobarbus* has the red or rosy coloration of pelvic, anal, and sometimes also pectoral fin and lower lobe of caudal fin characteristic of most if not all species of *Cirrhinus*.

KEY TO THE SPECIES OF *LABIOBARBUS*

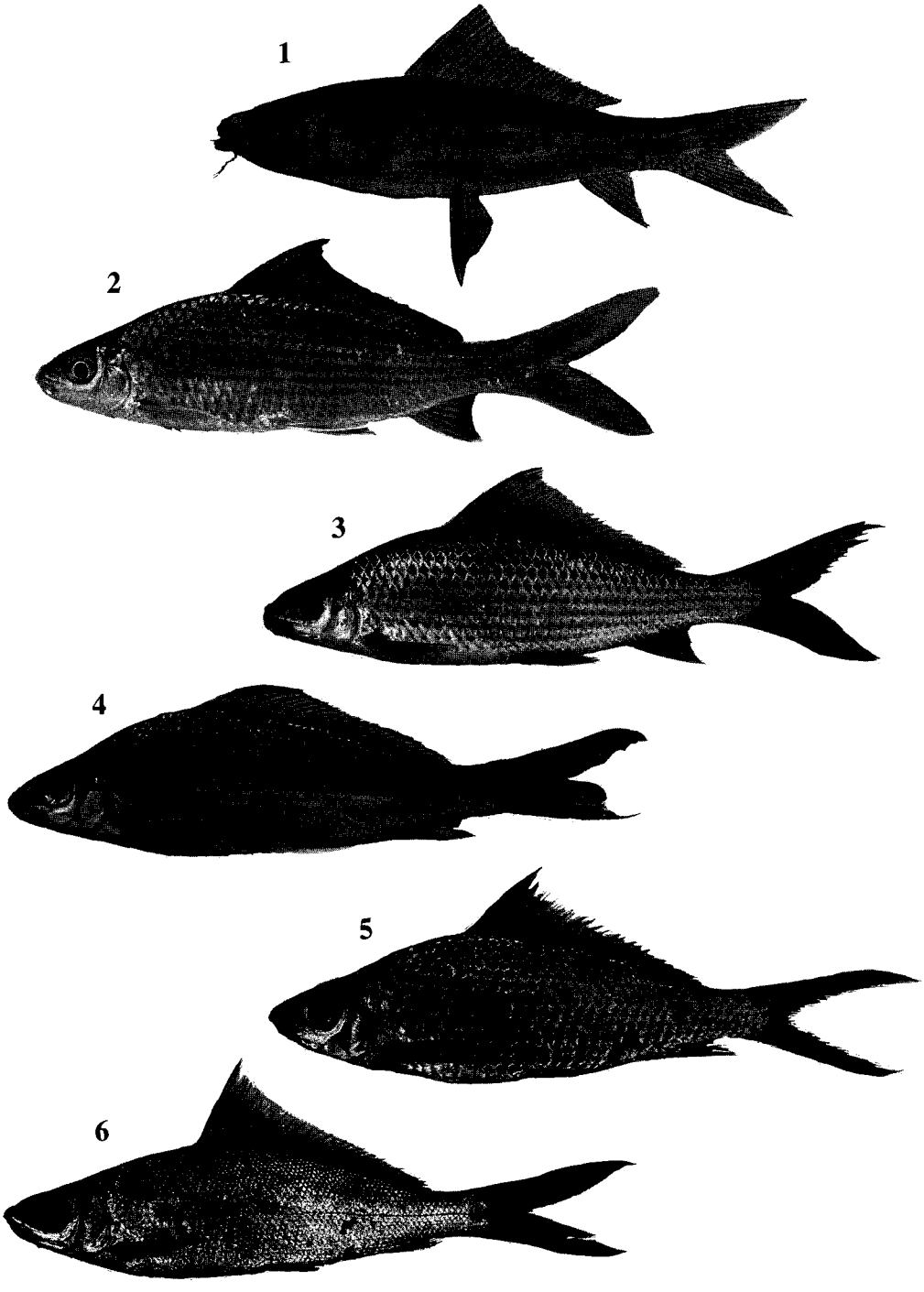
1. Scales in lateral series 48-68 2
   Scales in lateral series 30-44 3

2. Scales in lateral series 61-68; a small, well-defined, sometimes ocellated black spot on shoulder and a similar spot in middle of caudal peduncle; body without longitudinal stripes formed by spots on scales; caudal fin uniformly dusky or colorless, lobes without stripe or black margin ..... *L. ocellatus*
   Scales in lateral series usually 48-54; usually no spot on shoulder or caudal peduncle; body with longitudinal stripes; caudal fin red with thin dusky or dark marginal stripe on each lobe ..... *L. fasciatus*

3. Dorsal and caudal fins without marked color pattern: dorsal fin with dusky median stripe and no red coloration; caudal fin dusky, sometimes with reddish coloration, but no well defined stripes 4
   Dorsal fin with black marginal and red submarginal stripe; caudal fin black with broad red marginal stripe on each lobe ..... *L. festivus*

4. Dorsal fin branched rays 18-22; predorsal profile strongly sloping; head and body very thick ..... *L. sabanus*
   Dorsal fin branched rays 22 or more; predorsal profile moderately sloping; head and body relatively narrow 5

5. Maxillary barbel relatively short, not extending posteriorly to hind border of eye; scales in lateral series 33-44 (usually only 33-38); circumpeduncular scales 16-20; humeral mark if present, not a well defined ring ..... *L. leptocheilus*
   Maxillary barbel relatively long, extending posteriorly well beyond hind border of eye; scales in lateral series 39-42; circumpeduncular scales 20-23; humeral mark usually absent, but sometimes forming a well defined ring ..... *L. siamensis*



Figs. 1-6. *Labiobarbus* spp. 1, *Labiobarbus leptocheilus*. Western Java. Water color copy, by Achille Valenciennes or his assistant Sophie Duvaucel, of van Hasselt's original drawing of *L. leptocheilus* (original lost; copy in archives of Bibliothèque Centrale, MNHN, MS 480-558, item XVI B 75). Photograph and copywrite: Bibl. Centr. MNHN; 2, *Labiobarbus leptocheilus*. Sungai Gemencheh, Muar basin, Malay peninsula. Photo Mohd. Zakaria-Ismail; 3, *Labiobarbus leptocheilus*, 140 mm. Tenasserim River, Southeast Burma; 4, *Labiobarbus fasciatus*, 127 mm. Sungai Maruwei, Barito basin. Photograph courtesy of D. Siebert; 5, *Labiobarbus festivus*, 110 mm. Danau Sembuluh, Kalimantan Tengah; 6, *Labiobarbus ocellatus*, 94.5mm. Danau Sembuluh, Kalimantan Tengah.

Labiobarbus leptocheilus (Valenciennes, 1842)

(Figs. 1-3)

Labiobarbus leptocheilus van Hasselt, 1823: 132 (nomen nudum).
Dangila leptocheila Valenciennes, in Cuvier & Valenciennes, 1842: 234 (type locality Batavia).
Dangila kuhlii Valenciennes, in Cuvier & Valenciennes, 1842: 231 (type locality Java; holotype should be in MNHN but is missing).
Dangila cuvieri Valenciennes, in Cuvier & Valenciennes, 1842: 230, pl. 470 (type locality supposedly Java; holotype reportedly purchased in Holland by Cuvier).
?*Cyrene philippina* Heckel, 1843: 1025 (type locality Philippines, almost certainly erroneous; holotype in Vienna not seen).
Dangila berdmorei Blyth, 1861: 162 (type locality, Tenasserim province, Burma [= Sitang River ?]; location of type material unknown).
Dangila sumatrana Bleeker, 1852: 596 (type locality Solok, Sumatrae occidentalis, in fluviis).
Dangila lineata Sauvage, 1878: 237 (type locality rapides de Stung-Strang, Laos); Sauvage, 1881:175, pl. 6, fig. 1 (syntype).
Dangila burmanica Day, 1878: 546, pl. 131, fig. 2 (type locality Moulmein and Tavoy [Tenasserim province, southeast Burma]).
Dangila rosea Popta, 1904: 193 (type locality le Bo, Mahakam basin).
Labiobarbus sumatranus - Smith, 1945: 223 (Thailand).
Labiobarbus burmanicus - Smith, 1945: 222 (Patani River); Sidthimunka, 1970: 12, fig. 50 (Mekong at Pa Mong).
Labiobarbus kuhlii - Smith, 1945: 228 (Chao Phraya basin); Sidthimunka, 1970: 12 (no fig.; Mekong at Pa Mong).
Labiobarbus leptocheilus - Smith, 1945: 227 (Thailand); Sidthimunka, 1970: 12, fig. 53 (Mekong at Pa Mong).
Labiobarbus lineatus - Smith, 1945: 223 (Thailand); Sidthimunka, 1970: 12, fig. 51 (Mekong at Pa Mong).

Material examined. - TYPE SPECIMENS: MNHN 3851, 84.9 mm, "Java", purchased by Cuvier in Holland (in 1824?) (holotype *D. cuvieri*). — BMNH 1866.5.2.220, 141 mm, Bleeker collection, labelled "*Dangila sumatrana* Type"; caudal fin broken off at about proximal third; probably holotype *D. sumatrana* (Bleeker's speciminis unici 185"'), in very poor condition. — MNHN 9544, 3:112-124 mm, Stung-Strang, Laos, Jullien (syntypes *D. lineata*). — RMNH 7569, 2:171-174 mm, Bo, Central Borneo, 5.viii.1900, A. W. van Nieuwenhuis (syntypes D. *rosea*).

BURMA: MSNG 17375, 116 mm, Meetan (Salween basin), coll. L. Fea (orig. det. *D. burmanica* by Vinciguerra). — MNHN 1992.1046, 9:75.3-139 mm, Tenasserim River, coll. T. R. Roberts, 12.iii.1992.

THAILAND: CAS 79156, 3:57.1-72.8 mm, Menam Kok near Tha Ton, Mekong basin, coll. T. R. Roberts, 15.v.1990. — CAS 79157, 133 mm, Mekong River at Bung Kan, coll. T. R. Roberts, 3.i.1989. — CAS 79166, 9:97.8-122 mm, Ubol Ratchatani market, coll. T. R. Roberts, 15.xii.1990. — CAS 79164, 4:50.6-59.0 mm, Yasothon market (Menam Chi, Mekong basin), coll. T. R. Roberts, 13.iii.1991. — CAS 79165, 72.7 mm, dammed backwater of Menam Chi at Maha Chana Chai Agricultural College, coll. T. R. Roberts, 14.iii.1991. — CAS 79158, 75.2 mm, Klong Waeh Kamong, 9 km N of Kabinburi, Bangpakong basin, coll. T. R. Roberts, 22.iii.1989. — CAS 79159, 77.4 mm, open channel in large swamp 9 km SSW of Prachinburi, Bangpakong basin, coll. T. R. Roberts, 1-2.xii.1990. — KUMF 416, 105 mm, Nan River, coll. H. M. Smith, 18.xi.1923 (orig. det. *D. kuhlii* by Smith). — KUMF 418, 167 mm, Klong Koh Nang Leirng (spelling?), Ban Pahan near Ayuthia, coll. H. M. Smith, 9.xii.1923 (orig. det. *D. leptocheila* by Smith). — KUMF 423, 2:148-149 mm, Chao Phraya at Nontaburi, coll. H. M. Smith, 24.xii.1925, (orig. det. *D. leptocheila* by Smith). — KUMF 424, 122 mm, Chao Phraya at Nontaburi, coll. 28.xii.1928 (orig. det. *D. leptocheila* by Smith). — KUMF 420, 188 mm, Klong Bang, E of Bangkok, coll. H. M. Smith, 16.ii.1924, (orig. det. *D. leptocheila* by Smith). — KUMF 421, 157 mm, Meklong at Ban Pong, coll. H. M. Smith, 17.xi.1924 (orig. det. *D. leptocheila* by Smith). — CAS 79160, 2:85.0-101 mm, Huay Sangkalia 7 km N of Sangklaburi on road to Chedi Sam Ong, Meklong basin, coll. T. R. Roberts, 11.ii.1989. — CAS 79161, 92.5 mm, Huay Mai Ti, Huai Kha Khaeng Wildlife Sanctuary, Meklong ba-

sin, coll. T. R. Roberts, 20.i.1990. — CAS 79167, 2:97.9-140 mm, Huay Kha Khaeng at Greung Grai, Huay Kha Khaeng Wildlife Sanctuary, Meklong basin, coll. T. R. Roberts, 21.i.1991. — KUMF 427, 168 mm, Kang Kra-Jan, Yarng Yong, Petchaburi, coll. H. M. Smith, 17.ii.1937 (orig. det. *D. leptocheila* by Smith). — KUMF 430, 121 mm, Klong Chawang, coll. R. Havmoller, ii.1929 (orig. det. *D. sumatrana* by Smith). — KUMF 425, 162 mm, Nakon Sritamarat market, coll. H. M. Smith, 4.vii.1928 (orig. det. *D. leptocheila* by Smith). — KUMF 426, 149 mm, Nakorn Sritamarat at Klong Tadi, coll. H. M. Smith, 17.vii.1928 (orig. det. *D. leptocheila* by Smith). — KUMF 428, 2:119-132 mm, Tapi River, Bandon, coll. H. M. Smith, 30.ix.1923 (orig. det. *D. lineata* by Smith). — CAS 79162, 66.0 mm, Klong Sok on highway 410 5 km W of Phanom, Tapi basin, coll. T. R. Roberts, 27.ii.1989. — CAS 79163, 2:62.6-67.6 mm, Menam Phumduong 25 km W of Phumphin, Tapi basin, coll. T. R. Roberts, 24.ii.1989. — KUMF 414, 108 mm, Patani River at Patani, coll. H. M. Smith, 15.x.1923 (orig. det. *D. lineata* by Smith). — BMNH 1903.4.13.166, 154 mm, southern Thailand, mouth of Pattani River, coll. Annandale & Robinson. — KUMF 415, 2:70-74 mm, Yala, Patani, coll. H. M. Smith, 30.i.1931 (orig. det. *D. kuhlii* by Smith).

INDO-CHINA: MNHN 8584, 8:97.4-124 mm, Cochinchine, Jullien, 1874. — MNHN 1935.330, 140 mm, Tram de Ea Hleo, Annam, coll. Chevey.

PENINSULAR MALAYSIA: UMKL 119, 10:63.8-88 mm, Kelantan, Sungai Kelantan, Pasir Mas, coll. M. Zakaria-Ismail, 3.vii.1984. — UMKL 75, 9:106-190 mm, Kelantan, Sungai Galas near Kg. Lulut (Kelantan basin), coll. M. Zakaria-Ismail, 30.viii.1975. — UMKL 69, 22:65-135 mm, Kelantan, Sungai Kelantan, Kg. Banggol, coll. M. Zakaria-Ismail, 10.v.1984. — UMKL 70, 2:81-105 mm, Kelantan, Sungai Kelantan near Kuala Besar (coastal stream), coll. M. Zakaria-Ismail, 5.vii.1984. — UMKL 739, 2:106-108 mm, Selangor, Sungai Teris, Bukit Rengit, coll. M. Zakaria-Ismail, x.1987. — UMKL uncat., 19:51.3-64.8 mm, Pahang, Sungai Keratong, Rompin basin, coll. M. Zakaria-Ismail, 23.v.1992. — ZRC 16741-50, 10:69.9-81.0 mm, Terengganu, Kuala Brang, coll. E. R. Alfred, 3.viii.1966. — UMKL 87, 89 mm, Pahang, Tasek Bera, 4.x.1971. — ZRC 11953-84, 32, Pahang, Tasek Berah, coll. J. I. Furtado, 1967. — ZRC 1849, 2:147-183 mm, Bukit Merah, Perak, Kurau basin, Fisheries Dept. 18.vii.1925 (orig. det. *D. cuvieri* by de Beaufort). — ZRC 8875, 210 mm, Perak, Sauk (Perak basin), coll. viii.1938. — ZRC 8772-77, 6:143-172 mm, Perak, Lake Chenderoh, coll. 1967. — ZRC 15070, 140 mm, Selangor, Bernam basin, north Selangor peat swamps, coll. P. Ng *et al.*, 19.vi.1991. — ZRC 15075, 30.5 mm, Selangor, north Selangor peat swamp, coll. P. Ng, 18.vi.1991. — ZRC 15076, 101 mm, Selangor, north Selangor peat swamp, Sungai Tengeh (Bernam basin), coll. P. Ng, vi.1991. — UMKL 2055, 12:66.7-114 mm, and UMKL 2074, 2:85-145 mm, Perak, Sungai Bernam near Kg. Kuala Slim (Bernam basin), coll. M. Zakaria-Ismail, 2.v.1992. — ZRC 7898-902, 5:78.8-91.2 mm, Negri Sembilan, Sungai Pilah, coll. E. R. Alfred, no date. — ZRC 2644, 128 mm, Johor, Dunlop Pump House pond, Batu Anam, coll. G. Tay, no date. — ZRC 7810-14, 5:114-201 mm, Johor, Sungai Skudai, coll. C. F. Lim, 10.ix.1970.

SUMATRA: MZB 4700, 8:120-143 mm, Sumatera Barat, Padang, Batang Sumpur (Sumpur Kampung Beringin), coll. I. Rachmatika, 30.ix.1982. — MZB 4230, 4:72-94 mm, Lubuk Lampan, S. Lempuing, Aki, Ogun Komering Hillir, coll. D. I. Hartoto, 8.x.1981. — MZB 4270, 86 mm, Lubak Lampan, Kec. Kayu Agung, coll. D. I. Hartoto, 2.x.1981. — MZB 4257, 2:84-104 mm, Sumatra Selatan, Lubuk Lampam, Kecamatan Kayu Agung, Sungai Ogan Komering Hillir, coll. D. I. Hartoto, 26.ix.1981. — MZB 2147, 2:59-63 mm, Lampung Way, Sekampung, coll. Soetikno, 16.vi.1976. — MZB 1829, 4:86-112 mm, Lampung, SW Sekampung, Bawang Palas, Sukarajatiga, coll. F. Sabar, 8.xi.1974. — MZB 2334, 2:106-113 mm, Jambi, Palembang, coll. Z. Arifin, 27.ii.1976. — ZMA 115.915, 133 mm, Kurintji, Air Penatai, coll. E. Jacobson, vii.1915. — ZMA 116.080, 10:32.8-37.3 mm, Indragiri basin, Djambi [specimens presumably collected at Djambi and/or in Indragiri basin], coll. P. H. Moolenburgh, 1909-10.

BORNEO: MNHN 1982.656, 78.8 mm, Kapuas mainstream 53 km W of Putussibau, coll. T. R. Roberts, 6-7.viii.1976 (orig. det. *D. lineata*). — USNM 230170, 2:70.0-78.5 mm, Kapuas mainstream 53 km W of Putussibau, coll. T. R. Roberts, 6.viii.1976, (orig. det. *D. lineata*). — MZB 5460, 90 mm, Kapuas basin, Nanga Era, Putussibau, coll. D. I. Hartoto, 26.iv.1983. — RMNH 7674, 158 mm, outlet of Sungai Raouen, Kapuas basin, coll. J. Büttikofer, 1894. — RMNH 7567, 133 mm, Boelit, coll. A. W. Nieuwenhuis, vii.1898. — MZB 4576, 2:86-96 mm, Sungai Mahakam, coll. Dulhaer, 21.i.1982. — MZB 2449, 113 mm, Lempake, S. Kapur [Mahakam basin?], coll. J. Supriarta 29.iii.1978. — AMNH 9479, 71.3 mm, Mendalam River, coll. H. A. Lorentz.

JAVA: RMNH 17617, 9:74.0-146 mm, rivier van West Java, coll. P. Buitendijk, iii.1925-v.1928. — RMNH 17616, 14:89.0-115 mm, rivier bei Buitenzorg, Mei 1922, coll. P. Buitendijk, viii.1928. — RMNH 17618, 76.0 mm, rivier Tjiliwong, Batavia, coll. P. Buitendijk, vi.1924. — RMNH 17620, 2:85.1-103 mm, Batavia, P. Buitendijk, vi.1926. — RMNH 17619, 83.6 mm, rivier bij Priok, coll. P. Buitendijk, iii.1913. — MZB 4613, 3:79-89 mm, Sungai Campur darat Tulungagung, Jawa Timur, coll. Sulastri, 10.viii.1982. — MZB 36, 83 mm, Sitoekemodjang bij Tjkampek, coll. 9.vii.1907.

Diagnosis. - Scales in lateral series 33-44; circumpeduncular scales 16-20. Body with evenly pronounced longitudinal stripes (contrast with *L. fasciatus*) formed by a spot on each scale. Dorsal and caudal fins without marginal or submarginal stripes. Vertebrae 22-24+11-13=34-36.

Intensity and number of longitudinal stripes on body highly variable. In part this depends on water quality: specimens from very muddy water tend to have very faintly developed stripes, those from the clearest and more darkly tinted waters the most intense and most numerous stripes. Thus this character probably cannot be used for distinguishing any of the nominal species listed in the synonymy.

Humeral and midpeduncular spots may be present or absent. When present the humeral spot usually consists of several irregular vertical bars on three or more scales just above and behind the pectoral fin base. The marks frequently come in contact to form larger marks, often resembling a partially or nearly complete ring, and perhaps occasionally a perfect ring. Some specimens have a large but faint midpeduncular spot. The humeral and peduncular spots of *L. leptocheilus* are never ocellated.

Remarks. - Having examined all known museum specimens of *Labiobarbus* from Java, I conclude there is only a single species there. Of the three nominal species described from Java by Valenciennes, only the type specimen of *D. cuvieri* is extant. The type specimen of *D. kuhlii*, which should be in Paris, is lost, and *D. leptocheila* was based only on a drawing. There is nothing in Valenciennes's descriptions to encourage a belief in more than one species. The holotype of *D. cuvieri* is now discolored, but the characteristic body stripes can still be seen; the figure published by Valenciennes shows the stripes (actually longitudinal rows of spots on the linear series of scales) very well.

As first reviser, I select *D. leptocheila* as having priority over *D. cuvieri* and *D. kuhlii*.

In order to eliminate any further possible confusion about the number of validly described species from Java and their identification, I have been tempted to designate MNHN 3851, holotype of D. cuv*ieri*, as neotype for *D. kuhlii* and *D. leptocheilus*. I have refrained from doing this, however, because of the possibility that the holotype of *D. cuvieri* may not have orignated in Java. There seems to be less to be gained from designating some other specimen as neotype for the two nominal species.

Day (1878: 546-7) reported two species of *Dangila* from Tenasserim province of southeast Burma, his new species *D. burmanica* and *D. berdmorei* Blyth, 1861. Although he did not expressly compare the two or directly point out their differences, he reported *D. burmanica* as having 39-40 scales in lateral series and color silvery, some scales with dark spots forming rows or horizontal bands, and *D. berdmorei* as having only 31 scales and color uniform in spirit. In the original description of *D. berdmorei*, however, Blyth reported 36 scales in lateral series and longitudinal stripes. As with most of the fish species described by Blyth, there is no figure accompanying the original description of *L. berdmorei* and the location of the type material is unknown. It apparently is not in the BMNH. Guha & Talwar (1983: 18-19) indicate that at least

some of the types from Blyth's 1861 paper are in the collections of the Zoological Survey of India, Calcutta, but do not specifically mention *L. berdmorei*. Day's figure of *D. burmanica* shows the characteristic color pattern of *L. leptocheilus*: no humeral or peduncular spots; spots on scales forming longitudinal stripes.

Distribution. - *Labiobarbus leptocheilus* has a large and nearly continuous range in mainland and insular Southeast Asia. It occurs in the lower Salween, Tavoy, Tenasserim, and perhaps also Sitang river basins of southeast Burma, throughout Thailand, the Mekong basin of Laos, Cambodia, and Vietnam, the length of the Malay peninsula, and much of Sumatra, Borneo, and Java. In Borneo it has been reported from western, northern, and eastern river basins including Kapuas, Rejang, Kinabatangan, and Mahakam. It has not been found in any of the southern drainages of Borneo (such as the Barito and Mentaya).

Labiobarbus fasciatus (Bleeker, 1853)

(Fig. 4)

Dangila fasciata Bleeker, 1853: 297 (type locality Pangabuang, Lampong province; holotype Bleeker's speciminis unici 232'").
Dangila taeniata Günther, 1868: 38 (unwarranted replacement name).
Dangila koedjem Popta, 1904: 192 (type locality le Boelit).

Material examined. - TYPE SPECIMENS: RMNH 4967, 184 mm, holotype *D. fasciata*? (specimen in very poor condition, nearly all scales missing, color pattern entirely gone; dorsal fin rays 32; vertebrae 23+11=34; if this is holotype, locality is Pangabuang, Sumatra). — BMNH 1866.5.2.79, 175 mm (233 mm TL), Bleeker collection, in somewhat better condition than RMNH 4967, so that color pattern on scale rows can be seen; midlateral stripe is bold, nearly continuous, stripes immediately above and below it faint posteriorly; this is probably Bleeker's non-type specimen from Pontianak. — RMNH 7566, 118 mm, Boelit, A. W. van Nieuwenhuis, vii.1894 (holotype *D. koedjem*; longitudinal stripe on lateral line scale row very dark, stripes on scale rows immediately above and below lateral line faint posteriorly; caudal fin lobes with faint marginal stripe; scales in lateral series about 49; vertebrae 23+11=34).

MALAY PENINSULA: BMNH 1922.5.19.68, 180 mm, Pahang, Tahan River, coll. B. Kloss.

SUMATRA: ZMA 115.918, 6:77.2-91.3 mm, Djambi, Sumatra, coll. P. H. Moolenburgh, 1909-10 (scales in lateral series 50-52; dorsal fin rays 31-33). — AMNH 9484, 93.8 mm, Djambi, coll. P. H. Moolenburgh. — ZMA 120.686, 2:139-141 mm, Taloek, Sumatra, coll. J. P. Kleiwig de Zwaan, 1907.

BORNEO: USNM 230169, 2:68.0-77.1 mm, Sungai Tekam, Kapuas basin, coll. T. R. Roberts. — BMNH 1992.11.13.1, 141 mm, Barito basin, coll. D. Siebert, vii.1992. — BMNH 1992.11.13.2-4, 3:68.3-127 mm, tributary of Sungai Maruwei, Barito basin, coll. D. Siebert, 15.vii.1992.

Diagnosis. - Scales in lateral series 48-54; longitudinal stripes on scale rows nearly continuous, rather than composed of spots or coalesced spots; stripe on lateral line more strongly developed than others, stripes on scale rows immediately above and below lateral line faint or absent, especially on posterior half of body; caudal fin pale red with faint or dusky submarginal stripes (colors less bold and reversed in position compared to *L. festivus*); dorsal fin rays 30-34; vertebrae 22-23+11-12=33-34.

Distribution. - Southern Malay Peninsula (Pahang basin); Sumatra; Borneo (Kapuas, Barito, Mahakam).

Labiobarbus festivus (Heckel, 1843)

(Fig. 5)

Cyrene festiva Heckel, 1843: 1025 (type locality Borneo)
Dangila festiva Bleeker, 1857: 16 (Kahajan)
Dangila festiva var. *stercusmuscarum* Vaillant, 1902: 87 (type locality "Pontianak"; "Smitau, rivière Sibau" [= Kapuas basin].

Material examined. - MALAY PENINSULA: ZRC 1952, 135 mm, Tasek Bera, Pahang, coll. P. Y. Berry, 1.ii.1961. — ZRC 11953-84, 32:76.5-170 mm, Tasek Bera, Pahang, coll. J. I. Furtado, 1967. — UMKL 61, 2:81-146 mm, Tasek Bera, Pahang, coll. LKS, 3.xii.1971. — UMKL 63, 2:126-161 mm, Fort Iskandar, Tasek Bera, Pahang, coll. J. I. Furtado, 19.x.1968. — UMKL 66, 33/66.1-115 mm, Tasek Bera, Pahang, coll. 1973. — UMKL 86, 9:64.3-81.5 mm and UMKL 88, 10:51.5-69.1 mm, Tasek Bera, Pahang, coll. AWK, 15.v.1973. — UMKL 118, 3:96-105 mm, Pos Iskandar, Tasek Bera, Pahang, coll. 20.ii.1982. — ZRC 8229, 154 mm, Sungai Kinchin, Pahang, Endau-Rompin basin, coll. Endau-Rompin Expedition, 16.vi.1989. — ZRC 8692-95, 4:152-191 mm, Rompin, Sungai Kinchin, Pahang, Endau-Rompin basin, coll. Endau-Rompin Expedition, 19.vii.1989.

BORNEO: MNHN 1992.1045, 109 mm, Danau Sembuluh at Bangkal, Sungai Seruyan basin, Kalimantan Tengah, coll. T. R. Roberts, 13.vi.1992.

Diagnosis. - *Labiobarbus festivus* has more colorful and intense coloration than other species of the genus. Thus the dorsal fin has a well defined black marginal stripe and a broad red submarginal stripe, and black spots at the base of the fin rays, while the caudal is black with broad red marginal stripes. The dark longitudinal stripes on the body are basically similar to those of *L. leptocheilus*, but are invariably well defined and relatively intense. There may be some variation in intensity with water quality, but *L. festivus* is seldom or never found in extremely or even slightly muddy water, but rather in clear to black waters. In specimens from black waters stripes are very intense and extend to all scale rows on side of body below lateral line. Humeral and peduncular spots absent. Vertebrae 22+11=33(1) (Danau Sembuluh).

Distribution. - Southern Malay peninsula (Pahang, Selangor, Endau-Rompin, Johore) and Borneo (Kapuas, Seruyan, Kahajan, Barito).

Labiobarbus ocellatus (Heckel, 1843)

(Fig. 6)

Cyrene ocellata Heckel, 1843: 1025 (type locality Borneo).
Dangila microlepis Bleeker, 1852: 592 (type locality Palembang) (see Bleeker, 1860: 195).
Dangila ocellata - Bleeker, 1860: 194.

Material examined. - MALAY PENINSULA: ZRC 8016-28, 13:141-155 mm, L. Chini, Pahang, coll. K. Hutton, 18.iv.1966.

BORNEO: MNHN 1992.1047, 4:46.5-96.4 mm, Danau Sembuluh at Bangkal, Sungai Seruyan basin, Kalimantan Tengah, coll. T. R. Roberts, 13.vi.1992.

SUMATRA: RMNH 6987, 142 mm Palembang, Sumatra (holotype *D. microlepis*; dorsal fin rays 31; scales in lateral series about 64). — AMNH 9503, 112 mm, Djambi, Batang Hari, coll. P. H. Moolenburgh, 26.iv.1909.

Diagnosis. - *Labiobarbus ocellatus* is distinguished very readily from all of its congeners by having much smaller scales (61-68 vs. only 30-54 scales in lateral series) and body without any longitudinal stripes whatever. A small but well defined, round, black humeral spot (often ocellated, i.e. surrounded by a pale or clear ring) and a similar midpeduncular spot. Vertebrae fewer than observed in other species of *Labiobarbus*, 22+10=32(4) (specimens from Danau Sembuluh).

Distribution. - Malay peninsula (Pahang), Sumatra (Pangabuang, Palembang, Lahat, Lematang Enim, Gunung Sahilan, Sungei Mahe, Danau Sialong Lotong, Kwantan, Indragiri, Djambi), Borneo (Kapuas, Seruyan, Mahakam, Kahajan). Sumatran records from Weber & de Beaufort (1916:114).

Labiobarbus siamensis (Sauvage, 1881)

Dangila siamensis Sauvage, 1881: 162, 176 (type locality Pexabury, Siam).
Dangila spilopleura Smith, 1934: 307, pl. 10 (type locality Chao Phrya at Hangraben, Tachin River, and Nakon Nayok River).
Labiobarbus spilopleura - Smith, 1945: 224, fig. 40; Sidthimunka, 1970:12, fig. 52 (Mekong at Pa Mong).

Material examined. - THAILAND: MNHN 1872, 2:126-128 mm, Pexabury [= modern Petchaburi], Siam, 1862, coll. Boucourt (syntypes *D. siamensis*). — MNHN A.5082, 2:122-124 mm, Siam, coll. Harmand, 1882 (orig. identified *D. siamensis*). — MNHN 1937.13, 4:120-152 mm, Angkor, coll. Delacour & Lowe. — KUMF 429, 69 mm, Tachin River (Klong Don Lao), coll. H. M. Smith, 16.ix.1927 (paratype *D. spilopleura*). — KUMF 2602, 121 mm, Ayudthaya, coll. Pornchai, 25.vi.1974. — KUMF 2681, 111 mm, Doi Tao, Tak, coll. Saman, 5.ii.1974. — KUMF 2659, 162 mm, Saraburi, coll. Somchat, 2.i.1974.

Notes on holotype. - The holotype was indicated by Smith, 1934:308 as follows: "the type is a female, 12 cm. long, with well developed ovaries, taken at Hangraben, off the Menam Chao Phra, north of Ayuthia, Central Siam, December 11, 1924." The specimen presumably was deposited originally in the "Siamese Department of Fisheries" along with seven paratypes specifically mentioned by Smith. The current location of the holotype is unknown; it was not found by me in KUMF or USNM. The figure by Luang Masya presumably is based on the holotype, but this is not certain.

Diagnosis. - Similar to *L. leptocheilus*, but distinguished by a shorter head, longer barbels, slightly smaller or more numerous scales, and more vertebrae. The perfect circular or ring-shaped humeral spot supposedly characteristic of *L. spilopleura* (Smith, 1934; 1945) is diagnostic when present, (e.g., type specimen figured by Luang Masya), but is absent or poorly developed in most specimens (e.g., specimen figured by Sidthimunka). Spots on individual scales smaller than in *L. leptocheilus* or *L. festivus*. Maxillary barbel very long, extending posteriorly to a point well past hind border of eye. Total gill rakers on first gill arch in four specimens from Angkor about 41-46. Scales in lateral series 39-42 (44 reported by Smith, 1934; 1945); in transverse series 8/1/5; circumpeduncular 20-23. Dorsal fin rays 30. Vertebrae more numerous than in any other species of *Labiobarbus*, 24-26+13-15=38(2), 39(5), 40(1).

Distribution. - *Labiobarbus siamensis* is known from the Chao Phraya, Bankpakong, and Mekong basins of Thailand, Laos, and Cambodia.

Labiobarbus sabanus (Inger & Chin, 1962)

Dangila sabana Inger & Chin, 1962: 94, fig. 44 (type locality Kinabatangan and Segama drainages, Sabah).

Material examined. - FMNH 44779, 10:86.8-175 mm, Sabah, Kinabatangan River, Lake Bukit Garam, coll. J. Allan Tubb, 18.vi.1949 (paratypes).

Diagnosis. - *Labiobarbus sabanus* is distinguished from all other species of *Labiobarbus* by having only 18-22 branched dorsal fin rays (vs. 22 or more), a very thick head and body, and a very steep dorsal profile, concave at the nape. Maxillary barbel very long, extending posteriorly well beyond eye. Lateral line scales 30-36, circumpeduncular 16 (after Inger & Chin, 1962). Vertebrae 23+12-13=35(9), 36(1).

Labiobarbus sabanus is generally similar to *L. leptocheilus*, but direct comparisons of *L. sabanus* with *L. leptocheilus* from Java, Thailand, and Borneo reveals substantial differences in shape and thickness of the head and body. On first examining specimens of *L. sabanus* I was struck by their superficial resemblance to some of the stout-bodied Asian species of *Labeo*. The head and interorbital space are easily one and a half times broader than in other species of *Labiobarbus*.

In its original description *Dangila sabana* was distinguished from *D. lineata* and other species of *Dangila* by low dorsal fin ray (iv,18-22) and lateral line scale (30-36) counts (Inger & Chin, 1962: 94). The diagnosis mentioned "young individuals with longitudinal dark stripes formed by black-tipped scales above the lateral line; a large precaudal spot"; such coloration is characteristic of *L. leptocheilus*. *Dangila sabana* also was said to differ from *D. lineata* generally in having "regularly three longitudinal dark stripes instead of none or occasionally only one or two below the lateral line", but this condition frequently is observed in *L. leptocheilus*.

Distribution. - *Labiobarbus sabanus* is known only from the type locality, the Kinabatangan and Segama river basins in Sabah, northeastern Borneo.

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ADDENDUM

When this study was virtually completed, I briefly examined two lots of recently collected *Labiobarbus* that were difficult to identify.

Labiobarbus cf. *leptocheilus* from Sarawak

Material examined. - BORNEO, SARAWAK: USNM 323737, 94.0 mm, Baleh R., coll. L. Parenti, 24.vii.1991. — USNM 323730, 190 mm, and USNM 323732, 114 mm, Batang Balui, coll. L. Parenti, 5.viii.1991. — USNM 323731, 2:168-180 mm, Batang Besua, where it flows into Batong Balui, coll. L. Parenti, 5.viii.1991. — USNM 323735, 58.7 mm, Rajang at Kapit, coll. L. Parenti, 26.vii.1919.

Remarks. - Samples from the Rejang basin in Sarawak are perhaps most similar to *L. leptocheilus*, but differ in having somewhat more scales in the lateral series (41-46) and faint submarginal stripes on the caudal fin lobes. They might represent an as yet undescribed species.

Intergrades of *Labiobarbus leptocheilus* and *L. festivus* from the Malay peninsula

During a visit to the Department of Zoology of the University of Malaysia at Kuala Lumpur in June 1992, I saw some very fresh samples of *Labiobarbus* that had just been collected in Sungai Keratong in the Endau-Rompin basin (southern Malay peninsula). The Endau-Rompin is inhabited by two species of *Labiobarbus*, *L. leptocheilus* and *L. festivus*, and the samples from Sungai Keratong appear to be composed largely of intergrades of these species.

Allopatric samples of *L. festivus* and *L. leptocheilus* are distinguished by marked differences in the pigment cells and their distribution in the dorsal and caudal fins. Thus in at least some populations, *L. leptocheilus* has melanophores only (no red chromatophores) in the dorsal fin, and they tend to be concentrated in the middle portion of the interradial membranes (thus producing a longitudinal dusky stripe in the middle of the dorsal fin). *Labiobarbus festivus* on the other hand, has melanophores and red chromatophores in the dorsal fin. The red

chromatophores occupy the middle portion of the interradial membranes, while the melanophores occur exclusively at the base of the fin and along its distal margin. Hence the dorsal fin has a black marginal stripe and a red median stripe, and black marks along its base. I have not observed enough fresh samples of *L. leptocheilus* to be sure it does not sometimes have red in the dorsal fin, but certainly it never has a well marked black marginal stripe or red median stripe.

In some Sungai Keratong samples, including UMKL uncat. 2:116-126 mm, Sungai Jekateh (tributary of Sungai Keratong), on the way to Kampong Chenderak Geh, collected 28 May 1992 by Mohd. Zakaria-Ismail, nearly all of the specimens have dorsal fin with both melanophores and red chromatophores. In a 126 mm specimen the dorsal fin seems to have no or almost no black marginal stripe, and an exceptionally broad red median stripe. Closer examination reveals that the red median stripe is composed of large red chromatophores and much smaller melanophores, with the red chromatophores occupying the areas adjacent to the fin rays. In several other specimens from the Sungai Keratong the red chromatophores and melanophores are dispersed randomly everywhere in the interradial dorsal fin membranes, a condition not observed in other material of *Labiobarbus*.

These specimens with unusual coloration in their dorsal fins cannot be readily identified with one of the three (usually readily distinguishable) species of *Labiobarbus* known from the Malay peninsula. They may be the result of hybridization between *L. festivus* and *L. leptocheilus*.